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MDCCCLXXIX.

ANATOMICAL BRITANNICA

OF A

DICTIONARY

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ON A PLAN NEW

AND IMPROVED

BY THE REV. JOHN HENRY

AND JOHN HENRY

IN TWO VOLUMES

THE FIRST, THEORY AND PRACTICE OF

THE SECOND, THE HISTORY AND

OF THE

VOLUME THE FIRST OF KNOWLEDGE



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Dictionary of Arts, Sciences, &c.

D.

D
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Dacca.**D**, THE fourth letter of the alphabet, and the third consonant.

Grammarians generally reckon D among the lingual letters, as supposing the tongue to have the principal share in the pronunciation thereof; though the Abbot de Dangeau seems to have reason in making it a palate letter. The letter D is the fourth in the Hebrew, Chaldee, Samaritan, Syriac, Greek, and Latin alphabets; in the five first of which languages it has the same name, though somewhat differently spoke, *e. g.* in Hebrew and Chaldee *Daleth*, in Syriac *Doletb*, and in Greek *Delta*.

The form of our D is the same with that of the Latins, as appears from all the ancient medals and inscriptions; and the Latin D is no other than the Greek Δ, rounded a little, by making it quicker and at two strokes. The Δ of the Greeks, again, is borrowed from the ancient character of the Hebrew *Daleth*; which form it still retains, as is shewn by the Jesuit Souciet, in his Dissertation on the Samaritan Medals.

D is also a numeral letter, signifying *five hundred*; which arises hence, that, in the Gothic characters, the D is half the M, which signifies a *thousand*. Hence the verse,

Litera D velut A quingentos significabit.

A dash added a-top, *Ḍ*, denotes it to stand for five thousand.

Used as an abbreviation, it has various significations: thus, D stands for Doctor; as, M. D. for Doctor of Medicine; D. T. Doctor of Theology; D. D. implies Doctor of Divinity, or "dono dedit;" D. D. D. is used for "dat, dicat, dedicat;" and D. D. D. D. for "dignum Deo donum dedit."

DAB, in ichthyology, the English name of a species of *PLEURONECTES*.

DABUL, a town of Asia, in the East Indies, on the coast of Malabar, and to the south of the gulf of Cambaye, on a navigable river. It was formerly very flourishing, but is now much decayed. It belongs to the Portuguese, and its trade consists principally in pepper and salt. E. Long. 73. 55. N. Lat. 17. 30.

DACCA, a town of Asia, in the kingdom of Bengal in the East Indies, situated in E. Long. 89. 10. N. Lat. 24. 0.—The advantages of the situation of this place, and the fertility of the soil round it, have

long since made it the centre of an extensive commerce.

The courts of Delhi and Muxadav are furnished from thence with the cottons wanted for their own consumption. They each of them maintain an agent on the spot to superintend the manufacture of them; and he has an authority, independent of the magistrate, over the brokers, weavers, embroiderers, and all the workmen whose business has any relation to the object of his commission. These unhappy people are forbidden, under pecuniary and corporal penalties, to sell, to any person whatever, a piece exceeding the value of three guineas: nor can they, but by dint of money, relieve themselves from this oppression.

In this, as in all the other markets, the Europeans treat with the Moorish brokers settled upon the spot, and appointed by the government. They likewise lend their name to the individuals of their own nation, as well as to Indians and Armenians living in their settlements, who, without this precaution, would infallibly be plundered. The Moors themselves, in their private transactions, sometimes avail themselves of the same pretence, that they may pay only two, instead of five, *per cent*. A distinction is observed, in their contracts, between the cottons that are bespoke, and those which the weaver ventures, in some places, to manufacture on his own account. The length, the number of threads, and the price, of the former are fixed: nothing further than the commission for the latter is stipulated, because it is impossible to enter into the same detail. Those nations that make a point of having fine goods, take proper measures that they may be enabled to advance money to their workmen at the beginning of the year. The weavers, who in general have but little employment at that time, perform their work with less hurry than in the months of October, November, and December, when the demand is pressing.

Some of the cottons are delivered unbleached, and others half-bleached. It were to be wished that this custom might be altered. It is very common to see cottons, that look very beautiful, go off in the bleaching. Perhaps the manufacturers and brokers foresee how they will turn out; but the Europeans have not so exquisite a touch, nor such an experienced eye to discern this. It is a circumstance peculiar to India, that cottons, of what kind soever they are, can never be well

Dacca.

Dace
Dacier.

bleached and prepared, but in the place where they are manufactured. If they have the misfortune to get damaged before they are shipped for Europe, they must be sent back to the places from whence they came.

DACE, in ichthyology, a species of *CYPRINUS*.

This fish is extremely common in our rivers, and gives the expert angler great diversion. The dace will bite at any fly; but he is more than ordinarily fond of the stone caddis, or May-fly, which is plentiful in the latter end of April, and the whole month of May. Great quantities of these may be gathered among the reeds or sedges by the water-side; and on the hawthorn bushes near the waters. These are a large and handsome bait; but as they last only a small part of the year in season, recourse is to be had to the ant-fly. Of these the black ones found in large mole-hills or ant-hills, are the best. These may be kept alive a long time in a bottle, with a little of the earth of the hill, and some roots of grafs; and they are in season throughout the months of June, July, August, and September. The best season of all is when they swarm, which is in the end of July, or beginning of August; and they may be kept many months in a vessel washed out with a solution of honey in water, even longer than with the earth and grafs-roots in the vial; though that is the most convenient method with a small parcel taken for one day's fishing. In warm weather this fish very seldom refuses a fly at the top of the water; but at other times he must have the bait sunk to within three inches of the bottom. The winter fishing for dace requires a very different bait: this is a white maggot with a reddish head, which is the produce of the eggs of the beetle, and is turned up with the plough in great abundance. A parcel of these put in any vessel, with the earth they were taken in, will keep many months, and are an excellent bait. Small dace may be put into a glass jar with fresh water; and there preferred alive for a long time, if the water is properly changed. They have been observed to eat nothing but the animalcula of the water. They will grow very tame by degrees.

DACHAW, a town of Bavaria in Germany. It is pretty large, well built, and seated on a mountain, near the river Amber. Here the elector has a palace and fine gardens. E. Long. 11. 30. N. Lat. 48. 20.

DACIER (Andrew), born at Castrès in Upper Languedoc, 1651, had a great genius and inclination for learning, and studied at Saumur under Tannegui Le Fevre, then engaged in the instruction of his daughter, who proved afterwards an honour to her sex. This gave rise to that mutual tenderness which a marriage of 40 years could never weaken in them. The duke of Montausier hearing of his merit, put him in the list of commentators for the use of the dauphin, and engaged him in an edition of *Pompeius Festus*, which he published in 1681. His edition of Horace printed at Paris in 10 vols in 12mo. and his other works, raised him a great reputation. He was made a member of the academy of inscriptions in 1695. When the history of Lewis XIV. by medals was finished, he was chosen to present it to his majesty; who being informed of the pains which he had taken in it, settled upon him a pension of 2000 livres, and appointed him keeper of the books of the king's closet in the Louvre. When that post was united to that of library-keeper to the

Dacier
Daçtlyl.

king, he was not only continued in the privileges of his place during life, but the survivance was granted to his wife, a favour of which there had been no instance before. But the death of Madam Dacier in 1720, rendered this grant, which was so honourable to her, ineffectual. He died Sept. 18. 1722, of an ulcer in the throat. In his manners, sentiments, and the whole of his conduct, he was a complete model of that ancient philosophy of which he was so great an admirer, and which he improved by the rules and principles of Christianity.

DACIER (Anne), daughter of Tannegui le Fevre, professor of Greek at Saumur in France. She early shewed a fine genius, which her father cultivated with great care and satisfaction. After her father's death she went to Paris, whither her fame had already reached; she was then preparing an edition of Callimachus which she published in 1674. Having shewn some sheets of it to Mr Huet, preceptor to the dauphin, and to several other men of learning at the court, the work was so highly admired, that the duke of Montausier made a proposal to her of publishing several Latin authors for the use of the dauphin. She rejected this proposal at first, as a task to which she was not equal. But the duke insisted upon it; so that at last he gained her consent; upon which she undertook an edition of Florus, published in 1674. Her reputation being now spread over all Europe, Christina queen of Sweden ordered count Königsmark to make her a compliment in her name: upon which Mademoiselle le Fevre sent the queen a Latin letter, with her edition of Florus: to which her majesty wrote an obliging answer; and not long after sent her another letter, to persuade her to abandon the Protestant religion, and made her considerable offers to settle at her court. In 1683, she married Mr Dacier; and soon after declared her design to the duke of Montausier and the bishop of Meaux, of reconciling herself to the church of Rome, which she had entertained for some time: but as Mr Dacier was not yet convinced of the reasonableness of such a change, they retired to Castrès in 1684, where they had a small estate, in order to examine the points of controversy between the Protestants and the Roman Catholics. They at last determined in favour of the latter, and signed their public abjuration in 1685. After this, the king gave both husband and wife marks of his favour. In 1693, she applied herself to the education of her son and daughter, who made a prodigious progress: the son died in 1694, and the daughter became a nun in the abbey of Longchamp. She had another daughter, who had united in her all the virtues and accomplishments that could adorn the sex; but she died at 18. Her mother has immortalized her memory in the preface to her translation of the *Iliad*. Madam Dacier was in a very infirm state of health the two last years of her life; and died, after a very painful sickness, August 17. 1720, aged 69. She was remarkable for her firmness, generosity, equality of temper, and piety.

DACTYL, in poetry, a metrical foot, consisting of one long and two short syllables; as, *carmina, evident, excellence*.

The dactyl and spondee are the only feet used in hexameter verses. See *HEXAMETER*.

DACTYLI 1031; the *Fingers of Mount Ida*. Concerning these, Pagan theology and fable give very different

Dactylis different accounts. The Cretans paid divine worship to them, as those who had nursed and brought up the god Jupiter; whence it appears, that they were the same as the Corybantcs and Curetes. Nevertheless Strabo makes them different; and says, that the tradition in Phrygia was, that "Curetes and Corybantcs were descended from the Dactyli Idæi: that there were originally an hundred men in the island, who were called *Dactyli Idæi*; from whom sprang nine Curetes, and each of these nine produced ten men, as many as the fingers of a man's two hands; and that this gave the name to the ancestors of the *Dactyli Idæi*." He relates another opinion, which is, that there were but five *Dactyli Idæi*; who, according to Sophocles, were the inventors of iron: that these five brothers had five sisters, and that from this number they took the name of *fingers of mount Ida*, because they were in number ten; and that they worked at the foot of this mountain. Diodorus Siculus reports the matter a little differently. He says "the first inhabitants of the Island of Crete were the *Dactyli Idæi*, who had their residence on mount Ida: that some said, they were an hundred; others only five, in number equal to the fingers of a man's hand, whence they had the name of *Dactyli*: that they were magicians, and addicted to mystical ceremonies: that Orpheus was their disciple, and carried their mysteries into Greece: that the *Dactyli* invented the use of iron and fire, and that they had been recompensed with divine honours."

Diomedes the Grammarian says, The *Dactyli Idæi* were priests of the goddess Cybele: called *Idæi*, because that goddess was chiefly worshipped on mount Ida in Phrygia; and *Dactyli*, because that, to prevent Saturn from hearing the cries of infant Jupiter, whom Cybele had committed to their custody, they used to sing certain verses of their own invention, in the Dactylic measure. See CURETES and CORYBANTES.

DACTYLIS, COCK'S-FOOT GRASS; a genus of the digynia order, belonging to the triandria class of plants. There are two species, the cynosuroides or smooth cock's-foot grass, and the glomeratus or rough cock's-foot grass. Both are natives of Britain: the first grows in marshy places, and the latter is common in meadows and pasture-grounds. This last is eat by horses, sheep, and goats; but refused by cows.

DACTYLUS in zoology, a name given by Pliny to the PHOLAS.

DADUCHI, in antiquity, priests of the goddess Ceres, so called, because at the feasts and sacrifices of that goddess, they ran about the temple, carrying a lighted torch, which they delivered from hand to hand, till it had passed through them all. This they did in memory of Ceres's searching for her daughter Proserpine, by the light of a torch, which she kindled in mount Ætna.

DÆDALUS, an ingenious Athenian artist, who invented divers mechanical instruments, as the saw, &c. and made walking statues, with their eyes rolling as if alive. He threw his brother's son out of a window, for fear he should excel him in his art, because he had invented the potter's wheel: whereupon he fled into Crete to king Minos, and carried his son Icarus along with him. There he built the celebrated labyrinth; in which he and his son were shut up, because of his having served Pasiphaë the queen in her base amours: he,

however, made himself and his son wings, by which he escaped; but his son not observing his directions, fell into the sea and was drowned. He fled to Cocceus king of Egypt, who caused him to be choaked in a flove, to prevent Minos's making war against him on his account. He is said to have lived about the year 2600. He made many famous works at Memphis in Egypt, where the inhabitants paid him divine honours.

DÆMON, a name given by the ancients to certain spirits, or genii, which appeared to men, either to do them service, or to hurt them. The Platonists distinguish between gods, demons, and heroes. The gods are those whom Cicero calls *Dii majorum gentium*. The demons are those whom we call *angels*. Christians, by the word *dæmon*, understand only evil spirits, or devils.

DÆMONIAC, a word applied to a person supposed to be possessed with an evil spirit, or *DÆMON*.

DÆMONIACS, in church-history, a branch of the anabaptists; whose distinguishing tenet is, that the devils shall be saved at the end of the world.

DAFFY'S ELIXIR. See PHARMACY, n° 421.

DAGNO, a town of Turkey in Europe, in Albania, with a bishop's see. It is the capital of the district of Ducagini, and it is seated on the rivers Drino and Nero, near their confluence. It is 15 miles south-east of Scutari, and 15 north-east of Alessio. E. Long. 19. 48. N. Lat. 42. o.

DAGO, or **DAGHO**, an island in the Baltic Sea, on the coast of Livonia, between the gulph of Finland and Riga. It is of a triangular figure, and may be about 20 miles in circumference. It has nothing considerable but two castles, called *Daggerwort* and *Paden*. E. Long. 22. 30. N. Lat. 58. 48.

DAGON, the false god of Ahhdod *, or, as the Greeks call it, *Azotus*. He is commonly represented as a monster, half man and half fish: whence most learned men derive his name from the Hebrew *dag*, which signifies a *fish*. Those, who make him to have been the inventor of *bread-corn*, derive his name from the Hebrew *Dagan*, which signifies *frumentum*; whence Philo Biblius calls him *Ζεύς Ἀγρίων*, *Jupiter Atratrius*.

This deity continued to have a temple at Ahhdod, during all the ages of idolatry, to the time of the Maccabees. For the author of the first book of Maccabees tells us, that "Jonathan, one of the Maccabees, having beaten the army of Apollonius, Demetrius's general, they fled to Azotus, and entered into Bethdagon (the temple of their idol); but that Jonathan set fire to Azotus, and burnt the temple of Dagon, and all those who were fled into it.

DAGON, according to some, was the same with Jupiter, according to others Saturn, according to others Venus, and according to most Neptune.

DAHGESTAN, a country of Asia, bounded by Circassia on the north, by the Caspian sea on the east, by Chirvein a province of Persia on the south, and by Georgia on the west. Its chief towns are Tarku and Derbent, both situated on the Caspian Sea.

DAHOMÉ, a kingdom of Africa, on the coast of Guinea, to the north of Whidah, or Fida. The king of this country conquered Whidah, and very much disturbed the slave-trade of the Europeans.

DAILLIE (John), a Protestant minister near Paris,

Dæmon
Dæilie.

* See 1 Sam.
chap. v.

Daisy
Dalea.

Dalkeith
Damasce-
nus.

ris, was one of the most learned divines of the 17th century, and was the most esteemed by the Catholics, of all the controversial writers among the Protestants. He was tutor to two of the grandsons of the illustrious Mr Du Pleffis Mornai. Mr Daille having lived 14 years with so excellent a master, travelled into Italy with his two pupils : one of them died abroad ; with the other he saw Italy, Switzerland, Germany, Flanders, Holland, and England, and returned in 1621. He was received minister in 1623, and first exercised his office in the family of Mr Du Pleffis Mornai ; but this did not last long, for that lord died soon after. The memoirs of this great man employed Mr Daille the following year. In 1625 he was appointed minister of the church of Saumur, and in 1626 removed to Paris. He served all the rest of his life in the service of this last church, and composed several works : his first piece was his master-piece, and an excellent work, *Of the Use of the Fathers*, printed 1631. It is a strong chain of reasoning, which forms a moral demonstration against those who would have religious disputes decided by the authority of the fathers. He died in 1670, aged 77.

DAISY. See BELLIS.

OX-EYE DAISY. See BUPHTHALMUM.

DALACA, an island of the Red Sea, over-against the coast of Abex, about 72 miles in length, and 15 in breadth. It is very fertile, populous, and remarkable for a pearl fishery. The inhabitants are negroes, and great enemies to the Mahometans. There is a town of the same name seated over-against Abassia.

DALEBURG, a town of Sweden, and capital of the province of Dalia, seated on the western bank of the lake Wener, 50 miles north of Gottenburg. E. Long. 13. o. N. Lat. 59. o.

DALECARLIA, a province of Sweden, so called from a river of the same name, on which it lies, near Norway. It is divided into three parts, which they call *valleys*; and is about 175 miles in length, and 100 in breadth. It is full of mountains, which abound in mines of copper and iron, some of which are of a prodigious depth. The towns are very small, and Idra is the capital. The inhabitants are rough, robust, and warlike ; and all the great revolutions in Sweden had their rise in this province. The river rises in the Dofrine mountains ; and, running south-east thro' the province, falls into the gulph of Bothnia.

DALECHAMP (James), a physician in Normandy, in the 16th century, wrote a history of plants, and was well skilled in polite learning. He wrote notes on Pliny's natural history, and translated Athenæus into Latin.

DALECHAMPIA, in botany ; a genus of the monadelphous order, belonging to the monœcia class of plants. There is but one species, viz. the scandens, a native of Jamaica. It is a climbing plant, which rises to a considerable height ; and is remarkable for nothing but having its leaves armed with bristly hairs, which sting the hands of those who unwarily touch them.

DALEM, a town of the United Provinces, and capital of a district of the same name. It was taken by the French in 1672, who demolished the fortifications. It is seated on the river Bervine, five miles north-east of Liege. E. Long. 5. 59. N. Lat. 50. 40.

DALEA, a province of Sweden, bounded on the

north by Dalecarlia, on the east by the Wermeland and the lake Wener, on the south by Gothland, and on the north by Norway and the sea.

DALKEITH, a town of Scotland, in Mid-Lothian, 6 miles south-east of Edinburgh. W. Long. 2. 20. N. Lat. 55. 50.

DALMATIA, a province of Europe ; bounded on the north by Bosnia, on the south by the gulph of Venice, on the east by Servia, and on the west by Morlachia. Spalatro is the capital of that part belonging to the Venetians ; and Ragusa, of a republic of that name : the Turks have a third, whose capital is Herzegovina. The air is wholesome, and the soil fruitful ; and it abounds in wine, corn, and oil.

DALTON, a town of Lancashire, in England. It is seated on the spring-head of a river, in a champaign country, not far from the sea ; and the ancient castle is made use of to keep the records, and prisoners for debt in the liberty of Furness. W. Long. 3. o. N. Lat. 54. 18.

DALTON (John), D. D. an eminent divine and poet, was the son of the rev. Mr John Dalton, rector of Deane, near Whitehaven in Cumberland, where he was born in 1709. He was educated at Queen's college, Oxford, and became tutor or governor to the lord Beauchamp, only son of the earl of Hertford, late duke of Somerset ; during which time he adapted Milton's admirable Masque of Comus to the stage, by a judicious insertion of several songs and different passages selected from other of Milton's works, as well as of several songs and other elegant additions of his own, suited to the characters and to the manner of the original author. During the run of this piece he industriously sought out a grand-daughter of Milton's, oppressed both by age and poverty ; and procured her a benefit from it, the profits of which amounted to a very considerable sum. He was promoted by the king to a prebend of Worcester ; where he died, on the 22^d of July 1763. Besides the above, he wrote a descriptive poem, addressed to two ladies at their return from viewing the coal-mines near Whitehaven ; and Remarks on 12 historical designs of Raphael, and the *Museum Græcum & Egyptiacum*.

DAMA, in zoology. See CERVUS.

DAMAGE, in law, is generally understood of a hurt or hindrance attending a person's estate : but, in common law, it is part of what the jurors are to inquire of in giving verdict for the plaintiff or defendant, in a civil action, whether real or personal ; for, after giving verdict on the principal cause, they are likewise asked their consciences, touching costs and damages, which contain the hindrances that one party hath suffered from the wrong done him by the other. See COSTS.

DAMAN, a maritime town of the East-Indies, at the entrance into the gulph of Cambay. It is divided by the river Daman into two parts ; one of which is called *New Daman*, and is a handsome town, well fortified, and defended by a good Portuguese garrison. The other is called *Old Daman*, and is very ill built. There is a harbour between the two towns, defended by a fort. It was taken by the Portuguese in 1535. The mogul has attempted to get possession of it several times, but always without effect. E. Long. 72. 35. N. Lat. 21. 5.

DAMASCENUS (John), an illustrious father of the

Damascus,
Damascus.

the church in the 8th century, born at Damascus, where his father, though a Christian, enjoyed the office of counsellor of state to the Saracen caliph; to which the son succeeded. He retired afterwards to the monastery of St Sabas, and spent the remainder of his life in writing books of divinity. His works have been often printed; but the Paris edition in 1712, 2 vols folio, is esteemed the best.

DAMASCIUS, a celebrated heathen philosopher, born at Damascus in the year 540, when the Goths reigned in Italy. He wrote the life of his master Iliodorus; and dedicated it to Theodora, a very learned and philosophical lady, who had also been a pupil to Iliodorus. In this life, which was copiously written, he frequently made oblique attacks on the Christian religion. We have nothing remaining of it but some extracts preserved by Photius. Damascius succeeded Theon in the rhetorical school, and Iliodorus in that of philosophy, at Athens.

DAMASCUS, a very ancient city of Syria in Asia, seated in E. Long. 47. 18. N. Lat. 33. 0. Some of the ancients suppose this city to have been built by one Damascus, from whom it took its name; but the most generally received opinion is, that it was founded by Uz the eldest son of Aram. It is certain, from Gen. xiv. 5. that it was in being in Abraham's time, and consequently may be looked upon as one of the most ancient cities in the world. In the time of king David it seems to have been a very considerable place; as the sacred historian tells us, that the Syrians of Damascus sent 20,000 men to the relief of Hadadezer king of Zobah. We are not informed whether at that time it was governed by kings, or was a republic. Afterwards, however, it became a monarchy which proved very troublesome to the kingdom of Israel, and would even have destroyed it entirely, had not the Deity miraculously interposed in its behalf. At last this monarchy was destroyed by Tiglath Pileser king of Assyria, and Damascus was never afterwards governed by its own kings. From the Assyrians and Babylonians it passed to the Persians, and from them to the Greeks under Alexander the Great. After his death it belonged, with the rest of Syria, to the Seleucidæ; till their empire was subdued by the Romans, about 70 years before Christ. From them it was taken by the Saracens in 633; and it is now in the hands of the Turks.—Notwithstanding the tyranny of the Turkish government, Damascus is still a considerable place. It is situated in a plain of so great extent, that one can but just discern the mountains which compass it on the other side. It stands on the west side of the plain, about two miles from the head of the river Barrady, which waters it. It is of a long, straight figure, extending about two miles in length, adorned with mosques and steeples, and encompassed with gardens computed to be full 30 miles round. The river Barrady, as soon as it issues from the clefts of the Antilibanus into the plain, is divided into three streams, whereof the middlemost and biggest runs directly to Damascus, and is distributed to all the cisterns and fountains of the city. The other two seem to be artificial; and are drawn round, one to the right, and the other to the left, on the borders of the gardens, into which they are let by little currents, and dispersed every where. The houses of the city, whose streets are very narrow, are all built

on the outside either with sun-burnt brick, or Flemish wall: and yet it is no uncommon thing to see the gates and doors adorned with marble portals, carved and inlaid with great beauty and variety; and within these portals to find large square courts beautified with fragrant trees and marble fountains, and compassed round with splendid apartments. In these apartments the ceilings are usually richly painted and gilded; and their duans, which are a sort of low stages seated in the pleasantest part of the room; and elevated about 16 or 18 inches above the floor, whereon the Turks eat, sleep, say their prayers, &c. are floored, and adorned on the sides with variety of marble mixed in mosaic knots and mazes, spread with carpets, and furnished all round with bolsters and cushions, to the very height of luxury. In this city are shewn the church of John the Baptist, now converted into a famous mosque; the house of Ananias, which is only a small grotto or cellar wherein is nothing remarkable; and the house of Judas with whom Paul lodged. In this last is an old tomb, supposed to be that of Ananias; which the Turks hold in such veneration, that they keep a lamp continually burning over it. There is a castle belonging to Damascus, which is like a little town, having its own streets and houses; and in this castle a magazine of the famous Damascus steel was formerly kept. The fruit-tree called the *damascene*, and the flower called the *damask rose*, were transplanted from the gardens belonging to this city; and the silks and linens known by the name of *damask*, were probably invented by the inhabitants.

DAMASK, a silk stuff, with a raised pattern, so as that the right side of the damask is that which hath the flowers raised or fattened.

Damaks should be of dressed silk, both in warp and woof; and, in France, half an ell in breadth: they are made at Chalons in Champagne, and in some places in Flanders, as at Tournay, &c. entirely of wool, $\frac{1}{8}$ of an ell wide, and 20 ells long.

DAMASK is also applied to a very fine steel, in some parts of the Levant, chiefly at Damascus in Syria; whence its name. It is used for sword and cutlass blades, and is finely tempered.

DAMASKEENING, or DAMASKING, the art or operation of beautifying iron, steel, &c. by making incisions therein, and filling them up with gold or silver wire; chiefly used for adorning sword-blades, guards and grips, locks of pistols, &c.

Damaskeneering partakes of the mosaic, of engraving, and of carving: like the mosaic, it has inlaid work; like engraving, it cuts the metal, representing divers figures; and, as in chasing, gold and silver is wrought in relievo. There are two ways of damasking: the one, which is the finest, is when the metal is cut deep with proper instruments, and inlaid with gold and silver wire: the other is superficial only.

DAMELOPRE, a kind of Bilander, used in Holland for conveying merchandize from one canal to another; being very commodious for passing under the bridges.

DAMIANISTS, in church-history, a branch of the ancient acephali-severite. They agreed with the catholics in admitting the IVth council, but disowned any distinction of persons in the Godhead; and professed one single nature, incapable of any difference.

Damask
||
Damianists.

Damietta
Damps.

Damps.

yet they called God "the Father, Son, and Holy Ghost."

DAMIETTA, a port-town of Egypt, situated on the eastern mouth of the river Nile, four miles from the sea, and 100 miles north of Grand Cairo. E. Long. 32°, and N. Lat. 31°.

DAMON, a philosopher B. C. 400, was so closely connected in friendship with his colleague Pythias, that Dionysius having sentenced one of them to death, permitted Damon to settle his affairs accordingly, on condition of finding a surety to return, which Pythias undertook. Damon coming at the time appointed, the tyrant admiring their friendship, pardoned them.

DAMPIER (William), a famous navigator, descended from a good family in Somersetshire in England, was born in 1652. Losing his father when very young, he was sent to the sea, where he soon distinguished himself, particularly in the South Sea. His voyage round the world is well known, and has gone through many editions. He appears afterward to have engaged in the Bristol expedition with Captain Woods Rogers; who failed in August 1708, and returned in September 1711: but we have no farther particulars of his life or death.

DAMPS, in natural history, (from the Saxon word *damp*, signifying vapour or exhalation), are certain noxious exhalations issuing from some parts of the earth, and which prove almost instantly fatal to those who breathe them.

These damps are chiefly observed in mines and coal-pits: though vapours of the same kind often issue from old lavas of burning mountains; and, in those countries where volcanos are common, will frequently enter houses, and kill people suddenly without the least warning of their approach. In mines and coal-pits they are chiefly of two kinds, called by the miners and colliers the *choke* and *fire damps*; and both go under one general name of *foul air*. The *choke-damp* is very much of the nature of fixed air; and usually infests those places which have been formerly worked, but long neglected, and are known to the miners by the name of *wastes*. No place, however, can be reckoned safe from this kind of damps, except where there is a due circulation of air; and the procuring of this is the only proper means of preventing accidents from damps of all kinds. The *choke-damp* suffocates the miners suddenly, with all the appearances found in those that are suffocated by fixed air. Being heavy, it descends towards the lowest parts of the workings, and thus is dangerous to the miners, who can scarce avoid breathing it. The *fire-damp*, which seems chiefly to be composed of inflammable air, rises to the roof of the workings, as being specifically lighter than the common atmosphere; and hence, though it will suffocate as well as the other, it seldom proves so dangerous in this way as by its inflammable property, by which it often takes fire at the candles, and explodes with extreme violence.

In the Phil. Transf. n° 119. there is an account of some explosions by damps of this kind, on which we have the following observations. 1. Those who are in the place where the vapour is fired, suddenly find themselves surrounded with flames, but hear little or no noise; though those who are in places adjacent, or above ground, hear a very great one. 2. Those who are surrounded by the inflamed vapour feel themselves

scorched or burnt, but are not moved out of their places, though such as unhappily stand in the way of it are commonly killed by the violence of the shock, and often thrown with great force out at the mouth of the pit; nor are the heaviest machines found able to resist the impetuosity of the blast. 3. No smell is perceived before the fire, but a very strong one of brimstone is afterwards felt. 4. The vapour lies towards the roof, and is not perceived if the candles are held low; but when these are held higher, the damp descends like a black mist, and catches hold of the flame, lengthening it to two or three handfuls; and this appearance ceases when the candles are held nearer the ground. 5. The flame continues in the vault for several minutes after the crack. 6. Its colour is blue, something inclining to green, and very bright. 7. On the explosion of the vapour, a dark smoke like that proceeding from fired gunpowder is perceived. 7. Damps are generally observed to come about the latter end of May, and to continue during the heat of summer. They return several times during the summer season, but observe no certain rule.

Besides these kind of damps, which are very common, we find others described in the Philosophical Transactions, concerning the nature of which we can say nothing. Indeed the account seems somewhat suspicious. They are given by Mr Jessop, from whom we have the foregoing observations concerning the fire-damp, and who had these from the miners in Derbyshire. After describing the common damp, which consists of fixed air, "They call the second sort (says he) the *pease-bloom damp*, because, as they say, it smells like pease-bloom. They tell me it always comes in the summer-time; and those grooves are not free which are never troubled with any other sort of damps. I never heard that it was mortal; the scent, perhaps, freeing them from the danger of a surprise: but by reason of it many good grooves lie idle at the best and most profitable time of the year, when the subterraneous waters are the lowest. They fancy it proceeds from the multitude of red-trefoil flowers, by them called *honeysuckles*, with which the limestone meadows in the Peake do much abound. The third is the strangest and most pestilential of any; if all be true which is said concerning it. Those who pretend to have seen it, (for it is visible), describe it thus: In the highest part of the roof of those passages which branch out from the main groove, they often see a round thing hanging, about the bigness of a foot-ball, covered with a skin of the thickness and colour of a cobweb. This they say, if it is broke by any accident, as the splinter of a stone, or the like, disperseth itself immediately, and suffocates all the company. Therefore, to prevent casualties, as soon as they have espied it, they have a way, by the help of a stick and long rope, of breaking it at a distance; which done, they purify the place well with fire, before they dare enter it again. I dare not avouch the truth of this story in all its circumstances, because the proof of it seems impossible, since they say it kills all that are likely to bear witness to the particulars: neither dare I deny, but such a thing may have been seen hanging on the roof, since I have heard many affirm it."—Some damps, seemingly of the same nature with those last mentioned, are noticed by the author of the Chemical Dictionary, under the word

Damps.

Damps. “ Amongst the noxious mineral exhalations, (says he), we may place those which are found in the mines of sal-gem in Poland. These frequently appear in form of light flocks, threads, and spiders webs. They are remarkable for their property of suddenly catching fire at the lamps of the miners with a terrible noise and explosion. They instantly kill those whom they touch. Similar vapours are found in some mines of fossil coal.”

With regard to damps, it is a question well worth deciding, Whether they are occasioned by a stagnation of the common atmosphere in the pit, impregnating itself by degrees with various noxious effluvia; or whether they are occasioned by some imperceptible operation of nature within the bowels of the earth itself?—As the choke-damp is often to be met with in old wastes, it would seem, that the air in those places becomes noxious merely from stagnation. But from some accounts given by those who are conversant in coal-mines, it appears that these damps, the inflammable ones especially, issue from particular places in great quantity, and often very suddenly; and that very dangerous effects will follow from merely beating on those places with a hammer. It cannot be denied, however, but that these accounts must be suspicious: for philosophers seldom visit these regions, at least with a design to take up their abode in them; and the workmen are no doubt apt to indulge the natural passion for the marvellous, in all their accounts of such phenomena. In the Phil. Transf. n^o 136, we have the following account of a fire-damp which seemed plainly to issue from the earth. “ This work is upon a coal of five yards in thickness, and hath been begun upon about six or eight and thirty years ago. When it was first found, it was extreme full of water, so that it could not be wrought down to the bottom of the coal; but a *witchet*, or cave, was driven out of the middle of it, upon a level for gaining room to work, and drawing down the spring of water that lies in the coal to the eye of the pit. In driving of which witchet, after they had gone a considerable way under ground, and were scant of wind, the fire-damps did begin by little and little to breed, and to appear in crevices and slits of the coal, where water had lien before the opening of the coal, with a small bluish flame, working and moving continually; but not out of its first seat, unless the workmen held their candles to it; and then being weak, the blaze of the candle would drive it with a sudden fizz, away to another crevice, where it would soon after appear blazing and moving as formerly. This was the first knowledge of it in this work, which the workmen made but a sport of; and so partly neglected, till it had gotten some strength; and then upon a morning, the first collier that went down, going forwards in the witchet with his candle in his hand, the damp presently darted out so violently at his candle, that it struck the man clear down, singed all his hair and clothes, and disabled him from working for a while after. Some other small warnings it gave them, inasmuch that they resolved to employ a man on purpose that was more resolute than the rest, to go down a while before them every morning, to chase it from place to place, and so to weaken it. His usual manner was to put on the worst rags he had, and to wet them all in water, and when he came within the danger of it, then he fell down groveling upon his belly, and so went forward,

holding in one hand a long wand or pole, at the head whereof he tied candles burning, and reached them by degrees towards it; then the damp would fly at them, and, if it missed of putting them out, would quench itself with a blast, and leave an ill-scented smoke behind. Thus they dealt with it till they had wrought the coal down to the bottom, and the water following, and not remaining as before in the body of it, among sulphureous and brassy metal that is in some veins of the coal, the fire-damp was not seen nor heard of till the latter end of the year 1675, which happened as followeth.

“ After long working of this coal, it was found upon the rising grounds, that there lay another roach of coal at the depth of 14 yards under it, which proved to be 3¹/₂ yards thick, and something more sulphureous. This encouraged us to sink in one of the pits we had formerly used on the five-yards coal.—As we sunk the lower part of it, we had many appearances of the fire-damp in the watery crevices of the rocks we sunk thro’, flashing and darting from side to side of the pit, and shewing rainbow-like colours upon the surface of the water in the bottom; but upon drawing up of the water with buckets, which stirred the air in the pit, it would leave burning, till the colliers at work, with their breath and sweat, and the smoke of their candles, thickened the air in the pit, and then it would appear again; they lighted their candles at it sometimes when they went out; and so in this pit it did no further harm.”

In another pit, however, it soon appeared, and at last produced a most terrible explosion. This was occasioned by one of the workmen going imprudently down with a lighted candle, after a cessation of work for some days, and the force exerted by it seemed equal to that of gunpowder.—Many very terrible accidents are also daily known to happen from vapours of this kind; but from any histories of these cases which can yet be obtained, no certain theory of the formation of these vapours can be established. Doctor Priestley hath indeed shewed, that inflammable air may be produced artificially in a great number of ways. It arises from a mixture of iron-sfilings and oil of vitriol or spirit of salt; and therefore the fire-damp hath been thought to proceed from large quantities of pyrites. But it is also produced from vegetable and animal substances in great quantities by distillation; and even from several metals by heat only, without any acid. From a letter by Doctor Franklin to Doctor Priestley, it appears, that inflammable vapours rise up even from the bottom of ponds of water in some places, take fire on the surface, and will burn for two or three seconds.—It doth not appear that these artificial methods of procuring inflammable air can throw the smallest light upon the natural processes by which it is produced in mines, or at the bottom of the waters above-mentioned. The supposition of its being produced by pyrites in a manner analogous to that from oil of vitriol and iron-sfilings can by no means be admitted: for the pyrites produce no acid capable of acting upon iron, unless after long exposure to the air; neither do they contain any iron in its metalline form, which is absolutely necessary to the success of the experiment. Though a mixture of iron-sfilings and brimstone will take fire from being exposed to the air, or even if slightly covered with earth,

Damps
Danaides.

yet if covered with water, though the mixture swells and turns black, it does not generate the least quantity of inflammable vapour.

The difficulty is still greater with regard to fixed air. This is well known to have issued from many parts of the earth, for a number of ages together; particularly the Grotto del Cani in Italy. Now, though we know that this kind of air is discharged in great quantity from fermenting and putrefying substances, and also from earthy ones when calcined by heat, it seems altogether impossible, upon these principles, to account for such a constant and regular production of this kind of air in the cavern above-mentioned.—The greatest quantity of fermenting or putrefying substances we can imagine, must in time have finished their fermentation or putrefaction, and then ceased to discharge this kind of air; and the like must have happened with any quantity of calcareous matter we can suppose to be subjected to the action of subterraneous heat. It seems probable, therefore, that nature hath some method of producing these kinds of air which hath not yet been imitated by any artificial processes; and, in all probability, both fixed and inflammable air answer some purposes in the natural operations which are as yet unknown to us.—Concerning this, the author of the Chemical Dictionary offers the following conjecture. “Almost all chemists and metallurgists agree in believing, that mineral exhalations contribute to the production of metals. This opinion is so much more probable, that, as phlogiston is one of the principles of metals, (if it be true that these mineral exhalations are nothing else than phlogiston), and as this principle is then in a state of vapour, and consequently much divided, perhaps reduced to its smallest integrant particles, it is then in its most favourable state for combination: it is therefore probable, that when these exhalations meet earths disposed to receive them, they combine more or less intimately with those earths, according to their nature. Perhaps this is the chief operation of the grand mystery of metallification.”

DAMSEL, from the French *dameiselle* or *dameiselle*, an appellation anciently given to all young people of either sex, that were of noble or genteel extraction, as the sons and daughters of princes, knights, and barons: thus we read of Damsel Pepin, Damsel Louis le Gros, Damsel Richard prince of Wales.

From the sons of kings this appellation first passed to those of great lords and barons, and at length to those of gentlemen who were not yet knights.

At present, damsel is applied to all maids or girls not yet married, provided they be not of the vulgar.

DANAE, in antiquity, a coin somewhat more than an obolus, used to be put into the mouths of the dead, to pay their passage over the river Acheron.

DANAE, in fabulous history, daughter to Acrisius, king of Argos; who being informed by an oracle, that he should be killed by her son, shut her up in a castle of brass to prevent it: but Jupiter transforming himself into a shower of gold, or, in other words, corrupting her guards, he obtained access to her; and Danaë becoming pregnant, brought forth Perseus, who at length killed Acrisius.

DANAIDES, in the ancient mythology, the daughters of Danaos, or Danaus, eleventh king of Argos, and brother of Ægyptus.—They were 50 in number,

and were espoused to the 50 sons of their uncle Ægyptus. Danaus, fearing the accomplishment of an oracle which had foretold that he should be expelled his kingdom by a son-in-law, persuaded his daughters to murder each of them her husband the first night; which they performed, all but Hypermenestra, who spared her husband Lynceus.—In vengeance for this crime of the 49 Danaides, the poets have condemned them to hell, to be continually employed in filling a cask perforated at the bottom.—The Danaides are sometimes also called *B-liders*, from their father, who was the son of the Ægyptian Belus. Hyginus has preserved the names of 47 of them.

DANAUS, in fabulous history, king of Argos, was, according to some authors, an Egyptian, and the brother of Ramesses. After having reigned nine years in conjunction with his brother, he, it is said, was forced to seek an asylum in the country of Argos, which he erected into a kingdom B. C. 1476; but was dethroned by his nephew Danaus. See the preceding article.

DANCE, or DANCING, as at present practised, may be defined, “an agreeable motion of the body, adjusted by art to the measures or tune of instruments, or of the voice.”—But, according to what some people reckon more agreeable to the true genius of the art, dancing is “the art of expressing the sentiments of the mind, or the passions, by measured steps or bounds that are made in cadence by regulated motions of the body, and by graceful gestures; all performed to the sound of musical instruments, or of the voice.”

There is no account of the original of the practice of dancing among mankind. It is found to exist among all nations whatever, even the most rude and barbarous; and, indeed, however much the assistance of art may be necessary to make any one perfect in the practice, the foundation must certainly lie in the mechanism of the human body itself.

The connection that there is between certain sounds and those motions of the human body called *dancing*, hath seldom or never been inquired into by philosophers, though it is certainly a very curious speculation. The power of certain sounds not only over the human species, but even over the inanimate creation, is indeed very surprising. It is well known, that the most solid walls, nay the ground itself, will be found to shake at some particular notes in music. This strongly indicates the presence of some universally diffused and exceedingly elastic fluid, which is thrown into vibrations by the concussions of the atmosphere upon it, produced by the motion of the sounding body.—If these concussions are so strong as to make the large quantity of elastic fluid vibrate that is dispersed through a stone wall, or a considerable portion of earth, it is no wonder they should have the same effect upon that invisible and exceedingly subtle matter that pervades and seems to reside in our nerves. The consequence in both cases is precisely the same: the inanimate bodies tremulate, i. e. *dance*, to the sound of the instrument; and the person who hears the sounds, has an inclination to move his limbs in proportion to the measure or succession of the musical notes.

It would seem, therefore, that the origin of dancing lies entirely in the mechanism of the nerves of the body.—Some there are that have their nerves constructed in

Danaos,
Daice.

in such a manner, that they cannot be affected by the sounds which affect others, and some scarce with any; while others have such an irritability of the nerves in this case, that they cannot, without the greatest difficulty, sit or stand still when they hear a favourite piece of music played.

It is conjectured, with a great degree of probability, by very eminent philosophers, that all the sensations and passions to which we are subject, do immediately depend upon the vibrations excited in the nervous fluid above-mentioned. Hence, musical sounds have the greatest power over those people who are of a delicate, sensible frame, and who have strong passions. If it is true, therefore, which is indeed conjectured with a great deal of probability, that every passion in the human nature immediately depends upon a certain affection of the nervous system, or a certain motion or vibration in the nervous fluid, we shall immediately see the origin of the different dances among different nations. One kind of vibration, for instance, raises the passions of anger, pride, &c. which are indispensably necessary in warlike nations. The sounds, for such there are, capable of exciting a similar vibration, would naturally constitute the martial music among such nations, and dances conformable to it would be instituted. This appears to be the case particularly among barbarous nations, as we shall presently have occasion to remark. Other vibrations of the nervous fluid produce the passions of joy, love, &c. and sounds capable of exciting these particular vibrations will immediately be formed into music for dances of another kind.

As barbarous people are observed to have the strongest passions, so they are also observed to be the most easily affected by sounds, and the most addicted to dancing. Sounds to us the most disagreeable, the drumming with sticks upon an empty cask, or the noise made by blowing into reeds incapable of yielding one musical note tolerable to us, is agreeable music to them. Much more are they affected by the sound of instruments which have any thing agreeable in them. Mr Gallini informs us, that "The spirit of dancing prevails almost beyond imagination among both men and women in most parts of Africa. It is even more than instinct, it is a rage, in some countries of that part of the globe.—Upon the Gold Coast especially, the inhabitants are so passionately fond of it, that in the midst of their hardest labour, if they hear a person sing, or any musical instrument played, they cannot refrain from dancing.—There are even well attested stories of some Negroes flinging themselves at the feet of an European playing on a fiddle, intreating him to desist, unless he had a mind to tire them to death; it being impossible for them to cease dancing while he continued playing."—The same thing is found to take place in America, though, as the inhabitants of that continent are found to be of a more fierce and barbarous nature than the African nations, their dances are still more uncouth and barbarous than those of the Negroes. "In Mexico, says Gallini, they have also their dances and music, but in the most uncouth and barbarous style. For their symphony they have wooden drums, something in form of a kettle-drum, with a kind of pipe or flagellet, made of a hollow cane or reed, but very grating to an European ear. It is observed they love every thing that makes a noise, how disagreeable soever the sound is.

They will also hum over something like a tune when they dance 30 or 40 in a circle, stretching out their hands, and laying them on each others shoulders. They stamp and jump, and use the most antic gestures for several hours, till they are heartily weary. And one or two of the company sometimes step out of the ring to make sport for the rest, by showing feats of activity, throwing their lances up into the air, catching them again, bending backwards, and springing forwards with great agility."

The origin of dancing among the Greeks was most certainly the same as among all other nations; but as they proceeded a certain length in civilization, their dances were of consequence more regular and agreeable than those of the more barbarous nations. They reduced dancing into a kind of regular system; and had dances proper for exciting, by means of the sympathy above-mentioned, any passion whatever in the minds of the beholders. In this way they are said to have proceeded very great lengths, to us absolutely incredible. At Athens, it is said, that the dance of the Eumenides or Furies on the theatre, had so expressive a character as to strike the spectators with irresistible terror: men grown old in the profession of arms trembled; the multitude ran out; women with child miscarried; people imagined they saw in earnest those terrible deities commissioned with the vengeance of Heaven to pursue and punish crimes upon earth.

To produce such effects as these would now be utterly impossible. For this reason it is, that many look upon the art of dancing as lost; and that the ancient dancers were possessed of some peculiar skill in executing these gestures that raise the passions, which are to us unknown. It seems rather probable, however, that the passions of mankind are now more under the dominion of reason, or some other principle, which keeps them from appearing with such violence as formerly. Hence it might very readily happen, that though these celebrated dancers, or others equally skilful, were to appear on modern theatres, they might be treated with contempt and derision. It is certain, that the ancients fell far short of the civilization of the modern Europeans, inasmuch, that they may very well be called barbarians and savages, in comparison of them. The art of dancing, therefore, is not lost, but only become different from what it was; and unless people were to live in a different manner from what they now do, it is utterly impossible to expect the same effects from any kind of gestures whatever.

It is remarkable, however, that though the Greeks were so extravagantly fond of dancing, that it entered into their polity both civil and religious, it was quite otherwise with the Romans. As long as the republic lasted, dancing was accounted dishonourable; inasmuch that Cicero reproaches Gabinius, a consular man, with having danced. It was introduced indeed under the Emperor Augustus, but the dancers were banished by Tiberius; and several senators were expelled by Domitian, because they had danced. The Greeks had martial dances, which they reckoned to be very useful for keeping up the warlike spirit of their youth; but the Romans, though equally warlike with the Greeks, never had any thing of the kind.—This probably may be owing to the want of that romantic turn for which the Greeks were so remarkable. The Romans had no

heroes among them such as Hercules, Achilles, or Ajax; nor does the whole Roman history furnish an example of a general that made war after the manner of Alexander the Great. Though their soldiers were as valiant as ever the Greeks could pretend to be, the object with them was the honour of the republic, and not their own personal praise. Hence there was less fury, and much more cool deliberate valour, exercised by the Romans, than any other nation whatever. The passions of pride, resentment, obduracy, &c. were excited in them, not by the mechanical means of music and dancing, but by being taught that it was their chief honour to fight for the republic.—It does not however appear, that the Romans were at all less capable of being affected in this mechanical manner than the Greeks. When dancing was once introduced, it had the very same effects at Rome as at Athens.

Among the Jews, dancing seems to have made a part of the religious worship on some occasions, as we learn from some passages in the Psalms, though we do not find either that or singing positively enjoined as a divine precept.—In the Christian churches mentioned in the New Testament, there is no account of dancing being introduced as an act of worship, though it is certain that it was used as such in after ages. Mr Gallini tells us, that “at *Limoges*, not long ago, the people used to dance the round in the choir of the church which is under the invocation of their patron saint, and at the end of each psalm, instead of the *Gloria Patri*, they sung as follows: *St Marcel, pray for us, and we will dance in honour of you*.” Though dancing would now be looked upon as the highest degree of profanation in a religious assembly, yet it is certain, that dancing, considered as an expression of joy, is no more a profanation than singing, or than simple speaking; nor can it be thought in the least more absurd, that a Christian should dance for joy that Jesus Christ is risen from the dead, than that David danced before the ark when it was returned to him after a long absence.

Plato reduces the dances of the ancients to three classes. 1. The military dances, which tended to make the body robust, active, and well-disposed for all the exercises of war. 2. The domestic dances, which had for their object an agreeable and innocent relaxation and amusement. 3. The mediatorial dances, which were in use in expiations and sacrifices.—Of military dances there were two sorts: the *gymnopedique* dance, or the dance of children; and the *enoplian*, or armed dance. The Spartans had invented the first for an early excitation of the courage of their children, and to lead them on insensibly to the exercise of the armed dance. This childrens dance used to be executed in the public place. It was composed of two choirs; the one of grown men, the other of children; whence, being chiefly designed for the latter, it took its name. They were both of them in a state of nudity. The choir of the children regulated their motions by those of the men, and all danced at the same time, singing the poems of Thales, Alcman, and Dionysodorus.—The *enoplian* or *pyrrhic* was danced by young men armed cap-a-pee, who executed, to the sound of the flute, all the proper movements either for attack or for defence. It was composed of four parts.—The first, the *podisus* or footing; which consisted in a quick shifting motion of the feet, such as was necessary for over-

taking a flying enemy, or for getting away from him when an overmatch.—The second part was the *xiphisus*; this was a kind of mock-fight, in which the dancers imitated all the motions of combatants; aiming a stroke, darting a javelin, or dextrously dodging, parrying, or avoiding a blow or thrust. The third part, called the *kamos*, consisted in very high leaps or vaultings, which the dancers frequently repeated, for the better using themselves occasionally to leap over a ditch, or spring over a wall. The *tetracomos* was the fourth and last part: this was a square figure, executed by slow and majestic movements; but it is uncertain whether this was every where executed in the same manner.

Of all the Greeks, the Spartans were those who most cultivated the Pyrrhic dance. Athenæus relates, that they had a law by which they were obliged to exercise their children at it from the age of five years. This warlike people constantly retained the custom of accompanying their dances with hymns and songs. The following was sung for the dance called *trichoria*, said to be instituted by Lycurgus, and which had its name from its being composed of three choirs, one of children, another of young men, and the third of old. The old men opened the dance, saying, “In time past we were valiant.” The young men answered, “We are so at present.”—“We shall be still more so, when our time comes,” replied the chorus of children. The Spartans never danced but with real arms. In process of time, however, other nations came to use only weapons of wood on such occasions. Nay, it was only so late as the days of Athenæus, who lived in the second century, that the dancers of the Pyrrhic, instead of arms, carried only stalks, ivy-bound wands, (thyrsus), or reeds. But, even in Aristotle's days, they had begun to use thyrsuses instead of pikes, and lighted torches in lieu of javelins and swords. With these torches, they executed a dance called the *conflagration of the world*.

Of the dances for amusement and recreation, some were but simply gambols, or sportive exercises, which had no character of imitation, and of which the greater part exist to this day. The others were more complex, more agreeable, figured, and were always accompanied with singing. Among the first or simple ones was the *ascolianus*; which consisted in jumping, with one foot only, on bladders filled with air or with wine, and rubbed on the outside with oil. The *dyspodium* was jumped with both feet close. The *kybistesis* was what is called in this country the *somerfet*.—Of the second kind was that called the *wine-press*, of which there is a description in Longinus, and the Ionian dances: these last, in the original of their institution, had nothing but what was decent and modest; but, in time, their movements came to be so depraved, as to be employed in expressing nothing but voluptuousness, and even the grossest obscenity.

Among the ancients there were no festivals nor religious assemblies but what were accompanied with songs and dances. It was not held possible to celebrate any mystery, or to be initiated, without the intervention of these two arts. In short, they were looked upon to be so essential in these kinds of ceremonies, that to express the crime of such as were guilty of revealing the sacred mysteries, they employed the word *kheistæ*, “to be out of

of the dance."—The most ancient of these religious dances is the *Bacchic*; which was not only consecrated to Bacchus, but to all the deities whose festival was celebrated with a kind of enthusiasm.—The most grave and majestic was the *hyporchrematic*: it was executed to the lyre, and accompanied with the voice.—At his return from Crete, Theseus instituted a dance at which he himself assisted at the head of a numerous and splendid band of youth round the altar of Apollo. The dance was composed of three parts; the *strophe*, the *antistrophe*, and the *stationary*.—In the *strophe*, the movements were from the right to the left; in the *antistrophe*, from the left to the right. In the *stationary*, they danced before the altar; so that the *stationary* did not mean an absolute pause or rest, but only a more slow or grave movement.—Plutarch is persuaded, that in this dance there is a profound mystery: he thinks, that by the *strophe* is indicated the motion of the world from east to west; by the *antistrophe*, the motion of the planets from the west to the east; and by the *stationary*, the stability of the earth: To this dance Theseus gave the name of *geranos*, or the crane; because the figures which characterized it bore a resemblance to those described by cranes in their flight.

With regard to the modern practice of dancing as an art, there are few directions that can be of much service. The following is extracted from Mr Gallini's description of the several steps or movements.

"The dancing (says he) is generally on a theatre, or in a saloon or room.—At the theatre there are four parts to be considered. 1. The nearest front to the spectators. 2, and 3. The two sides or wings. 4. The furthest front from the spectators.

"In a saloon or room, the place in which are the spectators decides the appellation respectively to them of right and left. The dancer should place himself in as advantageous a point of view to them as possible.

"In the dance itself, there are to be distinguished, the attitude of the body, the figure, the positions, the bends, the raisings or leaps, the steps, the cabriol, the fallings, the slides, the turns of the body; the cadences.

"The attitude of the body requires the presenting one's self in the most graceful manner to the company.

"The figure is to follow the track prescribed to the steps in the dance.

"The position is that of the varied attitudes, which must be at once striking and easy, as also of the different exertions of the legs and feet in dancing.

"The bends are inflexions of the knees, of the body, of the head, or the arms.

"The raisings are the contrast to the bends, the extension of the knee. One of these two motions necessarily precedes the other.

"The step is the motion by the foot or feet from one place to another.

"The leap is executed by springing up into the air; it begins with a bend, and proceeds with a quick extension of the legs, so that both feet quit the ground.

"The cabriole is the crossing, or cutting of capers, during the leap, before the return of the feet to the ground.

"The falling is the return of the feet to the ground, by the natural gravitation of the body.

"The slide is the action of moving the foot along

the ground without quitting it.

"The turn is the motion of the body towards either side, or quite round.

"The cadence is the knowledge of the different measures, and of the times of movement the most marked in the music.

"The track is the line marked by the dance: it may be either straight or curve, and is susceptible of all the inflexions correspondent to the various designs of the composer.—There are the right, the diametral line, the circular line, and the oblique line. The right line is that which goes lengthways, reckoning from one end of the room towards the other. The diametral line is across the room, from one side to the other. The circular line is waving, or undulatory, from one place to another. The oblique line proceeds obliquely from one quarter of the room towards another.—Each of these lines may directly or separately form the dancer's track, diversified with steps and positions.

"The regular figure is when two or more dancers move in contrary directions; that is to say, that when one moves towards the right, the other moves to the left.—The irregular line is when the couples figuring together are both on the same side.

"Commonly the man gives the right-hand to the lady in the beginning or ending of the dance, as we see in the *minuet*, *louvre*, &c.

"When a greater number of dancers figure together, they are to execute the figure agreeably to the composition of the dance, with special attention to keep an eye constantly on the partner.—When, in any given dance, the dancers have danced for some time in the same place, the track is only to be considered as the conductor of the steps, but not of the figure; but when the dance continues, without being confined to the same place, then the track must be considered as the conductor both of the steps and of the figure.

"Now, to observe the figure, the dancer must have placed himself at the beginning of the track upon which he is to dance, and comprehend the figure before he himself begins it. He is to remark and conceive whether the figure is right, diametral, circular, or oblique; if it is progressive or retrogressive, or towards the right or left. He should have the air played or sung to him, to understand the movement.—Where the tracks cross one another, the steps of each of the couples must leave a sufficient distance between them not to confuse the figure.

"There are commonly reckoned ten kinds of positions, which are divided into *true* and *false*, five each.—There are three principal parts of the foot to be observed; the toes, the heel, and the ankle.

"The true positions are when the two feet are in a certain uniform regularity, the toes turned equally outwards.—The false are divided into regular and irregular. They differ from the true, in that the toes are either both turned inwards; or if the toes of one foot are turned outwards, the others are turned inward.

"In the first of the true positions, the heels of the two feet are close together, so that they touch; the toes being turned out. In the second the two feet are open, in the same line, so that the distance between the two heels is precisely the length of one foot. In the third the heel of one foot is brought to the angle

of the other, or seems to lock in with it. In the fourth, the two feet are the one before the other, a foot's length distance between the two heels, which are on the same line. In the fifth, the two feet are across, the one before the other; so that the heel of one foot is directly opposite to the toes of the other.

"In the first of the false positions, the toes of both feet are turned inwards, so that they touch, the heels being open. The second is, when the feet are asunder at a foot's distance between the toes of each, which are turned inward, the heels being on a line. The third is, when the toes of one foot are turned outwards, the other inwards, so that the two feet form a parallel. The fourth is, when the toes of the two feet are turned inwards; but the toes of one foot are brought nearer the angle of the other. The fifth is, when the toes of the two feet are turned inwards, but the heel of one foot is opposite to the toes of the other.

"There are mixed positions, composed of the true and false in combination; which admit of such an infinite variety, and are in their nature so unsusceptible of description by words, that it is only the sight of the performance that can give any tolerable idea of them.

"Of the bends of the knee there are two kinds; the one *simple*, the other *forced*. The simple bend is an inflexion of the knees without moving the heel, and is executed with the foot flat to the ground. The forced bend is made on the toes with more force and lower.

"Much is to be observed on the head of *steps*. First, not to make any movement before having put the body in an upright posture, firm on the haunches.

"Begin with the inflexion of the knee and thigh; advance one leg foremost; with the whole foot on the ground, laying the stress of the body on the advanced leg.

"There are some who begin the step by the point of the toes; but that has an air of theatrical affectation. Nothing can be more noble than a graceful ease and dignity of step. The quantity of steps used in dancing are almost innumerable; they are nevertheless reducible under five denominations, which may serve well enough to give a general idea of the different movements that may be made by the leg, *viz.* the direct step, the open step, the circular step, the twisted step, and the cut step.

"The *direct* step is when the foot goes upon a right line, either forwards or backwards.

The *open* step is when the legs open. Of this step there are three kinds: one when they open outwards; another, when, describing a kind of circle, they form an in-knee'd figure: a third, when they open sideways; this is a sort of right step, because the figure is in a right line.

"The *round* step, is when the foot, in its motion, makes a circular figure, either inwards or outwards.

"The *twisted* step, or *pas tortille*, is when the foot in its motion turns in and out. There are three kinds of this step; one forwards, another backwards, the third sidelong.

"The *cut* step is when one leg or foot comes to strike against the other. There are also three sorts of this step; backwards, forwards, and sidelong.

"The steps may be accompanied with bendings,

risings, leaps, cabrioles, fallings, slidings, the foot in the air, the tip-toe, the rest on the heel, quarter-turns, half-turns, three-quarter turns, and whole-turns.

"There may be practised three kinds of bends, or sinkings, in the steps; *viz.* bending before the step proceeds, in the act of stepping, and at the last of the steps.

"The beginning or initial sink-pace is at the first setting off, on advancing the leg.

"The bend in the act of stepping continues the march or walk.

"The final sink-pace closes the march.

"The rising is just the reverse of the bend, or sink-pace, which shall have preceded it.

"Some great masters in the art of dancing, having observed that music, which is inseparable from it, was capable of being preserved and conveyed by the musical characters, imagined by analogy, that the like advantage could be procured to the composition of dances. Upon this plan they attempted what is called the *choreography*, an art which they suppose was either utterly unknown to the ancients, or not transmitted to us from them.

"It may indeed be easily allowed, that the track or figure of a dance may be determined by written or engraved lines; but those lines will necessarily appear so perplexing, so intricate, so difficult, if not impossible to seize, in their various relations, that they are only fit to disgust and discourage, without the possibility of their conveying a satisfactory or retainable instruction. —Thence it is, that the article of *Choreography* in the French *Encyclopédie* is universally exploded as unintelligible and useless: though nothing more than an elementary indication of the art; and an explanation, such as it is, of some of the technical terms of it."

Rope-DANCER, *schenobater*, a person who walks, leaps, dances, and performs several other feats, upon a small rope or wire.

The ancients had their rope-dancers as well as we. These had four several ways of exercising their art: The first vaulted, or turned round the rope like a wheel round its axis, and there hung by the heels or neck. The second flew or slid from above, resting on their stomach, with the arms and legs extended. The third ran along a rope stretched in a right line or up and down. Lastly, the fourth not only walked on the rope, but made surprising leaps and turns thereon. They had likewise the *crenobates*, and *orobates*; that is, people who walked on the brinks of precipices: Nay more, Suetonius in *Galba*, c. 6. Seneca in his 85th Epistle, and Pliny, *lib. viii. c. 2.* make mention of elephants that were taught to walk on the rope.

St Vitus's DANCE. See (the *Index* subjoined to)

MEDICINE.

DANCELETTE, in heraldry, is when the outline of any bordure, or ordinary, is indented very largely, the largeness of the indentures being the only thing that distinguishes it from indented.

DANDELION, in botany. See LEONTODON.

DANEGELT, an annual tax laid on the Anglo-Saxons, first of 1 s. afterwards 2 s. for every hide of land thro' the realm, for maintaining such a number of forces as were thought sufficient to clear the British seas of Danish pirates, which heretofore greatly annoyed our coasts.

DANEGELT,

Danegelt
li
Daniel.

DANEGLT was first imposed as a standing yearly tax on the whole nation, under king Ethelred, A. D. 991. That prince, says Camden, *Britan.* 142. much distressed by the continual invasions of the Danes; to procure his peace, was compelled to charge his people with heavy taxes, called *danegelt*.—At first he paid 10,000 *l.* then 16,000 *l.* then 24,000 *l.* after that 36,000 *l.* and lastly, 48,000 *l.*

Edward the Confessor remitted this tax: William I. and II. reassumed it occasionally. In the reign of Henry I. it was accounted among the king's standing revenues; but king Stephen, on his coronation-day, abrogated it for ever.

No church or church-land paid a penny to the *danegelt*: because, as is set forth in an ancient Saxon law, the people of England placed more confidence in the prayers of the church than in any military defence they could make.

DANDOLO (Henry), doge of Venice, a brave admiral and politician. With a Venetian fleet he took Constantinople in 1203, and had the moderation to refuse to be emperor. He died in 1250.

DANET (Peter), abbot of St Nicholas de Verdun, was one of the persons chosen by the duke of Montausier to write on the classics for the use of the dauphin. He had a share in Phædrus, which he published with notes and explications in Latin. He also wrote a dictionary in Latin and French, and another in French and Latin. He died at Paris in 1709.

DANIEL, the fourth of the greater prophets, was born in Judea of the tribe of Judah, about the 25th year of the reign of Josiah. He was led captive to Babylon, with other young Hebrew lords, after the taking of Jerusalem by Nebuchadnezzar, who took them into his service. That prince gave them masters to instruct them in the language and sciences of the Chaldeans, and ordered them to be fed with the most delicate viands; but they, fearing that they should eat meat forbidden by the law of Moses, desired the king's officers to allow them only pulse. The wisdom and conduct of Daniel pleasing Nebuchadnezzar, that prince gave him several posts of honour. It is commonly believed, that this prophet, when but 12 years of age, made known the innocence of the chaste Susannah; but the learned are not agreed, that the young Daniel, who confounded the old men, was the same with this prophet. However, he explained Nebuchadnezzar's dream of the mysterious statue, which foretold the four great monarchies; on which account he was made prefect of the province of Babylon. In the reign of Darius the king of the Medes, he refused to adore the golden statue of the king, and was cast into the lions den, when those beasts, tho' pinched with hunger, did him no manner of hurt. And he explained the characters written on the wall of the room where Belshazzar was feasting.

It is believed that Daniel died in Chaldæa, and that he did not take advantage of the permission granted by Cyrus to the Jews of returning to their own country. St Epiphanius says he died at Babylon; and herein he is followed by the generality of historians. The first six chapters of the book of Daniel are an history of the kings of Babylon, and what befel the captive Jews under their government. In the six last he is altogether prophetic, foretelling not only what should happen

Daniel,
Dante.

to his own church and nation, but events in which foreign princes were concerned; particularly the rise and downfall of the four secular monarchies of the world, and the establishment of the fifth, or spiritual kingdom of the Messiah. "Amongst the old prophets (says the great Sir Isaac Newton), Daniel is the most distinct in the order of time, and easiest to be understood; and therefore, in those things which relate to the last times, he must be made key to the rest.—His prophecies are all of them related to one another, as if they were but several parts of one general prophecy. The first is the easiest to be understood, and every following prophecy adds something to the former."

DANIEL (Samuel), an eminent poet and historian, was born near Taunton in Somersetshire in the year 1562, and educated at Oxford: but leaving that university without a degree, he applied himself to English history and poetry under the patronage of the earl of Pembroke's family. He was afterwards tutor to the lady Ann Clifford; and, upon the death of Spencer, was created poet-laureat to queen Elizabeth. In king James's reign he was appointed gentleman extraordinary, and afterwards one of the groom of the privy-chamber, to the queen consort, who took great delight in his conversation and writings. He wrote an history of England, several dramatic pieces, and some poems; and died in 1619.

DANIEL (Gabriel), a celebrated Jesuit, and one of the best French historians, was born at Rouen in 1649. He taught polite literature, philosophy, and divinity, among the Jesuits; and was superior of their house at Paris, where he died in 1728. There are a great number of his works published in French, of which the principal are, 1. An History of France, of which he also wrote an abridgment in nine volumes 12^{mo}. 2. An history of the French Militia, in 2 vols 4^{to}. 3. An answer to the Provincial Letters. 4. A voyage to the World of Descartes. 5. Letters on the doctrines of the Theorists, and on Probability. 6. New difficulties relating to the knowledge of Brutes; and, 7. A theological treatise on the Efficacy of Grace.

DANTE (Alighieri), one of the first poets of Italy, born at Florence in 1265, of a good family. He consecrated the first of his muse to love; but afterwards he undertook a more serious work. He would have been more happy if he had never meddled with any thing else: for being ambitious, and having attained some of the most considerable posts of the common wealth, he was crushed by the ruins of the faction he had embraced. Pope Boniface VIII. sent Charles of Valois thither in 1301, to re-establish the peace; Florence being divided into two factions, one named the *whites*, and the other the *black*. No better way was found to pacify the city than to expel thence the faction of the white, which Dante favoured. He endeavoured to revenge himself at the expence of his country, and did all he could to expose it to a bloody war. He died in exile in 1321. He applied himself diligently to study during his banishment; and wrote some books wherein he showed more fire and spirit than he would have done had he enjoyed a more quiet state of life. The most considerable of his works is the poem entitled "The Comedy of Hell, Purgatory, and Paradise." It has much displeased the church of Rome; as did likewise another book of his entitled, "De

"De

Dante
Danube.

“De Monarchia;” wherein he maintains, that the authority of the emperors ought not to depend on that of the Popes.

DANTE (John Baptist), a native of Perugia, an excellent mathematician, called the *new Dadaus*, for the wings he made himself, and with which he flew several times over the lake Trasymenus. He fell in one of his enterprises; the iron work with which he managed one of his wings having failed; by which accident he broke his thigh: but it was set by the surgeons, and he was afterwards called to Venice to profess mathematics.

DANTZIC, the metropolis of the palatinate of Pomerania in Poland, standing on a branch of the Vistula, about four miles above where it falls into the Baltic; in E. Long. 18. 36. N. Lat. 54. 20. It is large, populous, and rich; and carries on a vast trade, being the chief mart and magazine of Poland, and one of the greatest granaries in the world; so that whole fleets of ships come hither every year to load with corn alone. It consists of the Old and New town, with their suburbs, has a fine harbour, a great number of ships, and had many valuable privileges. Among the last were those of coining money, gathering amber, and sending representatives to the general diets of Poland and the Prussian senate. It is well fortified; but, being commanded by two hills on the south side, cannot sustain a long siege. It is computed that 365,000 lasts of Polish wheat are shipped from this place, one year with another. Hither Poland sends its commodities for exportation, and from hence is chiefly supplied with those of other countries. Among the latter are great quantities of herrings, both Scotch and Dutch. The exports and imports consist of a variety of articles, and furnish a vast deal of business and wealth to the city. The inhabitants, who are computed at 200,000, are mostly Lutherans, with a mixture of Calvinists and Papists. A constant garrison of 200 soldiers is kept in the city. One of the suburbs is called *Scotland*; and the Scots have great privileges in consequence of their gallant defence of the town, under one of the family of Douglas, when it was besieged by the Poles. It is said there are upwards of 30,000 pedlars of that nation in Poland, who travel on foot, and some with three, four, or five horses. In king Charles II.'s time they were about 23,000: in that reign Sir John Denham and Mr Killigrew were sent to take the number of them, and to tax them by the poll, with the king of Poland's licence; which having obtained, they brought home L. 10,000 Sterling, besides their charges in the journey. Here is a Lutheran college with seven professors, and one teacher of the Polish language. At the mouth of the Vistula, which is defended by several forts, is a good harbour belonging to Dantzic. Its territory consists mostly of islands formed by the Vistula and Motlau.—It is hardly credible how this city has changed its masters in competition for the crown of Poland, and what sums have been extorted from it. While the kingdom of Poland remained, Dantzic was under its protection, but governed by its own magistrates in the form of a republic; but since the destruction of that kingdom, the city of Dantzic has been greatly oppressed by the king of Prussia.

DANUBE, the largest and most considerable river in Europe, rising in the Black Forest, near Zunberg;

and running N. E. through Swabia by Ulm, the capital of that country; then running E. through Bavaria and Austria, passes by Ratibon, Passau, Ens, and Vienna. It then enters Hungary, and runs S. E. from Pressburg to Buda, and so on to Belgrade; after which it divides Bulgaria from Molachia and Moldavia, discharging itself by several channels into the Black Sea, in the province of Bessarabia. Towards the mouth, it was called the *Ister* by the ancients; and it is now said, that four of the mouths are choked up with sand, and that there are only two remaining. It begins to be navigable for boats at Ulm, and receives several large rivers as it passes along. It is so deep between Buda and Belgrade, that the Turks and Christians have had men of war upon it; and yet it is not navigable to the Black Sea, on account of the cataracts.

DAPHNE, in fabulous history, the daughter of the river Peneus, was at her own desire turned into a laurel by her father, to avoid the amours of Apollo.

DAPHNE, *Spurge-laurel*; a genus of the monogynia order, belonging to the octandria class of plants. There are 11 species, of which the two following are the most remarkable. 1. The *laureola*, or common spurge laurel, is a native of the woods in many parts of England. It is a low evergreen shrub, rising with several stalks from the root to the height of three feet, garnished with thick spear-shaped leaves sitting close to the branches, of a lucid green colour. Between these to the upper part of the stalks, come out the flowers in small clusters, of a yellowish green colour, and appear soon after Christmas, if the season is not remarkably severe. The leaves continue green all the year, which renders the plants very ornamental; and as they will thrive under tall trees, they are therefore proper to fill up the spaces of plantations. 2. The *mezereon*, or spurge-olive, is a native of England, Germany, &c. and is a very ornamental shrub in gardens. It rises to the height of five or six feet, with a strong woody stalk, putting forth many woody branches, so as to form a regular head. The flowers come out very early in the spring, before the leaves appear, growing in clusters all round the shoots of the former year. There are commonly three flowers produced from each joint or knot, standing on the same short footstalk, which have short swelling tubes divided into four parts at the top, which spread open: they have a very fragrant odour; so that where there are plenty of the shrubs together, they perfume the air to a considerable distance around them. The flowers are of a white or peach-blossom colour. After the flowers are past, the leaves come out, which are spear-shaped, smooth, and placed without order. The flowers are succeeded by oval berries; those of the white kind being yellow; and of the other, red. Both sorts are easily propagated by seeds, which should be sown soon after they are ripe; for if not sown till the next spring, they very often miscarry.

Very happy effects have been found from the use of the first species in rheumatic fevers. It operates as a brisk and rather severe purgative. It is an efficacious medicine in worm cases; but is dangerous in unskillful hands, as being possessed of considerable acrimony. The whole plant hath the same qualities, but the bark of the root is the strongest. Dr Aitton fixes the outside dose at ten grains.—An ointment prepared from the

Daphne.

Dapifer
Darda
nelles.

the bark or the berries of mezereum root hath been successfully applied to ill-conditioned ulcers. The whole plant is very corollive. Six of the berries will kill a wolf. A woman gave 12 grains of the berries to her daughter, who had a quartan ague: she vomited blood, and died immediately. A decoction made of two drams of the cortical part of the root, boiled in three pints of water till one pint is waisted; and this quantity drunk daily, is said to be very efficacious in relolving venereal nodes, and other indurations of the pectorum. The considerable and long-continued heat and irritation produced by this root in the throat when chewed, made Mr Withering think of giving it in a case of difficulty of swallowing, seemingly occasioned by a paralytic affection. The patient was directed to chew a thin slice of the root as often as she could bear it; and, in about two months, she recovered her power of swallowing. She bore the disagreeable irritation and ulcerations its acrimony occasioned in her mouth with great resolution: for she was reduced to skin and bone, and for three years before had suffered extremely from hunger, not being able to satisfy her appetite; for she swallowed liquids very imperfectly, and solids not at all: her complaint came on after lying in.—The plant is eaten by sheep and goats, but refused by cows and horses.

DAPIFER, the dignity or office of grand-master of a prince's household. This title was given by the emperor of Constantinople to the Czar of Russia, as a testimony of favour. In France the like officer was instituted by Charlemagne, under the title of *dapiferat*; and the dignity of dapifer is still subsisting in Germany, the elector of Bavaria assuming the title of *arch-dapifer of the empire*, whose office is, at the coronation of the emperor, to carry the first dish of meat to table, on horse-back.

DAPPLE-BAY, in the menage: When bay horses have marks of a dark bay, they are called *dapple-bays*.

DAPPLE-Black: When a black horse has got spots or marks more black or shining than the rest of his skin, he is called a *dapple-black*.

DARAPT1, among logicians, one of the modes of syllogisms of the third figure, whose premises are universal affirmatives, and the conclusion is a particular affirmative: thus,

DAR- Every body is divisible;

AP- Every body is a substance;

TI, Therefore, some substance is divisible.

DARDA, a town and fort of Lower Hungary, built by the Turks in 1686, and taken by the Imperialists the next year, in whose hands it remains. It is seated on the river Draw, 10 miles from its confluence with the Danube, and at the end of the bridge of Esseck. E. Long 19. 10. N. Lat. 45. 45.

DARDANELLES, two ancient and strong castles of Turkey, one of which is in Romania, and the other in Natolia, on each side the canal formerly called the *Hellepont*. This keeps up a communication with the Archipelago, and the Propontis or Sea of Marmora. The mouth of the canal is four miles and a half over; and the castles were built in 1659, to secure the Turkish fleet from the insults of the Venetians. The ships that come from Constantinople are searched at the castle on the side of Natolia, to see what they have on board.

DARDANUS, son of Jupiter and Eleëtra, founded the city and kingdom of Troy.

DARE, in ichthyology, the same with dace. See **DACE**.

DARIEN, or the Isthmus of Panama, is a province between South and North America, being a narrow isthmus, or neck of land, which joins them together. It is bounded on the north by the North Sea, on the south by the South Sea, on the east by the gulph or river of Darien, and on the west by another part of the South Sea and the province of Veragua. It lies in the form of a bow, or crescent, about the great bay of Panama, in the South Sea; and is 300 miles in length, and 60 in breadth. This province is not the richest, but is of the greatest importance to Spain, and has been the scene of more actions than any other in America. The wealth of Peru is brought hither, and from hence exported to Europe. This has induced many enterprising people to make attempts on Panama, Porto-Bello, and other towns of this province, in hopes of obtaining a rich booty.

The Scotch got possession of part of this province in 1699, and had laid the foundations of a new town, designing to call it *New Edinburgh*; but, as the English were then in alliance with the Spaniards, king William would not permit them to go on. However, this country is not a very desirable place to settle in, it being generally mountainous and barren, as well as excessively hot, and the lower grounds are liable to be suddenly overflowed in the rainy season. Some of the mountains are so high, and of such difficult access, that it requires several days to pass them. It was from these mountains the Spaniards first discovered the South Sea, or Pacific Ocean, in 1513.

DARIL, in logic, one of the modes of syllogism of the first figure, wherein the major proposition is an universal affirmative, and the minor and conclusion particular affirmatives: thus,

DA- Every thing that is moved, is moved by another;

RI- Some body is moved;

I. Therefore, some body is moved by another.

DARIUS, the name of several kings of Persia. See (*History of*) **PERSIA**.

DARKING, a market-town of Surrey in England, situated ten miles east of Guilford. The market is noted for corn and provisions, more especially for fowls. W. Long. 8. 20. N. Lat. 51. 18.

DARLINGTON, a town of the county of Durham, situated in a flat on the river Skerne, which falls into the Tees. It is a pretty large place, has several streets and a spacious market-place. W. Long. 1. 15. N. Lat. 54. 30.

DARMSTADT, a town of Germany in the circle of the Upper Rhine, and capital of the Landgraviate of Hesse-Darmstadt, with a handsome castle, where its own prince generally resides. It is seated on a river of the same name in E. Long. 8. 40. N. Lat. 49. 50.

DARNEL, in botany. See **LILIUM**.

DARNLEY (Lord). See (*History of*) **SCOTLAND**.

DARTFORD, a town of the county of Kent in England, seated on the river Darent not far from its

Dardan
Dartford.

Dartmouth influx into the Thames. E. Long. o. 16. N. Lat. 51.

Date,
Date.

DARTMOUTH, a sea-port town of Devonshire, seated on the river Dart, near its fall into the sea. It is a well frequented and populous place, having a commodious harbour, and a considerable trade by sea. The town is large and well built; but the streets are narrow and bad, though all paved. It has the title of an earldom, and sends two members to parliament. W. Long. 4. o. N. Lat. 50. 25.

DARTOS, in anatomy, one of the coats which form the scrotum. It is called the *dartos muscle*; but Dr Hunter says, that no such muscle can be found, and Albinus takes no notice of it in his tables.

DASYPUS, the *ARMADILLO* or *Tatou*, in zoology; a genus of quadrupeds, belonging to the order of bruta. The dasypus has neither foreteeth nor dogteeth; it is covered with a hard bony shell, intersected with distinct moveable zones or belts: this shell covers the head, the neck, the back, the flanks, and extends even to the extremity of the tail; the only parts to which it does not extend, are the throat, the breast, and the belly, which are covered with a whitish skin of a coarse grain, resembling that of a hen after the feathers are pulled off. The shell does not consist of one entire piece, like that of the tortoise; but is divided into separate belts, connected to each other by membranes, which enable the animal to move it, and even to roll itself up like a hedge-hog. The number of these belts does not depend on the age of the animal, as some have imagined; but is uniformly the same at all times, and serves to distinguish the different species. All the species of this animal were originally natives of America: they were entirely unknown to the ancients; and modern travellers mention them as peculiar to Mexico, Brazil, and the southern parts of America; though some indeed have confounded them with two species of manis, or shell-lizard, which are found in the East Indies: others report that they are natives of Africa, because some of them have been transported from Brazil to the coast of Guinea, where a few have since been propagated: but they were never heard of in Europe, Asia or Africa, till after the discovery of America.—They are all endowed with the faculty of extending and contracting their bodies, and of rolling themselves up like a ball, but not into so complete a sphere as the hedge-hog. They are very inoffensive animals, excepting when they get into gardens, where they devour the melons, potatoes, and other roots. They walk quickly; but can hardly be said to run or leap, so that they seldom escape the pursuit either of men or dogs. But nature has not left them altogether defenceless. They dig deep holes in the earth; and seldom go very far from their subterraneous habitations: upon any alarm, they immediately go into their holes; but, when at too great a distance, they require but a few moments to make one. The hunters can hardly catch them by the tail before they sink their body in the ground; where they stick so close, that the tail frequently comes away and leaves the body in the earth; which obliges the hunters, when they want to take them alive and unimpaired, to dilate the sides of the hole. When they are taken, and find that there is no resource, they instantly roll themselves up, and will not extend their bodies, unless they are held near a

fire. When in deep holes, there is no other method of making them come out, but by forcing in smoke or water. They keep in their holes through the day, and seldom go abroad in quest of subsistence but in the night. The hunters usually chase them with small dogs, which easily come up with them. When the dogs are near, the creatures instantly roll themselves up, and in this condition the hunters carry them off. However, if they be near a precipice they often escape both the dogs and hunters: they roll themselves up, and tumble down like a ball, without breaking their shell, or receiving any injury. The dasypus is a very fruitful animal: the female generally brings forth four young ones every month; which is the reason why the species are so numerous, notwithstanding they are so much fought after on account of the sweets of their flesh. The Indians likewise make baskets, boxes, &c. of the shells which cover their heads.

Linnaeus enumerates six species of dasypus, principally distinguished by the number of their moveable belts. See Plate LXXXVII. fig. 1.

DATA, among mathematicians, a term for such things or quantities as are given or known, in order to find other things thereby that are unknown. Euclid uses the word *data* (of which he hath a particular tract) for such spaces, lines, and angles as are given in magnitude, or to which we can assign others equal.

From the primary use of the word *data* in mathematics, it has been transplanted into other arts; as philosophy, medicine, &c. where it expresses any quantity, which, for the sake of a present calculation, is taken for granted to be such, without requiring an immediate proof for its certainty; called also the *given* quantity, number, or power. And hence also such things as are known, from whence either in natural philosophy, the animal mechanism, or the operation of medicines, we come to the knowledge of others unknown, are now frequently in physical writers called *data*.

DATE, an addition or appendage in writings, acts, instruments, letters, &c. expressing the day and month of the year when the act, or letter, was passed or signed; together with the place where the same was done. The word is formed from the Latin *datum* "given," the participle of *do* "I give."

DATE, the fruit of the phoenix or great palm-tree. This fruit is somewhat in the shape of an acorn. It is composed of a thin, light, and glossy membrane, somewhat pellucid and yellowish; which contains a fine, soft, and pulpy fruit, which is firm, sweet, and somewhat viscid to the taste, esculent, and wholesome; and within this is inclosed a solid, tough, and hard kernel, of a pale grey colour on the outside, and finely marbled within like the nutmeg.—For medicinal uses, dates are to be chosen large, full, fresh, yellow on the surface, soft and tender, not too much wrinkled; such as have a viscid taste, and do not rattle when shaken. They are produced in many parts of Europe, but never ripen perfectly there. The best are from Tunis: they are also very fine and good in Egypt, and in many parts of the east. Those of Spain and France look well; but are never perfectly ripe, and are very subject to decay. They are preserved three different ways: some pressed and dry; others pressed more moderately,

derately, and again moistened with their own juice; and others not pressed at all, but moistened with the juice of other dates, as they are packed up, which is done in baskets or in skins. Those preserved in this last way are much the best. Dates have always been esteemed moderately strengthening and aftringent.

DATI (Carlo), professor of polite learning at Florence. His native country became very famous, as well on account of his works, as of the eulogies which have been bestowed on him by learned men. The chief work to which Dati applied himself, was *Della Pittura Antica*, of which he published an essay in the year 1667. He died in 1675, much lamented, as well for his humanity and amiable manners, as for his parts and learning.

DATISI, in logic, a mode of syllogisms in the third figure, wherein the major is an universal affirmative, and the minor and conclusion particular affirmative propositions. For example,

Da- All who serve God are kings;

Ti- Some who serve God are poor;

si Therefore, some who are poor are kings.

DATIVE, in grammar, the third case in the declension of nouns; expressing the state or relation of a thing to whose profit or loss some other thing is referred. See GRAMMAR.

It is called *dative*, because usually governed by a verb implying something to be given to some person. As, *commodare Socrati*, "to lend to Socrates;" *utilis reipublice*, "useful to the commonwealth;" *pernicius ecclesie*, "pernicious to the church."

In English, where we have properly no cases, this relation is expressed by the sign *to*, or *for*.

DATURA, the THORN-APPLE; a genus of the monogynia order, belonging to the pentandria class of plants. There are six species. The stramonium, or common thorn-apple, rises a yard high, with an erect, strong, round, hollow, green stalk, branching luxuriantly, having the branches widely extended on every side; large, oval, irregularly-angulated, smooth, dark-green leaves; and from the divisions of the branches, large white flowers singly, succeeded by large, oval, prickly capsules, growing erect, commonly called *thorn-apples*. At night the upper leaves rise up and inclose the flowers. The blossoms have sometimes a tinge of purple or violet. The flowers consist of one large, funnel-shaped petal, having a long tube, and spreading pentagonal limb, succeeded by large roundish capsules of the size of middling apples, closely beset with sharp spines. An ointment prepared from the leaves gives ease in external inflammations and in the hæmorrhoids. The seeds were lately recommended by Dr Storck to be taken internally in cases of madness; but they seem to be a very unsafe remedy. Taken even in a small dose, they bring on a delirium, and in a large one would certainly prove fatal. Cows, horses, sheep, and goats, refuse to eat this plant.

DATYL, in natural history, a sort of PHOLAS.

DAUCUS, the CARROT; a genus of the digynia order, belonging to the pentandria class of plants. There are five species; but the only one which merits attention is the carota, or common carrot. This is so well known as to need no description. There are several varieties, as the white, the orange, and the purple carrot; but of these the orange carrot is the most e-

steemed. It grows larger, larger, and is commonly more handsome than the others, being often 15 or 18 inches long in the eatable part, and from two to four in diameter at top. Carrots are propagated by seeds, which are sown at different seasons of the year, in order to procure a supply of young roots for the table at all times. The season for sowing for the earliest crop is soon after Christmas. They should be sown in an open situation, but near a wall; though if they are sown close under it they will be apt to run up to feed too fast, and give no good roots: about eight inches distance is the most proper. They delight in a warm sandy soil, which should be light, and well dug to a good depth, that the roots may meet with no obstruction in running down, so as to make them forked, and shoot out lateral branches. This will happen especially when the ground has been too much dunged the same year that the seeds were sown, which will also occasion them to be worm-eaten. The hairyness of these seeds makes the sowing of them difficult, on account of their being so apt to stick together. Before sowing, therefore, they should be put through a fine chaff sieve; and a calm day should be chosen for sowing them. When sown, they should be trod in with the feet, and the ground raked level over them. When they first come up they should be cut up to four inches distance, and a month after this they are to be cleared again; and if drawn while young, they are now to be left at six inches distance every way: if they are to stand to grow large, they must be separated to ten inches distance. The second season for sowing carrots is in February. This must be done under a wall or hedge, on warm banks: but those which are to be on open large quarters should not be sown till the beginning of March. In July, carrots may be sown for an autumnal crop; and lastly, in the end of August, for those which are to stand the winter. These last will be fit for use in March, before any of the spring ones; but they are seldom so tender or well tasted. In order to preferre carrots for use all winter, they are to be dug up in the beginning of November, and laid in a dry place in sand; and these roots being again planted in February, will ripen seeds in August for succeeding crops: the longest and straightest roots are to be chosen for this purpose.

Under the article AGRICULTURE, n^o 44. we have taken notice of the good properties of carrots as a food for cattle. They have been greatly recommended as proper for fattening hogs; but from some experiments mentioned in the *Georgical Essays*, it appears, that tho' the bacon thus fed is of excellent quality, the feeding is considerably dearer than that fed with pease, pollard, &c. In the same essays, the following experiment is mentioned by Dr Hunter, concerning the propriety of raising carrots for the use of the distiller. "In the month of October (1773), I took 24 bushels of carrots. After being washed, topped, and tailed, I put them into a large brewing copper with four gallons of water; and covering them up with cloths to hasten the maceration, I ordered a fire to be kindled underneath, which in a short time reduced the whole into a tender pulp. They were then put into a common screw-press, and the juice taken from them; which, together with the liquor left in the copper, was run through a flannel bag. The juice was then returned into the copper; and, as it was my design to make it

Daucus,
Davenant.

into ale, I put to it a proportionable quantity of hops. The liquor was then boiled about an hour, when it acquired both the taste and colour of wort. It was next put into a cooler, and afterwards into the working vessel, where the yeast was added to it. It worked kindly, and in all respects was treated as ale. I allowed it to remain in the cask about four months, when I broached it, but found it of a thick, muddy appearance. I attempted to fine it, but in vain. The taste was by no means displeasing, as it much resembled malt liquor. My first intention being frustrated, I threw it into the still, being about 40 gallons in measure, and by two distillations obtained four gallons of a clean proof spirit. It had, however, contracted a flavour from the hop, which should be left out when the intention is to reduce the liquor into spirit. From a gross calculation I am induced to think that a good acre of carrots manufactured in this manner, will leave a profit of L. 40, after deducting the landlord's rent, cultivation, distillation, and other incidental expences. In this calculation, I presume that the spirit is worth six shillings per gallon, and not excised. An acre of barley will by no means produce so much spirit. A rich sandy loam is the best land for carrots; which, after the crop is removed, will be in high cultivation for corn."

Attempts have also been made to prepare sugar from carrots, but without success; a thick syrupy matter like treacle being only obtainable.—Raw carrots are given to children troubled with worms. They pass thro' most people but little changed.—A poultice made of the roots hath been found to mitigate the pain and abate the stench of foul and cancerous ulcers.—Crickets are very fond of carrots; and are easily destroyed by making a paste of powdered arsenic, wheat-meal, and scraped carrots, which must be placed near their habitations.—By their strong antiseptic qualities, a marmalade made from carrots has also been found useful in preventing and curing the sea-scurvy.—The seeds have been reckoned carminative and diuretic; and were formerly much used as a remedy for the stone, but are at present disregarded.—Carrots were first introduced into England, by the Flemings, in the reign of queen Elizabeth.

DAVENANT (Sir William), an eminent poet in the 17th century, was born at Oxford in 1606. After some stay at the university, he entered into the service of Frances first duchess of Richmond, and afterward of Fulke Grevil, lord Brook; who having an excellent taste for poetry, was much charmed with him. He got great esteem by writing poems and plays; and upon the death of Ben Jonhson was created poet-laureat. He wrote his poem *Gondibert* at Paris. He formed a design for carrying over a considerable number of artificers, especially weavers, to Virginia, by the encouragement of Henrietta Maria, the queen-mother of England, who obtained leave for him of the king of France. But he and his company were seized by some parliament ships, and he carried prisoner first to the Isle of Wight, and then to the Tower of London; but, by the mediation of Milton and others, he got his liberty as a prisoner at large. At this time tragedies and comedies being prohibited, he contrived to set up an Opera, to be performed by declamations and music. This Italian opera began in Rutland-house in Charter-

house-yard, 1656; but was afterwards removed to the Cock-Pit in Drury-Lane, and was much frequented for many years. In 1648, his *Madagascar*, with other poems, were printed. He died in 1668.

DAVENANT (Doctor Charles), an eminent civilian and writer, eldest son of the preceding, and educated in Cambridge: he wrote several political tracts; and likewise plays. He was (1685) impowered, with the matter of the revels, to inspect the plays designed for the stage, that no immoralities might be presented. His *Essays on Trade* are in high esteem; and were lately reprinted in 5 vols. 8vo. Doctor Davenant was inspector-general of exports and imports; and died in 1712.

DAVENTRY, or DAINTRY, a handsome town of Northamptonshire in England, situated on the side of a hill on the great road to Chester and Carlisle. W. Long. 1. 15. N. Lat. 52. 12.

DAUGHTER, *filia*, a female child. See the article CHILDREN.

DAVID, king of Israel, and Hebrew poet, was born at Bethlehem 1085, and died 1014 years B. C. His history is particularly recorded in the sacred writings.

St DAVID's, an episcopal town of Pembrokeshire, in S. Wales; but has neither market nor fair. It is seated in a barren soil on the river Ilen, not a mile from the sea-shore. It was once a considerable place, and had walls, which are now demolished; but it is small at present, and thinly inhabited; however, the cathedral is a pretty good structure. From the cape, near this place, there is a prospect into Ireland. W. Lon. 5. 20. N. Lat. 52. 0.

St DAVID's, a town and fort of Asia, in the peninsula on this side the Ganges, and on the coast of Coromandel. It is an English factory, and one of the strongest places they have in the East-Indies. The fort stands close to the river, and the territory belonging to it is 8 miles on the sea-shore, and 4 within land. It produces good long-cloths, chints, calicoes, and muslins. Each house has a garden; and there are plenty of black cattle, but small. The rivers and sea abound with excellent fish. It is 80 miles S. of Fort St George. E. Long. 79. 55. N. Lat. 11. 30.

DAVIES (Sir John), an eminent lawyer and poet, born about the year 1570. He first distinguished himself by his poem *Noſce Teipſum* on the Immortality of the Soul. He became attorney-general, and speaker of the House of Commons in Ireland; and afterward was appointed lord chief justice of the court of King's Bench in England, but died before his installation, in 1626. He published many law tracts; but was esteemed more of a scholar and a wit, than of a lawyer.

DAVILA (Henrico Catherino), a celebrated historian, was born of an illustrious family in the Isle of Cyprus; but was obliged to leave his country, on its being taken by the Turks, in 1571. He first retired to Avila in Spain, whence his family supposed they had derived their name and origin; from thence he went to France, and made himself known at court under the reigns of Henry III. and Henry the Great. He there distinguished himself on several occasions by his valour; and at length went to Venice, where he had a very handsome pension settled upon him by that republic, in whose service his brother Lewis Davila had

been

Davenant
|| Davila.

DAVIS
Dauphin.

been a commander. Davila, while he was at Venice, wrote his admirable History of the Civil Wars of France, which contains every thing worth notice that passed from the death of Henry II. in 1559, to the peace of Vervins in 1598. He was killed about the year 1635, by a gentleman of Verona; who, in a dispute about furnishing him with carriages in pursuance of his having a commission from the republic, discharged a pistol at Davila, and wounded him in such a manner, that he died soon after. Davila's son, a youth of about 18, being present, had the spirit to revenge the death of his father; for, instantly rushing upon the murderer, he cut him in pieces.

DAVIS (John), a famous navigator in the 16th century, was born at Sandridge, near Dartmouth, in Devonshire; and distinguished himself by making three voyages to the most northern parts of America, in order to discover a North-west passage to the East-Indies; in which he discovered the Straits which bear his name. He afterwards performed five voyages to the East-Indies; in the last of which he was slain in a desperate fight with some Japanese, near the coast of Malacca, on the 27th of December 1605. He wrote an account of his second voyage for the discovery of the North-west passage; a Voyage to the East-Indies; and other tracts.

DAVIS'S *Straits*. See *New Britain*.

DAVIT, in a ship, a long beam of timber, represented by *a, a*, Plate LXXXVII. fig. 2. and used as a crane whereby to hoist the flukes of the anchor to the top of the bow, without injuring the sides of the ship as it ascends; an operation which, by mariners, is called *fish- ing the anchor*. The anchors being situated on both the bows, the davit may be occasionally shifted, so as to project over either side of the ship, according to the position of that anchor on which it is employed. The inner end of the davit is secured by being thrust into a square ring of iron *b*, which is bolted to the deck, and forelocked under the beams. This ring, which is called the *span-shackle*, exhibited at large by fig. 9. is fixed exactly in the middle of the deck, and close behind the foremast. Upon the outer end of the davit is hung a large block *c*, through which a strong rope traverses, called the *fish-pendent*, *d*; to whose foremoist end is fitted a large iron hook *e*, and to its after-end a tackle or complication of pulleys *f*; the former of which is called the *fish-hook*, and the latter the *fish-tackle*.

The davit, therefore, according to the sea-phrase, is employed to *fish the anchor*; which being previously *catted*, the fish-hook is fastened upon its flukes; and the effort of the tackle being transmitted to the hook, by means of the fish-pendent, draws up that part of the anchor sufficiently high upon the bow to fasten it, which is done by the *shank painter*. See that article. —There is also a davit of a smaller kind occasionally fixed in the long-boat, and employed to weigh the anchor therein.

DAUPHIN, a title given to the eldest son of France, and heir presumptive of the crown, on account of the province of Dauphiny; which, in 1343, was given to Philip of Valois, on this condition, by Humbert, dauphin of the Viennois.

The seigneurs or lords of Auvergne have likewise borne the appellation of dauphin; but the dauphins of

Dauphiny
Day.

Auvergne held it not till a good while after those of the Viennois, and even received it from them.

DAUPHINY, a province of France, bounded on the west by the river Rhone, on the north by the Rhone and Savoy, on the south by Provence, and on the east by the Alps. Hence the presumptive heir of France is called the Dauphin. In some places it is very fertile; and produces corn, wine, olives, wood, coppers, silk, crystal, iron, and copper. But the greatest part of this province is barren, and the inhabitants are obliged to go into other countries for subsistence. The mountains abound in fables and game of all sorts; and here are fir-trees proper for masts. The principal rivers are, the Rhone, the Durance, the Isere, and the Drone. There a great number of mineral springs; and Grenoble is the capital town.

DAURAT (John), an eminent French poet, born in 1507. In the reign of Henry II. he was preceptor to the king's pages, and Charles IX. who took great delight in his conversation, and honoured him with the title of his poet: but his generosity and want of management, placed him in that class of learned men who have been very near starving. Conformable to the taste of the age, he had so much skill in making anagrams, that several illustrious persons gave him their names to anagrammatise: he also undertook to explain the Centuries of Nostradamus. Making verses was a disease in him: for no book was printed, nor did any person of consequence die, but Daurat made some verses on the occasion; as if he had been poet in ordinary, or his muse had been a hired mourner, to the whole kingdom. Scaliger tells us, that he spent the latter part of his life in endeavouring to find all the bible in Homer. He died in 1588.

DAY, according to the most natural and obvious sense of the word, signifies that space of time during which it continues to be light; in contradistinction to night, being that partition of time wherein it is dark; but the space of time in which it is light, being somewhat vague and indeterminate, the time between the rising and the setting of the sun is usually looked on as the day; and the time which lapses from its setting to its rising again, the night.

The word *day* is often taken in a large sense, so as to include the night also; or to denote the time of a whole apparent revolution of the sun round the earth; in which sense it is called by some a natural day, and by others an artificial one: but, to avoid confusion, it is usual to call it in the former sense simply the *day*, and in the latter a *nychthemeron*; by which term that acceptance of it is aptly denoted, as it implies both day and night.

The *nychthemeron* is divided into twenty-four parts, called *hours*; which are of two sorts, equal and unequal or temporary. See the article *HOUR*.

Different nations begin their day at a different hour. Thus the Egyptians began their day at midnight; from whom Hippocrates introduced that way of reckoning into astronomy, and Copernicus and others have followed him: But the greatest part of astronomers reckon the day to begin at noon, and so count twenty-four hours, till the noon of the next day; and not twice twelve, according to the vulgar computation. The method of beginning the day at midnight prevails also in Great Britain, France, Spain, and most parts of Europe.

Day-coal. Europe. See ASTRONOMY, n° 300.

The Babylonians began their day at sun-rising; reckoning the hour immediately before its rising again, the twenty-fourth hour of the day; from whence the hours reckoned in this way are called the *Babylonic*. In several parts of Germany, they begin their day at sun-setting, and reckon on till it sets next day, calling that the *twenty-fourth hour*: these are generally termed *Italian hours*. The Jews also began their nycthemeron at sun-setting: but then they divided it into twice twelve hours, as we do; reckoning twelve for the day, be it long or short, and twelve for the night; so that their hours continually varying with the day and night, the hours of the day were longer than those of the night for one half year, and the contrary the other; from whence their hours are called temporary: those at the time of the equinoxes became equal, because then those of the day and night are so. The Romans also reckoned their hours after this manner, as do the Turks at this day.

This kind of hours is called *planetary*, because the seven planets were anciently looked upon as presiding over the affairs of the world, and to take it by turns each of these hours, according to the following order: Saturn first, then Jupiter, Mars, the Sun, Venus, Mercury, and last of all the Moon: hence they denominated each day of the week from that planet whose turn it was to preside the first hour of the nycthemeron. Thus, assigning the first hour of Saturday to Saturn, the second will fall to Jupiter, the third to Mars; and so the twenty-second of the same nycthemeron will fall to Saturn again, and therefore the twenty-third to Jupiter, and the last to Mars: so that on the first hour of the next day, it will fall to the Sun to preside; and by the like manner of reckoning, the first hour of the next will fall to the Moon; of the next, to Mars; of the next, to Mercury; of the next, to Venus: hence, the days of the week came to be distinguished by the Latin names of *Dies Saturni, Solis, Lunæ, Martis, Mercurii, Jovis, et Veneris*; and among us, by the names of Saturday, Sunday, Monday, &c.

Day-Coal, in natural history, a name given by the miners of England, and the common people who live in coal-countries, to that seam or stratum of the coal which lies uppermost in the earth. The same vein or stratum of coal usually runs a great way thro' the country, and dips and rises in the earth at different places; so that this upper stratum, or day-coal, is, in the various parts of the same stratum, sometimes near the surface, and sometimes many fathoms deep. The subterranean fires found in some of our coal-countries feed principally on this coal; and are nearer to or farther from the surface, as it rises or sinks.

Day-Net, among fowlers, a net generally used for taking such small birds as play in the air, and will stoop either to prey, gig, or the like; as larks, linnets, buntings, &c. The time of the year for using this net is from August to November; and the best time is very early in the morning: and it is to be observed, that the milder the air, and the brighter the sun is, the better will be the sport, and of longer continuance. The place where this net should be laid, ought to be plain champaign, either on short stubbles, green lays, or flat meadows, near corn-fields, and somewhat remote from towns and villages: you must be sure to let your net

lie close to the ground, that the birds creep not out and make their escape.—The net is made of a fine pack-thread with a small mesh, not exceeding half an inch square; it must be three fathoms long, and but one broad: it must be verged about with a small, but strong, cord; and the two ends extended upon two small, long, poles, suitable to the breadth of the net, with four stakes, tail-strings, and drawing-lines.—This net is composed of two, which must be exactly alike; and are to be laid opposite to one another, so even and close, that when they are drawn and pulled over, the sides must meet and touch each other.—You must stake this net down with strong stakes, very stiff on their lines, so that you may with a nimble touch cast them to and fro at pleasure; then fasten your drawing-cords or hand-lines (of which there must be a dozen at least, and each two yards long) to the upper end of the foremost stakes: and so extend them of such a straightness, that with a little strength they may rise up in the nets, and cast them over.

Your nets being thus laid, place your gigs, or playing-wantons, about 20 or 30 paces beyond, and as much on this side your nets: the gigs must be fastened to the tops of long poles, and turned into the wind, so as they may play to make a noise therein. These gigs are a sort of toys made of long goose-feathers, like shuttle-cocks, and with little small tunnels of wood running in broad and flat swan-quills, made round like a small hoop; and so, with longer strings fastened to a pole, will, with any small wind or air, move after such a manner, that birds will come in great flocks to play about them.

When you have placed your gigs, then place your stake; which is a small stake of wood, to prick down into the earth, having in it a mortice-hole, in which a small and slender piece of wood, about two foot long, is fastened, so as it may move up and down at pleasure: and fasten to this longer stick a small line, which, running through a hole in the stick above-mentioned, and so coming up to the place where you are to sit, you may, by drawing the line up and down with your right hand, raise up the longer stick as you see occasion.

Fasten a live lark, or such like bird, to this longer stick, which, with the line making it to stir up and down by your pulling, will entice the birds to come to your net.

There is another stake, or enticement, to draw on these birds, called a *looking-glass*; which is a round stake of wood, as big as a man's arm, made very sharp at the end, to thrust it into the ground: they make it very hollow in the upper part, above five fingers deep; into which hollow they place a three-square piece of wood about a foot long, and each two inches broad, lying upon the top of the stake, and going with a foot into the hollowness: which foot must have a great knob at the top, and another at the bottom, with a deep slenderness between; to which slenderness you are to fasten a small pack-thread, which, running through a hole in the side of the stake, must come up to the place where you sit. The three-square piece of wood which lies on the top of the stake, must be of such a poise and evenness, and the foot of the socket so smooth and round, that it may whirl and turn round upon the least touch; winding the pack-thread so many times about it,

Days,
Daze.

it, which being suddenly drawn, and as suddenly let go, will keep the engine in a constant rotatory motion: then fasten with glue on the uppermost flat squares of the three-square piece, about twenty small pieces of looking-glass, and paint all the square wood between them of a light and lively red: which, in the continual motion, will give such a reflection, that the birds will play about to admiration until they are taken.

Both this and the other fable are to be placed in the middle between the two nets, about two or three feet distance from each other; so that, in the falling of the nets, the cords may not touch or annoy them: neither must they stand one before or after another; the glass being kept in a continual motion, and the bird very often fluttering. Having placed your nets in this manner, as also your gigs and fables, go to the further end of your long-drawing lines and fable lines; and, having placed yourself, lay the main drawing line across your thigh, and, with your left, pull the fable-line to shew the birds; and when you perceive them to play near and about your nets and fables, then pull the net over with both hands, with a quick, but not too hasty motion; for otherwise your sport will be spoiled.

See Plate XCV. fig. 1. where A shews the bodies of the main net, and how they ought to be laid. B, the tail-lines, or the hinder lines, flaked to the ground. C, the fore-lines flaked also to the ground. D, the bird-fable. E, the looking-glass fable. G, the line which draws the bird-fable. H, the line that draws the glass-fable. I, the drawing, double lines of the nets, which pull them over. K, the flakes which flake down the four nether points of the net, and the two tail-lines. L, the flakes that flake down the fore-lines. M, the single line, with the wooden button to pull the net over with. N, the flake that flakes down the single line, and where the man should sit; and Q the gite.

DAYS of Grace are those granted by the court at the prayer of the defendant, or plaintiff, in whose delay it is.

Days of grace, in commerce, are a customary number of days allowed for the payment of a bill of exchange, &c. after the same becomes due.

Three days of grace are allowed in Britain; ten in France and Dantzic; eight at Naples; six at Venice, Amsterdam, Rotterdam, and Antwerp; four at Frankfurt; five in Leipzig; twelve at Hamburg; six in Portugal; fourteen in Spain; thirty in Genoa, &c.

Day's-Man, in the north of England, an arbitrator or person chosen to determine an affair in dispute.

Intercalary Days. See **INTERCALARY Days**.

Day's-Work, among seamen, the reckoning or account of the ship's course during 24 hours, or between noon and noon, according to the rules of trigonometry. See **DEAD-RECKONING**.

DAZE, in natural history, a name given by our miners to a glittering sort of stone, which often occurs in their works; and, as it is unprofitable substance, is one of those things they call *wrecks*. The word *daze* takes in with them every stone that is hard and glittering; and therefore it comprehends the whole genus of the telangia, or stony modules, which have the flakes of talc in their substance: these, according to the colour of the stony matter they are bedded in, and their own colour, give the names of *black daze*, *white*, *red*,

and *yellow daze*, to these stones.

DEACON, DIACONUS, a person in the lowest degree of holy orders, whose business is to baptize, read in the church, and assist at the celebration of the eucharist. The word is formed from the Latin *Diaconus*, of the Greek *διακονος*, minister, servant. Deacons were instituted seven in number, by the apostles, *Act.* chap. vi. which number was retained a long time in several churches. Their office was to serve in the Agapæ, and to distribute the bread and wine to the communicants. Another part of the office of deacons, was to be a sort of monitors and directors to the people in the exercise of their public devotions in the church; for which purpose they made use of certain known forms of words, to give notice when each part of the service began. Whence they are sometimes called *eirokerukes*; "the holy cryers of the church."

Deacons had, by licence and authority from the bishop, a power to preach, to reconcile penitents and grant them absolution, and to represent their bishops in general councils. Their office out of the church was to take care of the necessitous, such as orphans, widows, prisoners, and all the poor and sick who had any title to be maintained out of the revenues of the church; to inquire into the morals and conversation of the people, and to make their report thereof to the bishop. Whence, on account of the variety of business, it was usual to have several deacons in the same church.

In the Romish church, it is the deacon's office to incense the officiating priest or prelate; to lay the corporal on the altar; to receive the patten or cup from the subdeacon, and present them to the person officiating; to incense the choir; to receive the pax from the officiating prelate, and carry it to the subdeacon; and at the pontifical mass, when the bishop gives the blessing, to put the mitre on his head, and to take off the archbishop's pall and lay it on the altar. In England, the form of ordaining deacons, declares that it is their office to assist the priest in the distribution of the holy communion; in which, agreeably to the practice of the ancient church, they are confined to the administering the wine to the communicants. A deacon in England is not capable of any ecclesiastical promotion; yet he may be a chaplain to a family, curate to a beneficed clergyman, or lecturer to a parish-church. He may be ordained at 23 years of age, *anno corrente*; but it is expressly provided, that the bishop shall not ordain the same person a priest and deacon in the same day. Deacons, according to St Paul, should be chaste, sincere, and blameless; neither great drinkers, nor given to filthy lucre: they should hold the mystery of the faith in a pure conscience; and should be well approved before they are admitted to the ministry.

DEACONESS, a female deacon; an order of women who had their distinct offices and services in the primitive church. This office appears as ancient as the apostolical age; for St Paul calls Phebe a servant of the church of Cenchrea. The original word is *διακονος*, answerable to the Latin word *ministra*. Tertullian calls them *vidue*, widows, because they were commonly chosen out of the widows of the church; and, for the same reason, Epiphanius, and the council of Laodicea, calls them *πρεβυτερας*, elderly women, because none but such were ordinarily taken into this office. For, indeed, by some ancient laws, these four quali-

Deacon,
Deaconess.

qualifications were required in every one that was to be admitted into this order. 1. That she should be a widow. 2. That she should be a widow that had born children. 3. A widow that was but once married. 4. One of a considerable age, 40, 50, or 60 years old. Though all these rules admitted of exceptions. Concerning their ordination, whether it was always performed by imposition of hands, the learned are much divided in their sentiments. Baronius and Valefius think they were not, and make no other account of them than as mere lay-perfons. But the author of the constitutions, speaking of their ordination, requires the bishop to use imposition of hands, with a form of prayer which is there recited. We are not, however, to imagine, that this ordination gave them any power to execute any part of the sacerdotal office. They were only to perform some inferior services of the church, and those chiefly relating to the women for whose fakes they were ordained. One part of their office was to assist the minister at the baptizing of women, to undress them for immersion, and to dress them again, that the whole ceremony might be performed with all the decency becoming so sacred an action. Another part of their office was to be private catechists to the women-catechumens who were preparing for baptism. They were likewise to attend the women that were sick and in distress; to minister to martyrs and confessors in prison; to attend the womens gate in the church; and, lastly, to assign all women their places in the church, regulate their behaviour, and preside over the rest of the widows; whence in some canons they are styled *regulatrici*, "governesses." This order, which since the 10th or 12th century has been wholly laid aside, was not abolished every where at once, but continued in the Greek church longer than in the Latin, and in some of the Latin churches longer than in others.

DEAD LANGUAGES. See PHILOLOGY, chap. iii. *Preservation of Dead Bodies.* See EMBALMING.

DEAD-LIGHTS, certain wooden ports which are made to fasten into the cabin windows, to prevent the waves from gushing into the ship in a high sea. As they are made exactly to fit the windows, and are strong enough to resist the waves, they are always fixed in on the approach of a storm, and the glass lights taken out, which must otherwise be shattered to pieces by the surges, and suffer great quantities of water to enter the vessel.

DEAD-mens-eyes, in the sea-language, a kind of blocks with many holes in them, but no sheevers, whereby the shrouds are fastened to the chains: the crow-feeve reeve also through these holes; and, in some ships, the main-flays are set tight in them; but then they have only one hole, through which the lanyards are passed several times. See Plate LXXXVII. fig. 3.

DEAD'S Part. See LAW, N^o clxxi. 6.

DEAD-Reckoning, in navigation, the judgement or estimation which is made of the place where a ship is situated; without any observation of the heavenly bodies. It is discovered by keeping an account of the distance she has run by the log, and of her course steered by the compass; and by rectifying these data by the usual allowances for drift, lee-way, &c. according to the ship's known trim. This reckoning, however, is always to be corrected, as often as any good observation of the sun can be obtained.

DEAD-Sea, in geography, a lake of Judea, into which

the river Jordan discharges itself; being about 70 miles long, and 20 broad. See ASPHALTITES.

DEAD-Tops, a disease incident to young trees, and cured by cutting off the dead parts close to the next good twig or shoot, and claying them over as in grafting.

DEAD-Water, at sea, the eddy-water just astern of a ship; so called, because it does not pass away so swift as the water running by her sides does. They say that a ship makes much dead-water, when she has a great eddy following her stern.

DEADLY-CARROT. See THAPSIA.

DEADLY-Feud, in English law-books, a profession of irreconcilable enmity, till a person is revenged by the death of his enemy. The word *feud* is derived from the German *Fehd*; which, as Hottoman observes, signifies *modo bellum, modo capitales inimicitias* *. Such enmity and revenge was allowed by law in the time of the Saxons, viz. If any man was killed, and a pecuniary satisfaction was not made to the kindred, it was lawful for them to take up arms and revenge themselves on the murderer: which was called *deadly feud*. And this probably was the original of an *APPEAL*.

DEAFNESS, the state of a person who wants the sense of hearing; or the disease of the ear, which prevents its due reception of sounds †.

Deafness generally arises either from an obstruction, or a compression, of the auditory nerve; or from some collection of matter in the cavities of the inner ear; or from the auditory passage being stopped up by some hardened excrement; or, lastly, from some excrescence, a swelling of the glands, or some foreign body introduced within it.

Those born deaf are also dumb, as not being able to learn any language; at least in the common way. However, as the eyes in some measure serve them for ears, they may understand what is said by the motion of the lips, tongue, &c. of the speaker; and even accustom themselves to move their own, as they fee other people do; and by this means learn to speak.—Thus it was that Dr Wallis taught two young gentlemen born deaf, to know what was said to them, and to return pertinent answers. Digby gives us another instance of the same, within his own knowledge. And there was a Swiss physician lately living at Amsterdam, one John Conrad Amman, who effected the same in several children born deaf, with surprising success. He has reduced the thing to a fixed art or method, which he has published in his *Surdus Loquens*, Amstelod. 1692, and *de Loquela*, ibid. 1700.

In the Phil. Trans. N^o 312. we have an account by Mr Waller, R. S. Secr. of a man and his sister, each about 50 years old, born in the same town with Mr Waller, who had neither of them the least sense of hearing; yet both of them knew, by the motion of the lips only, whatever was said to them, and would answer pertinently to the question propoed. It seems they could both hear and speak when children; but lost their sense afterwards; whence they retained their speech, which, though uncouth, was yet intelligible.

Such another instance is that of Mr Goddy's daughter, minister of St Gervais in Geneva, related by bishop Burnet. "At two years old they perceived she had lost her hearing; and ever since, though she hears great noises, yet hears nothing of what is said to her.

But

† See (Index subjoined to) Medicine.

* See Feud.

Deal
Dean.

But by observing the motions of the mouth and lips of others, she acquired so many words, that out of these she has formed a sort of jargon, in which she can hold conversation whole days with those that can speak her language. She knows nothing that is said to her, unless she see the motion of their mouths that speak to her; so that in the night they are obliged to light candles to speak to her. One thing will appear the strangest part of the whole narration: she has a filter, with whom she has practised her language more than with any body else; and in the night, by laying her hand on her filter's mouth, she can perceive by that what she saith, and so can discourse with her in the dark." *Burn. Let. IV. p. 248.*

It is observable that deaf persons, and several others thick of hearing, hear better and more easily if a loud noise be raised at the time when you speak to them: which is owing, no doubt, to the greater tension of the ear-drum on that occasion. Dr Willis mentions a deaf woman, who, if a drum were beat in the room, could hear any thing very clearly; so that her husband hired a drummer for a servant, that by this means he might hold conversation with his wife. The same author mentions another, who, living near a steeple, could always hear very well if there was a ringing of three or four bells, but never else.

DEAL, a thin kind of fir-planks, of great use in carpentry: they are formed by sawing the trunk of a tree into a great many longitudinal divisions, of more or less thickness according to the purposes they are intended to serve.

A very good method of seasoning planks of deal and fir, is to throw them into salt water as soon as they are sawed; and keep them there three or four days, frequently turning them. In this case they will be rendered much harder, by drying afterwards in the air and sun: but neither this nor any other method yet known will preserve them from shrinking.

Rods of deal expand laterally, or cross the grain, in moist weather, and contract again in dry; and thence have been found to make an useful hygrometer.

DEAL, a town of Kent in England, lying between Dover and Sandwich, in E. Long. 1. 30. N. Lat. 51. 16. is supposed to be the *Dola* of Nennius, and is situated on a flat and level coast. This town, according to Dr Campbell, justifies an observation he had made in favour of situations of this kind, viz. that they are less liable than others to be injured by the sea. The town of Deal, as far as we are able to judge, except it may be the sea's shrinking a little from it, is in much the same condition in which it ever was, even from the earliest accounts. The learned Dr Halley has proved, *Miscellanea Curiosa*, vol. iii. p. 426, that Julius Cæsar landed here, August 26th, the year before the coming of Christ 55.—The great conveniency of landing, has been of infinite service to the place; so that it is large and populous, divided into the upper and lower towns, adorned with many fair buildings, and is in effect the principal place on the Downs.

DEAN, an ecclesiastical dignity in cathedral and collegiate churches, and head of the Chapter.

Rural DEAN, called also *Arch-prefbyter*, originally exercised jurisdiction over ten churches in the country, and afterwards became only the bishop's substitute, to grant letters of administration, probate of wills, &c.;

Dean
Death.

to convocate the clergy; and to signify to them sometimes by letters the bishop's will, and to give induction to the arch-deacon. Their office is now lost in that of the arch-deacons and chancellors.

DEAN of a *Monastery*, was a superior established under the abbot, to ease him in taking care of ten monks; whence he was called *decanus*.

DEAN and *Chapter*, are the council of the bishop, to assist him with their advice in affairs of religion, and also in the temporal concerns of his see. When the rest of the clergy were settled in the several parishes of each diocese, these were reserved for the celebration of divine service in the bishop's own cathedral; and the chief of them, who presided over the rest, obtained the name of *decanus* or *dean*, being probably at first appointed to superintend ten canons or prebendaries.

All ancient deans are elected by the chapter, by *congregatio* from the king, and letters missive of recommendation; in the same manner as bishops: but in those chapters that were founded by Henry VIII. out of the spoils of the dissolved monasteries, the deanery is donative, and the installation merely by the king's letters patent. The chapter, consisting of canons or prebendaries, are sometimes appointed by the king, sometimes by the bishop, and sometimes elected by each other.

The dean and chapter, are the nominal electors of a bishop. The bishop is their ordinary and immediate superior; and has, generally speaking, the power of visiting them; and correcting their excesses and enormities. They had also a check on the bishop at common law; for till the statute 32 Hen. VIII. c. 28, his grant or lease would not have bound his successors, unless confirmed by the dean and chapter.

DEAN of *Guild*. See LAW, N° clviii. 11.

DEANERY, the office of a DEAN.—Deaneries and prebends may become void, like a bishopric, by death, by deprivation, or by resignation either to the king or bishop. If a dean, prebendary, or other spiritual person, be made a bishop, all the preferments of which he was before possessed are void; and the king may present to them, in right of his prerogative royal. But they are not void by the election, but only by the consecration.

DEATH is generally considered as the separation of the soul from the body; in which sense it stands opposed to life, which consists in the union thereof.

Physicians usually define death by a total stoppage of the circulation of the blood, and a cessation of the animal and vital functions consequent thereon; as respiration, sensation, &c.

An animal body, by the actions inseparable from life, undergoes a continual change. Its smallest fibres become rigid; its minute vessels grow into solid fibres no longer pervious to the fluids; its greater vessels grow hard and narrow; and every thing becomes contracted, closed, and bound up: whence the dryness, immobility, and extenuation, observed in old age. By such means the offices of the minute vessels are destroyed; the humours stagnate, harden, and at length coalesce with the solids. Thus are the subtillest fluids in the body intercepted and lost, the concoction weakened, and the reparation prevented; only the coarser juices continue to run slowly through the greater vessels, to the preservation of life, after the animal functions

tions are destroyed. At length, in the process of these changes, death itself becomes inevitable, as the necessary consequence of life. But it is rare that life is thus long protracted, or that death succeeds merely from the decays and impairment of old age. Diseases, a long and horrid train, cut the work short.

The signs of death are in many cases very uncertain. If we consult what Winslow or Bruchier have said on this subject, we shall be convinced, that between life and death the shade is so very undistinguishable, that even all the powers of art can scarcely determine where the one ends and the other begins. The colour of the visage, the warmth of the body, and suppleness of the joints, are but uncertain signs of life still subsisting; while, on the contrary, the paleness of the complexion, the coldness of the body, the stiffness of the extremities, the cessation of all motion, and the total insensibility of the parts, are but uncertain marks of death begun. In the same manner also, with regard to the pulse and breathing; these motions are often so kept under, that it is impossible to perceive them. By bringing a looking-glass near to the mouth of the person supposed to be dead, people often expect to find whether he breathes or not. But this is a very uncertain experiment: the glass is frequently filled by the vapour of the dead man's body; and often the person is still alive, though the glass is no way tarnished. In the same manner, neither burning nor scarifying, neither noises in the ears nor pungent spirits applied to the nostrils, give certain signs of the discontinuance of life; and there are many instances of persons who have endured them all, and afterwards recovered, without any external assistance, to the astonishment of the spectators. This ought to be a caution against hasty burials, especially in cases of sudden death, drowning, &c.

DEATH in Law. In law, there is a natural death and a civil death: natural, where nature itself expires; civil, where a person is not actually dead, but adjudged so by law. Thus, if any person, for whose life an estate is granted, remains beyond sea, or is otherwise absent, seven years, and no proof made of his being alive, he shall be accounted naturally dead.

LAW of DEATHBED. See LAW, N° cxxxix. 38—41.

DEATH-Watch, in natural history, a little insect famous for a ticking noise, like the beat of a watch, which the vulgar have long taken for a preface of death in the family where it is heard: whence it is also called *pediculus, fatidicus, mortifaga, pulsatorius*, &c.

There are two kinds of death-watches. Of the first we have a good account in the Phil. Trans. by Mr Allen. It is a small beetle $\frac{1}{2}$ of an inch long, of a dark-brown colour, spotted; having pellucid wings under the vagina, a large cap or helmet on the head, and two antennæ proceeding from beneath the eyes, and doing the office of proboscides. The part it beats withal, he observed, was the extreme edge of the face, which he chuses to call the upper-lip, the mouth being protracted by this bony part, and lying underneath out of view.

This account is confirmed by Dr Derham; with this difference, that instead of ticking with the upper-lip, he observed the insect to draw back its mouth, and beat with its forehead. That author had two death-watches, a male and a female, which he kept alive in a box several months; and could bring one of them to

beat whenever he pleased, by imitating its beating. By his ticking noise he could frequently invite the male to get up upon the other in the way of coition. When the male found he got up in vain, he would get off again, beat very eagerly, and then up again: Whence the ingenious author concludes, those pulsations to be the way whereby these insects woo one another, and find out and invite each other to copulation.

The second kind of death-watch is an insect in appearance quite different from the first. The former only beats seven or eight strokes at a time, and quicker; the latter will beat some hours together without intermission; and his strokes are more leisurely, and like the beat of a watch. This latter is a small greyish insect, much like a louse when viewed with the naked eye.

It is very common in all parts of the house in the summer-months: it is very nimble in running to shelter, and shy of beating when disturbed; but will beat very freely before you, and also answer the beating, if you can view it without giving it disturbance, or shaking the place where it lies, &c. The author cannot say whether they beat in any other thing, but he never heard their noise except in or near paper. As to their noise, the same person is in doubt, whether it be made by their heads, or rather snouts, against the paper; or, whether it be not made after some such manner as grasshoppers and crickets make their noise. He inclines to the former opinion: the reason of his doubt is, that he observed the animal's body to shake and give a jerk at every beat, but could scarce perceive any part of its body to touch the paper. But its body is so small and near the paper, and its motion in ticking so quick, that he thinks it might be, yet he not perceive it. The ticking, as in the other, he judges to be a wooing-aft; as having observed another, after much beating, come and make offers to the beating insect, who, after some offers, left off beating, and got upon the back of the other. When they were joined, he left off again; and they continued some hours joined tail to tail, like dog and bitch in coition. Whether this insect changes its shape and becomes another animal, or not, he cannot say; though he has some cause to suspect that it becomes a sort of fly. It is at first a minute white egg, much smaller than the nits of lice; though the insect is near as big as a louse. In March it is hatched, and creeps about with its shell on. When it first leaves its shell, it is even smaller than its egg; though that be scarce discernible without a microscope. In this state it is perfectly like the mites in cheese: from the mite-state they grow gradually to their mature perfect state; when they become like the old ones, they are at first very small, but run about much more swiftly than before.

DEBENTURE, a term of trade used at the custom-house for a kind of certificate signed by the officers of the customs, which entitles a merchant exporting goods to the receipt of a bounty or draw-back. All merchandises that are designed to be taken on board for that voyage being entered and shipped, and the ship being regularly cleared out, and failed out of port on her intended voyage, debentures may be made out from the exporter's entries, in order to obtain the drawbacks, allowances, bounties, or premiums; which debentures for foreign goods are to be paid within one month after demand. And in making out these debentures, it must be observed, that every piece of vel-

Debenture || **Decalogue.** lum, parchment, or paper, containing any debenture for drawing back customs or duties, must, before writing, be stamped, and pay a duty of 8d.

The forms of debentures vary, according to the merchandise exported. In the execution of debentures for tobacco, it must be particularly observed, 1. That debentures for the same quantity, may be made on one or more parchments. 2. That the exporter's oath must be printed, specifying whether he acts for himself or on commission. If exported to any other foreign ports than Ireland, the word *Ireland* must be added to the oath after *Great-Britain*. 4. That as no tobacco may be consumed on board ships of war in Europe, but what has paid full duties, and been manufactured in Great Britain, no drawback is to be allowed for tobacco exported in any man of war. 5. That the eight pounds *per* hoghead of 350 pounds, or more, allowed for draught at importation, must not be deducted on exportation. 6. That debentures for tobacco exported to Ireland, must not be paid till a certificate be produced, testifying the landing thereof. 7. That no persons may swear to the exportation, but such as are permitted to swear to debentures for other goods. In debentures for all other foreign goods, no person may be admitted to swear to the exportation, but the true exporter, either as a proprietor, or who, being employed by commission, is concerned in the direction of the voyage. All kinds of debentures, before delivered or paid to the exporters, are entered into a separate book kept for that purpose by the collector and comptroller of the customs.

DEBITA FUNDI. See LAW, N° clxvi. 1.

DEBITA Frustrum. See LAW, N° clxx. 17.

DEBILITY, among physicians, a relaxation of the solids, occasioning oftentimes weaknesses and faintings.

DEBRECHEN, a town of Upper Hungary, about 77 miles east of Buda: E. Long. 21. 10. N. Lat. 47. 45.

DEBRUIZED, in heraldry, a term peculiar to the English, by which is intimated the grievous restraint of any animal, debarred of its natural freedom, by any of the ordinaries being laid over it.

DEBT, in law, any thing due to another, whether it be money, goods, or services; or the action brought for recovering the same.

DEBTOR, a person who owes any thing to another; in contradistinction to creditor, which is he to the debt is owing.

DEBTOR, in merchants accounts. See BOOK-KEEPING.

DECAGON, in geometry, a plane figure with ten sides and ten angles.

DECAGYNIA, (from *deka ten*, and *gyn a woman*;) the name of an order, or secondary division, in the class decandria, of the sexual method, consisting of plants whose flowers are furnished with ten stamens and the same number of styles; which last are considered by Linnaeus, and the sexualists, as the female organs of generation in plants. Neurada, and American night-shade, furnish examples.

DECALOGUE, the ten precepts or commandments delivered by God to Moses, after engraving them on two tables of stone.

The Jews, by way of excellence, call these commandments the *ten words*, from whence they had af-

terwards the name of *decalogue*: but it is to be observed, that they joined the first and second into one, and divided the last into two: they understand that against stealing, to relate to the stealing of men, or kidnapping; alleging, that the stealing one anothers goods or property, is forbidden in the last commandment.

The emperor Julian objected to the decalogue, that the precepts it contained (those only excepted which concern the worship of false gods, and the observance of the sabbath) were already so familiar to all nations, and so universally received, that they were unworthy, for that very reason, to be delivered, by so great a legislator, to so peculiar a people. The church of Rome has struck the second commandment quite out of the decalogue; and to make their number complete, hath split the tenth into two: The reason of which may be easily conceived.

DECAN, a kingdom of Asia, in the peninsula on this side the Ganges, bounded on the south by the kingdom of Bissnagar, on the west by the ocean, on the north by Mogulistan, and on the east by the mountains which separate it from Golconda.

DECANDRIA (*deka ten*, and *ang a husband*); Linnaeus's tenth class, comprehending those hermaphrodite plants which bear flowers with ten stamens. See BOTANY, p. 1292, and Plate LIX. fig. 10.

DECANTATION, among chemists, &c. the gently pouring off a liquor from its feces, by inclining the lip or *canthus* of the vessel; whence the name.

DECANUS, in Roman antiquity, an officer who presided over the other ten officers, and was head of the contubernum, or serjeant of a file of soldiers.

DECAPROTI, **DECEMPRIMI**, in Roman antiquity, officers for gathering the tributes and taxes.

The decaproti were also obliged to pay for the dead, or to answer to the emperor for the quota parts of such as died, out of their own estates.

DECASTYLE, in the ancient architecture, a building with an ordnance of ten columns in front, as the temple of Jupiter Olympius was.

DECEIT, in law; a subtle trick, or device, to which may be added all manner of craft and collusion, or underhand practice, used to defraud another, by any means whatever.

DECEMBER, the last month of the year, consisting of thirty-one days; and so called as being the tenth month in the Roman year, which commenced with March.

DECEMPEDA, in antiquity, a rule or rod divided into ten feet, each of which was subdivided into inches, and those into digits, used in measuring of land, and by architects, in giving the proper dimensions and proportions to the parts of their buildings.

DECEMVIRI, in Roman antiquity, ten magistrates chosen annually at Rome, to govern the commonwealth instead of consuls, with an absolute power to draw up and make laws for the people.

One of the decemvirs had all the ensigns and honours of the function, and the rest had the like in their turn, during the year of their decemvirate. In them was vested all the legislative authority ever enjoyed by the kings, or, after them, by the consuls. It was the decemviri that drew up the laws of the Twelve Tables, thence called *leges decemvirales*, which were the whole or the Roman law for a considerable time.

Decan

Decemviri.

Decennalia
||
Decius.

DECENNALIA, ancient Roman festivals, celebrated by the emperors every tenth year of their reign, with sacrifices, games, and largesses for the people. The emperor Augustus first instituted these solemnities, in which he was imitated by his successors. At the same time the people offered up vows for the emperor, and for the perpetuity of the empire; which were therefore called *vota decennalia*. Augustus's view in establishing the decennalia was to preserve the empire and the sovereign power without offence or restraint to the people. For during the celebration of this feast, that prince used to surrender up all his authority into the hands of the people; who, filled with joy, and charmed with the goodness of Augustus, immediately delivered it him back again.

DE CHALES (Claudius Francis Milliet), an excellent mathematician, mechanic, and astronomer, descended from a noble family, and born at Chamberry in 1611. His principal performances are an edition of Euclid's elements of geometry, in which the unserviceable propositions are rejected, and the uses of those retained, annexed; a discourse on fortification; and another on navigation. These with others have been collected, first in 3 vols folio, and afterwards in 4, under the title of *Mundus Mathematicus*: being indeed a complete course of mathematics. He died in 1678, professor of mathematics in the university of Turin.

DECIDUOUS, an appellation chiefly used in respect of plants: thus, the calix or cup of a flower is said to be *deciduous*, when it falls along with the flower-petals; and, on the contrary, it is called *permanent*, when it remains after they are fallen. Again, deciduous leaves are those which fall in autumn; in contradistinction to those of the ever-greens, which remain all the winter. See **DEFOLIATION**.

DECLI, in astronomy, an aspect or position of two planets, when they are distant from each other a tenth part of the zodiac.

DECIMAL ARITHMETIC, the art of computing by decimal fractions. See **ARITHMETIC**.

DECIMATION, a punishment inflicted by the Romans, on such soldiers as quitted their posts, or behaved themselves cowardly in the field. The names of the guilty were put into an urn or helmet, and as many were drawn out as made the tenth part of the whole number, and these were put to the sword and the others saved. This was called *decimare*; a word of the ancient Roman militia, who, to punish whole legions, when they had failed in their duty, made every tenth soldier draw lots, and put him to death for an example to the others.

As the Romans had their decimatio, they had also the vicefimatio, and even centesimatio, when only the 20th or 100th man suffered by lot.

DECIPHERING, the art of finding the alphabet of a cipher. For the art both of Ciphering and Deciphering, see the article **CIPHER**.

DECIVS (Publius), the Roman consul, and brave general, memorable for devoting himself for his country, in a battle with the Latins 340 B. C. Decius Mus, his son, followed his father's example, as did a grandson. The custom was, that the officer who devoted himself to the gods for the service of his country, after certain ceremonies of consecration, rushed completely armed into the midst of the enemy's fore-

most ranks, when their own depaired of victory: tho' this was an act of superstition which proved fatal to the hero, it reanimated his party, and occasioned them to gain the battle. See **DEVOTION**.

DECIVS, the Roman emperor. He persecuted the Christians, which was accounted the 7th persecution. At last he drowned himself in a marsh, that he might escape his enemies; who had killed his son, and defeated his army; A. D. 251.

DECK of a SHIP, (from *decken*, Dan. to cover); the planked floors of a ship, which connect the sides together, and serve as different platforms to support the artillery and lodge the men, as also to preserve the cargo from the sea in merchant-vessels. As all ships are broader at the lower deck than on the next above it, and as the cannon thereof are always heavier, it is necessary that the frame of it should be much stronger than that of the others; and for the same reason the second or middle deck ought to be stronger than the upper deck or forecaille.

Ships of the first and second rates are furnished with three whole decks, reaching from the stem to the stern, besides a forecaille and a quarter-deck, which extends from the stern to the mainmast; between which and the forecaille a vacancy is left in the middle, opening to the upper deck, and forming what is called the *waist*. There is yet another deck above the hinder or utmost part of the quarter-deck, called the *poop*, which also serves as a roof for the captain's cabin or couch.

The inferior ships of the line of battle are equipped with two decks and a half; and frigates, sloops, &c. with one gun-deck and a half, with a spar-deck below to lodge the crew.

The decks are formed and sustained by the beams, the clamps, the water-ways, the carlings, the ledges, the knees, and two rows of small pillars called *stanchions*, &c. See those articles.

That the figure of a deck, together with its corresponding parts, may be more clearly understood, we have exhibited a plan of the lower-deck of a 74 gun ship in Plate LXXXVIII. And as both sides of the deck are exactly similar, the pieces by which it is supported appear on one side, and on the other side the planks of the floor of which it is composed, as laid up on those upper pieces.

A, the principal or main hatch-way.

B, the stern-post.

C, the stem.

D, the beams, composed of three pieces, as exhibited by D, in one of which the dotted lines shew the arrangement of one of the beams under the other side of the deck.

E, part of the vertical, or hanging knees.

F, the horizontal or lodging knees, which fasten the beams to the sides.

G, the carlings ranging fore and aft, from one beam to another.

H, the gun-ports.

I, the pump-decies, being large wooden tubes, which return the water from the pumps into the sea.

K, the spurs of the beams, being curved pieces of timber serving as half-beams to support the decks, where a whole beam cannot be placed on account of the hatchways.

Decius,
Deck.

Deck,
Declama-
tion.

Declama-
tion.

L, the wing-transom, which is bolted by the middle to the stern-post, and whose ends rest upon the fashion-pieces.

M, the bulk-head or partition, which incloses the manger, and prevents the water which enters at the hawse-holes from running aft between decks.

N N, the fore hatch-way.

O O, the after hatch-way.

P, the drum-head of the gear capstern.

P p, the drum-head of the main capstern.

Q, the wing-transom knee.

R, one of the breast-hooks under the gun-deck.

S, the breast-hook of the gun-deck.

T T, the station of the chain-pumps.

V, the breadth and thickness of the timbers at the height of the gun-deck.

U U, scuttles leading to the gunner's store-room, and the bread-room.

W, the station of the fore-mast.

X, the station of the main-mast.

Y, the station of the mizen-mast.

Z, the ring-bolts of the decks, used to retain the cannon whillit charging.

a a, The ring-bolts of the sides whereon the tackles are hooked that secure the cannon at sea.

c a d, The water-ways, through which the scupper holes are pierced, to carry the water off from the deck into the sea.

b b, Plan of the foremast and aftmast cable-bits, with their cross-pieces g g, and their standards e e.

Thus we have represented on one side all the pieces which sustain the deck with its cannon; and on the other side, the deck itself, with a tier of 32-pounders planted in battery thereon. In order also to shew the use of the breaching and train-tackle, one of the guns is drawn in as ready for charging.

The number of beams by which the decks of ships are supported, is often very different, according to the practice of different countries; the strength of the timber of which the beams are framed; and the services for which the ship is calculated.

As the deck which contains the train of a fire-ship is furnished with an equipage peculiar to itself, the whole apparatus is particularly described in the article *FIRE-SHIP*.

Flush-Deck implies a continued floor laid from stem to stern, upon one line, without any stops or intervals.

Half-Deck, a space under the quarter-deck of a ship of war, contained between the foremast bulk-head of the steerage, and the fore-part of the quarter-deck. In the colliers of Northumberland the steerage itself is called the *half-deck*, and is usually the habitation of the crew.

DECLAMATION, a speech made in public, in the tone and manner of an oration, uniting the expression of action to the propriety of pronunciation, in order to give the sentiment its full impression upon the mind. According to the manners and customs of the present age, public harangues are made only, 1. In the pulpit. 2. In the senate, in council, or other public assembly. 4. By public professors. 5. On the theatre.

I. With regard to the declamation of the pulpit, the dignity and sanctity of the place, and the importance

of the subject, require the preacher to exert the utmost powers of his voice to produce a pronunciation that is perfectly distinct and harmonious, and that he observe a deportment and action which is expressive and graceful. No man therefore, who is destitute of a voice, should ascend the pulpit, and there act the part of a pantomime before his audience. The preacher should not, however, roar like a common crier, and rend the ear with the voice of thunder; for such kind of declamation is not only without meaning and without persuasion, but highly incongruous with the meek and gentle expressions of the gospel. He should likewise take particular care to avoid a monotony; his voice should rise from the beginning, as it were by degrees, and its greatest strength should be exerted in the application. Each inflexion of the voice should be adapted to the phrase, and to the meaning of the words; and each remarkable expression should have its peculiar inflexion. The dogmatic requires a plain, uniform tone of voice only; and the menaces of the gospel demand a greater force than do its promises and rewards; but the latter should not be pronounced in the soft tone of a flute, nor the former with the loud sound of a trumpet. The voice should still retain its natural tone in all its various inflexions. Happy is that preacher, to whom nature has given a voice that is at once strong, flexible, and harmonious.

An air of complacency and benevolence, as well as devotion, should be constantly visible in the countenance of the preacher. But every appearance of affectation must be carefully avoided: for nothing is so disgusting to an audience, as even the semblance of dissimulation. Eyes constantly rolling, turned towards heaven, and streaming with tears, rather denote a hypocrite, than a man possessed of the real spirit of religion, and that feels the true import of what he preaches. An air of affected devotion infallibly destroys the efficacy of all that the preacher can say, however just and important it may be. On the other hand, he must avoid every appearance of mirth or raillery, or of that cold unfeeling manner which is so apt to freeze the hearts of his hearers.

The body should be in general erect, and in a natural and easy attitude. The perpetual movement, or contortion, of the body, has a ridiculous effect in the pulpit, and makes the figure of a preacher and a harlequin much too similar. But, on the other hand, he ought not to remain constantly upright and motionless, like a speaking statue.

The motions of the hands give a strong expression to a discourse; but they should be constantly decent, grave, noble, and expressive. The preacher, who is incessantly in action, who is perpetually clapping his hands, or who menaces with a clenched fist, or counts his arguments on his fingers, will only excite mirth among his auditory. In a word, declamation is an art that the sacred orator should study with the utmost assiduity. The design of a sermon is to convince, to affect, and to persuade. The voice, the countenance, and the action, which are to produce this triple effect, are therefore the objects to which the preacher should particularly apply himself.

II. The declamation of a minister or statesman in the senate, in council, or other public assembly, is of a more unconfined nature. To persuade, to move the passions,

Bielfield's
Elements.

passions, and gain an ascendancy in a public assembly, the orator should himself feel the force of what he says, and the declamation should only express that internal sensation. But nothing should be carried to excess. A finavity in the tone of voice, a dignity of deportment, a graceful action, and a certain tranquillity of countenance, should constantly accompany the statesman when he speaks in public, even when he is most earnestly engaged in debate, or when he is addressing his sovereign in person. A pleasing tone of voice, and a distinct pronunciation, prejudice the hearers greatly in the speaker's favour. A young man may improve these to a surprising degree. Demosthenes, who had a natural impediment in his speech, was accustomed to go to the sea-shore, and partly filling his mouth with pebbles he declaimed with a loud voice. The stones by degrees gave a volubility to his tongue, and the roaring of the waves reconciled him insensibly to the noise of the multitude.

III. The principal object of a public professor is the instruction of the studious youth: for which purpose, he is to convince and persuade. Every tone of voice, every expression of the countenance, or action of the body, which can produce this effect by enforcing the words, should therefore be employed by those who are to teach the sciences. There is, moreover, one very essential reflection which every professor ought to make, and which is, that the chair, from which he harangues, is surrounded by young students, naturally possessed with vivacity, not infrequently ludicrous, and for the most part previously instructed in the preparatory sciences. They are therefore constantly inclined to criticise, to jest, and to ridicule: for which reason, the professor should endeavour to inspire them with respect and attention, by a grave, commanding, and venerable countenance; and carefully avoid all appearance of grimace in his action, and every kind of affectation in his discourse, that he may not afford the least opportunity for pleasantry.

IV. We are now come to *theatric declamation*.

1. This was very different among the ancients from what it is, and ought to be, with us, from the nature of the thing itself, and from the difference of circumstances. Numberless passages in Quintilian, and other ancient historians, critics, grammarians, and commentators, evidently prove, that the ancient dramatic declamation was subservient to the rules of the musical rhythmus: and by this, according to Aristides*, their action, as well as recital, was regulated. But to explain this seeming paradox, it will be necessary to make here some preliminary remarks. The ancients gave a much more extensive signification than we do to the word *music*, (*musica*), which they derived from the muses, or at least from some of them. It is for this reason, that the same Aristides and Quintilian define it to be "An art that teaches all that relates to the use of the voice, and the manner of performing all the motions of the body with grace." *Arts decoris in vocibus & motibus*. Therefore poetry, declamation, dancing, pantomimes, and many other gestures and exercises, were subservient to this art.

2. That part of general music which taught the art of declamation and gesture according to the rules of an established method, (and which we perform by instinct, or at most by the aid of common sense), was

distinguished by the name of *hypocritic music*: and this musical art was called, by the Greeks, *orchestis*; and by the Romans, *saltatio*. It was, however, so far from being an advantage to the ancients to have had this art, which we have not, that it was, on the contrary, a mark of great imperfection. For, in the first place, it was an instance of high absurdity to represent a tragedy, or comedy, before an audience of twenty thousand people, the far greatest part of whom could neither hear nor see what passed to any good purpose, unless they were possessed of organs which we have not. The theatres of London and Paris may conveniently contain about a thousand persons; and that is found sufficient in the most populous cities, where there are several places of entertainment on the same day, and where the people are reasonable enough to succeed each other in their diversions. As the features of the face could not be distinguished at so great a distance, and still less the alteration of countenance in order to represent the different passions, they were obliged to have recourse to *masks*; a wretched, childish invention, that destroyed all the strength and variety of expression. Their action became extravagant; and, at the same time, subservient to a regular mechanism, which prevented all the refinement, and all the pleasure of surprise, in the performance; and must have had an effect horribly disagreeable to those who were placed near the stage.

3. The egregious imperfection of their language likewise, which consisted of syllables long and short, whose duration was determined by a set measure of time, and their manner of tuning these syllables, after the method of the orchestis of the Greeks, was another disadvantage. For by this means they determined by notes or characters placed after the long and short syllables, not only the nature, but the duration, of each action. Now, nothing could be more affected, more constrained and disgusting, than such method of declaiming. How far superior in this respect are the moderns, who consult nature alone in their theatrial declamation; who can make the audience hear each sigh; who can accompany it with a proper attitude; who can incessantly vary their action; who can seize the lucky moment, and make the countenance fully express the sensations of the mind? Nature does all here; and art, infinitely inferior to nature, did all among the ancients. Modern declamation cannot be subservient to a musical rhythmus, seeing we speak rapidly, and without affectation. Our actors learn their art without art, from nature itself, assisted by reflection; and they arrive at a degree of excellence infinitely greater than that of the ancients, by a method far more simple, and by efforts incomparably more easy.

4. We do not, moreover, precisely know what the theatrial declamation of the ancients was; nor what were the musical instruments which accompanied that declamation. The title to the Eunuch of Terence says, for example, "That Flaccus, the freedman of Claudius, made the music of that piece, in which he employed the two flutes, the right and the left." These flutes, it is likely, gave the tone to the actor; which must have had a very odd effect on the audience. Most of the ancient pieces have similar titles. They who would be particularly informed of the art of declaiming among the Greeks and Romans, may read to advantage the Critical Reflections on Poetry and Painting

* *Demusica*,
lib. i.

ting by the Abbé du Bos. The third part of that work consists entirely of learned researches, and ingenious reflections, on this silly practice of the ancients. But as this art has happily no place in modern declamation, and can at best serve only to make a parade of erudition, we shall say no more of it, but pass to matters of real utility.

5. We think there is good reason to believe, moreover, that the most polished nations of modern Europe do not accompany their discourses, in general, with so many gesticulations, as did the Greeks, the Romans, and other inhabitants of warm climates. They appear to have found the method of animating a discourse, and giving it an expression, by the simple inflexions of the voice, and by the features of the countenance; which is far more decent, more just, and rational, than all those contortions which perpetually derange the natural attitude of the body and its members, and give the speaker the air of a harlequin.

6. *Expression*, therefore, forms at once the essence and the end of declamation; and the means of producing it consists in a pronunciation that is sonorous, distinct, and pleasing, supported by an action that is decent and proper to the subject. If the best dramatic poet has need of a good declaimer or actor to make his writing produce its proper effect, the actor has likewise need of a good poet to enable him to please and affect by his action: for it is to little purpose that he endeavours to charm his auditory by uniting, with nature, all the powers of art, if the poet has not furnished him with sentiments that are rational and affecting.

7. The actor, in studying his part before a large mirror, where he can see his whole figure, in order to determine the most proper expression for every thought, should consult nature, and endeavour to imitate her. But, in this imitation, he should take care not to make too servile a copy. He has this to observe, in common with his colleagues, the masters in all the polite arts: 'The theatre is intended to exhibit an imitation of nature, and not nature itself. Tragedy and comedy form pictures of human life; but these pictures are also pieces of perspective, which require strokes somewhat stronger than nature, that they may be discerned at a distance. The actor is elevated to a considerable height from the ground; he is surrounded by scenery, he is separated from the audience by the orchestra, and he speaks in verse; all this is not natural: but the spectator is to accede to this necessary illusion, in order to promote his own pleasure, which would not be so great as it is were all these matters otherwise disposed. Declamation, therefore, should somewhat exceed, but never lose sight of, nature.'

8. The tone of the actor's voice should be natural, but regulated by the extent of the theatre; sufficiently loud to be heard by all the audience, but not so violent as to rend their ears. A pure and graceful pronunciation, without any provincial accent, is likewise a great merit in an actor; and he should also habituate himself to speak in a manner perfectly distinct. It is a capital point in the pronouncing of verse, not to separate the two hemistichs, by resting too long on the *cesura* in the middle, or dwelling on the end of each hemistich: for, by so doing, the actor falls into a monotony, an insufferable uniformity of cadence, in a piece that consists of some thousand verses. The gra-

dations of the voice demand also a very judicious observance. The speaker, who begins in a high tone, will find it very difficult to sustain it through the whole piece; and he, who clamours incessantly, will find his lungs fail him in those parts where the vehemence of passion requires the strongest efforts. If we may be allowed the expression, the strongest touches, the boldest figures, will not there stand out from the picture in a striking manner.

9. The deportment of an actor should be constantly graceful, decent, and proper to the character he represents. An old man has a different position of body from a young *petit maitre*; an aged queen from a young princess; a noble gallant from a valet de chambre. A rational observance of nature, and an imitation of the best actors, are here the surest guides. The same may be said of the action of the hands, the theatrical step, &c. An inanimated figure, a body in the position of a statue, and hands immovable, are as displeasing in the scene, as a player whose incessant gesticulation resembles the action of a puppet.

10. Every actor who aspires to make his art something more than merely mechanical, will begin by enabling himself readily to repeat his part, that the defect of his memory may not embarrass his action. When he is so far a master of it, he will make it the subject of serious reflection in his closet; endeavour to seize the true sense of the author; and to find out that expression of each sentiment and passion, which is the most natural, the most striking, and best adapted to the stage; and which he will cultivate by repeated essays, till he is able to render it in its full force.

DECLARATORY ACTION. See LAW, N^o clxxxiii.

21.

DECLENSION, in grammar, an inflection of nouns according to their divers cases; as nominative, genitive, dative, &c. See GRAMMAR.

DECLINATION, in astronomy, the distance of any celestial object from the equinoctial, either northward or southward. It is either true or apparent, according as the real or apparent place of the object is considered. See ASTRONOMY, N^o 210, 211.

DECLINATION of the *Sea-Compass* or *Needle*, is its variation from the true meridian of any place.

DECLINATION of a *Wall*, or *Plane*, for *Dials*, is an arch of the horizon, contained either between the plane and the prime vertical circle, if you reckon it from the east or west; or else between the meridian and the plane, if you account it from the north or south. See DIAL.

DECLINATORIES, are instruments for taking the declinations, inclinations, and reclinations of planes; and they are of several kinds.

The best sort for taking the declination consists of a square piece of brass, or wood, with a limb accurately divided into degrees; and every fifth minute, if possible, having a horizontal dial moving on the centre, made for the latitude of the place it is to serve in; and which has a small bit of fine brass fixed on its meridian line, like a fiducial edge, to cut the degrees of the limb: for at any time when the sun shines, by having the hour of the day, you may find the declination of any wall or plane by this instrument.

DECLINATURE of JUDGES. See LAW, N^o clvi. 12.

DECLIVITY denotes the reverse of ACCLIVITY.
DECOC.

Decoction
||
Decoration.

DECOCTION, usually signifies either the action of boiling a substance in water, or the water itself in which the substance has been boiled. It is only applicable to matters containing some principles soluble in water; such particularly are animal and vegetable matters. Decoction ought not to be used with such substances as contain any volatile principles, as they would be dissipated in the air during the process. But it may be safely used, nay even becomes necessary, when the matters to be treated are solid, and of a close and compact texture; because then the water could not extract its principles without a boiling heat. Most soft animal matters, as flesh, skin, tendons, may be conveniently boiled in water; because they contain no principle volatile with a boiling heat. Water extracts from them nothing but a gelatinous substance, and some oily parts which float on the surface of the water. All vegetable matters which are inodorous, and particularly those which are hard, as roots, barks, &c. are generally boiled, when an extraction of their principles by water is required.—To this rule, however, there are some exceptions. Peruvian bark, for instance, gives its strength to cold water better than to such as is boiling hot. Many other vegetables also have the same property of yielding less to boiling than to cold water. And therefore a general rule may be established, that decoction ought not to be employed but when absolutely necessary; that is, when the same principles, or the same quantities of those principles, cannot be obtained by an infusion, and that without heat, if it can be so done, considering that the proximate principles of vegetables are generally so delicate, and so susceptible of change and decomposition, that frequently the most gentle heat changes much their nature and properties.

DECOLLATION, **BEHEADING**, a term seldom used but in the phrase *decollation* of St John Baptist; which denotes a painting, wherein is represented the Baptist's head, struck off from his trunk; or the feast held in honour of that martyr.

DECOMPOSITION, in chemistry, usually signifies the division or separation of the constituent parts of bodies.—It differs from mere mechanical division, in that when a body is chemically decomposed, the parts into which it is resolved are essentially different from the body itself; but though a mechanical force is applied to it ever so long, or with ever so much violence, the minutest particles into which the body may be reduced, still retain their original nature.—Thus, for example, though we suppose nitre, or any other salt, to be reduced to ever so fine powder, each particle retains the nature of nitre, as much as the largest unpounded mass; but if oil of vitriol is applied, a decomposition takes place, and one of the component parts of the nitre rises in the form of a smoking acid spirit, which never could have been suspected to lie hid in the mild neutral salt.

DECORATION, in architecture, any thing that adorns and enriches a building, church, triumphal arch, or the like, either without side or within.

The orders of architecture contribute greatly to the decoration: but then the several parts of those orders must have their just proportions, characters, and ornaments; otherwise the finest order will bring confusion rather than richness. See **ARCHITECTURE**.

Decorations in churches, are paintings, vases, festoons, &c. occasionally applied to the walls; and with so much conduct and discretion, as not to take off any thing from the form of the architecture: as is much practised in Italy, at the solemn feasts.

DECORATION is more particularly applied to the scenes of theatres.

In operas, and other theatrical performances, the decorations must be frequently changed conformably to the subject.

The ancients had two kinds of decorations for their theatres: the first, called *versatiles*, having three sides, or faces, which were turned successively to the spectators: the other called *distiles*, shewing a new decoration by drawing or sliding another before it.—This latter sort is still used, and apparently with much greater success than among the ancients, who were obliged to draw a curtain whenever they made a change in the decoration; whereas on our stage the change is made in a moment, and almost without being perceived.

DECORUM, in architecture, is the suitableness of a building, and the several parts and ornaments thereof, to the station and occasion.

DECOUPLE, in heraldry, the same as uncoupled: thus a chevron decouple, is a chevron wanting so much of it towards the point, that the two ends stand at a distance from one another, being parted and uncoupled.

DECOY, in naval affairs, a stratagem employed by a small ship of war to betray a vessel of inferior force into an uncautions pursuit, till she has drawn her within the range of her cannon, or what is called within *gunshot*. It is usually performed by painting the stern and sides in such a manner as to disguise the ship, and represent her either much smaller and of inferior force, or as a friend to the hostile vessel, which she endeavours to ensnare, by assuming the emblems and ornaments of the nation to which the stranger is supposed to belong. When she has thus provoked the adversary to chase, in hopes of acquiring a prize, she continues the decoy by spreading a great sail, as endeavouring to escape; at the same time that her course is considerably retarded by an artful alteration of her trim, till the enemy approaches. Decoying is also performed to elude the chase of a ship of a superior force in a dark night, by throwing out a lighted cask of pitch into the sea, which will burn for a considerable time and misguide the enemy. Immediately after the cask is thrown out, the ship changes her course, and may easily escape if at any tolerable distance from the foe.

Decoy, among fowlers, a place made for catching wild-fowl. A decoy is generally made where there is a large pond surrounded with wood, and beyond that a marshy and uncultivated country: if the piece of water is not thus surrounded, it will be attended with the noise and other accidents which may be expected to frighten the wild-fowl from a quiet haunt, where they mean to sleep, during the day-time, in security. If these noises or disturbances are wilful, it hath been held that an action will lie against the disturber.—As soon as the evening sets in, the decoy *rises* (as they term it), and the wild fowl feed during the night. If the evening is still, the noise of their wings, during their flight, is heard at a very great distance, and is a pleasing

Decorum
||
Decoy.

Decoy. pleasing though rather melancholy sound. This *rising* of the decoy in the evening, is in Somersetshire called *radding*.

The decoy-ducks are fed with hempseed, which is thrown over the screens in small quantities, to bring them forwards into the pipes, and to allure the wild-fowl to follow, as this seed is so light as to float.

There are several *pipes*, as they are called, which lead up a narrow ditch that closes at last with a funnel-net. Over these pipes, (which grow narrower from their first entrance), is a continued arch of netting suspended on hoops. It is necessary to have a pipe or ditch for almost every wind that can blow, as upon this circumstance it depends which pipe the fowl will take to; and the decoy-man always keeps on the leeward side of the ducks, to prevent his effluvia reaching their sagacious nostrils. All along each pipe at certain intervals, are placed screens made of reeds, which are so situated, that it is impossible the wild-fowl should see the decoy-man, before they have passed on towards the end of the pipe, where the purse-net is placed. The inducement to the wild-fowl to go up one of these pipes is, because the decoy-ducks trained to this, lead the way, either after hearing the whistle of the decoy-man, or enticed by the hempseed; the latter will dive under water, whilst the wild-fowl fly on, and are taken in the purse.

It often happens, however, that the wild-fowl are in such a state of sleepiness and dozing, that they will not follow the decoy-ducks. Use is then generally made of a dog, who is taught his lesson: he passes backwards and forwards between the reed-screens, (in which are little holes, both for the decoy-man to see, and the little dog to pass through); this attracts the eye of the wild-fowl, who, not choosing to be interrupted, advance towards the small and contemptible animal, that they may drive him away. The dog all the time, by the direction of the decoy-man, plays among the screens of reeds, nearer and nearer the purse-net; till, at last, perhaps, the decoy-man appears behind a screen, and the wild-fowl not daring to pass by him in return, nor being able to escape upwards on account of the net-covering, rush on into the purse-net. Sometimes the dog will not attract their attention, if a red handkerchief, or something very singular, is not put about him.

The general season for catching fowl in decoys, is from the latter end of October till February: the taking of them earlier is prohibited by an act 10 *Geo. II. c. 32.* which forbids it from June 1st to October 1st, under the penalty of five shillings for each bird destroyed within that space.

The Lincolnshire decoys are commonly set at a certain annual, from 5 to 20 pounds a-year: and there is one in Somersetshire that pays 30*l.* The former contribute principally to supply the markets in London. Amazing numbers of ducks, wigsons, and teal, are taken: by an account sent us* of the number caught a few winters past, in one season, and in only ten decoys, in the neighbourhood of Wainfleet, it appeared to amount to 31,200, in which are included several other species of ducks: it is also to be observed, that, in the above particular, wigson and teal are reckoned but as one, and consequently sell but at half price of the ducks. This quantity makes them so cheap on

the spot, that we have been assured, several decoy-men would be content to contract for years to deliver their ducks at Boston, for 10*d.* per couple. The account of the numbers here mentioned, relates only to those that were sent to the capital.

It was customary formerly to have in the fens an annual *driving* of the young ducks before they took wing. Numbers of people assembled, who beat a vast tract, and forced the birds into a net placed at the spot where the sport was to terminate. A hundred and fifty dozens have been taken at once: but this practice being supposed to be detrimental, has been abolished by act of parliament.

DECREE, an order made by a superior power for the regulation of an inferior.

DECREE, in the civil law, is a determination which the emperor pronounces upon hearing a particular cause between the plaintiff and defendant.

DECREEs of *Council*, are the laws made by them, to regulate the doctrine and policy of the church.

DECREEs in *Chancery*, are the determination of the lord-chancellor, upon a full hearing of the merits of a cause.

DECREET, in the law of Scotland, a final decree or judgment of the lords of session, from which an appeal only lies to parliament.

DECREET-*Arbital*, in Scots law, the sentence or judgment of one to whom parties voluntarily submit the determination of any question betwixt them *.

DECUREMENT, in heraldry, signifies the wane of the moon from the full to the new. The moon in this state is called *moon decrecent*, or in *decours*; and when borne in coat-armour, faces to the left side of the escutcheon, as she does to the right side when in the increment. * See Law, N^o cxxxv.

DECREPITATION, in chemistry, signifies the quick separation of the parts of a body, occasioned by a strong heat, and accompanied with noise and crackling. This effect is most frequently produced by water contained betwixt the parts of the decrepitating body, when these parts have a certain degree of adhesion together. This water being quickly reduced into vapours by the heat suddenly applied to it, rarifies, and bursts with noise the parts which compress it. The bodies most subject to decrepitation are certain salts, such as common salt, vitriolated tartar, nitre of lead, &c. the decrepitation of all which proceeds from the water of their crystallization. Clays which are not perfectly dry, and flints, are also subject to decrepitation.

DECRETAL, in the canon law, a letter of a Pope determining some point or question in the ecclesiastical law. The decretals compose the second part of the canon law. The first genuine one, acknowledged by all the learned as such, is a letter of Pope Siricius, written in the year 385, to Himerus bishop of Tarragona, in Spain, concerning some disorders which had crept into the churches of Spain. Gratian published a collection of decretals, containing all the ordinances made by the Popes till the year 1150. Gregory IX. in 1227, following the example of Theodosius and Justinian, formed a constitution of his own, collecting into one body all the decisions and all the causes which served to advance the papal power; which collection of decretals was called the *pentateuch*, because it contains five books.

Decree
Decretation.

DECUPLE PROPORTION, that of ten to one.
DECURIO, in Roman antiquity, a commander of ten men in the army, or the chief of a decury.
DECURRENT LEAF. See **BOTANY**, p. 1297.
DECURY, ten persons ranged under one chief, or leader, called the *decurio*.

The Roman cavalry was divided into decuries, which were subdivisions of a century, each century containing ten decuries.

DECUSSATION, a term in geometry, optics, and anatomy, signifying the crossing of two lines, rays, or nerves, when they meet in a point, and then go on separately from one another.

DECUSSORIUM, a surgeon's instrument, which, by pressing gently on the dura mater, causes an evacuation of the pus collected between the cranium and the before-mentioned membrane, through the perforation made by the trepan.

DEDHAM, a town of Essex in England, consisting of about 400 lofty houses. The streets are not paved, but very clean, occasioned by their lying pretty high. It has one large old church, remarkable for a fine Gothic steeple, with a great deal of carved work about it, but much injured by time. E. Long. 1. 10. N. Lat. 52. 5.

DEDICATION, the act of consecrating a temple, altar, statue, palace, &c. to the honour of some deity.

The use of dedications is very ancient both among the worshippers of the true God, and among the heathens: the Hebrews call it *חננה* *hannuchah*, "imitation;" which the Greek translators render *Εκκατα*, and *Εκκαταρος*, "renewing."

In the scripture we meet with dedications of the tabernacle, of altars, of the first and second temple, and even of the houses of private persons. There are also dedications of vessels, and garments of the priests and Levites, and even of the men themselves.

The heathens had also dedications of temples, altars, and images of their gods, &c. Nebuchadnezzar held a solemn dedication of his statue, *Dan. iii. 2*. Pilate dedicated gilt bucklers at Jerusalem to Tiberius, *Philo de legat.* Petronius would have dedicated a statue to the emperor in the same city, *ibid. p. 791*. Tacitus, *Hist. lib. iv. c. 53*, mentions the dedication of the capitol, upon rebuilding it by Vespasian, &c.

The Jews celebrated the anniversary of the dedication of their temple every year for eight days. This was first enjoined by Judas Maccabeus, and the whole synagogue, in the year of the Syro-Macedonian Æra 148, i. e. 164 years before Christ. The heathens had the like anniversaries, as that of the dedication of the temple of Parthenope, mentioned by Lycophron. Under Christianity, dedication is only applied to a church; and is properly the consecration thereof performed by a bishop, with a number of ceremonies prescribed by the church.

The Christians finding themselves at liberty under Constantine, in lieu of their ruinous churches, built new ones in every place; and dedicated them with a deal of solemnity. The dedication was usually performed in a synod; at least they assembled a number of bishops to assist at the service. We have the description of those of the churches at Jerusalem and Tyre in Eusebius, and many others in later writers.

DEE (John), a famous mathematician and astro-

loger, was born (July 1527) in London, where his father was a wealthy vintner. In 1542, he was sent to St John's college, Cambridge. After five years close application to mathematical studies, particularly astronomy, he went to Holland, in order to visit several eminent mathematicians on the continent. Having continued abroad near a year, he returned to Cambridge; and was there elected one of the fellows of Trinity college, then first erected by king Henry VIII. In 1548, he took the degree of master of arts; and, in the same year, left England a second time; his stay at home being rendered uneasy to him, by the suspicions that were entertained of his being a conjuror; arising partly from his application to astrology, but especially on account of a piece of machinery in the *Lispis* of Aristophanes, which he exhibited to the university, and in which he represented the *Scarabeus* flying up to Jupiter, with a man and a basket of victuals on its back. These suspicions he could never after shake off: nor did his subsequent conduct, as we shall see, tend to clear him of the imputation; for if he was not actually a conjuror, it was not for want of endeavours.

Upon leaving England, he went to the university of Louvain; where he was much esteemed, and visited by several persons of high rank. Here he resided about two years, and then set out for France; where, in the college of Rheims, he read lectures of Euclid's elements with vast applause. In 1551, he returned to England, and was introduced by the secretary Cecil to king Edward, who assigned him a pension of 100 crowns, which he afterwards relinquished for the rectory of Upton upon Severn; but soon after the accession of queen Mary, having some correspondence with the lady Elizabeth's servants, he was accused of practising against the queen's life by enchantment. On this account he suffered a tedious confinement, and was several times examined; till, in the year 1555, he obtained his liberty by an order of council.

When queen Elizabeth ascended the throne, our astrological Dee was consulted by lord Dudley, concerning a propitious day for her majesty's coronation. He was on this occasion introduced to the queen, who made him great promises, which were never performed, though she condescended to receive his instructions relative to the mystical interpretation of some of his unintelligible writings, which he published about this time. In 1564, he made another voyage to the continent; in order to present a book which he had dedicated to the emperor Maximilian. He returned to England in the same year; but in 1571, we find him in Lorain; where, being dangerously ill, the queen sent over two physicians to his relief. Having once more returned to his native country, he settled at Mortlake in Surrey, where he continued his studies with unremitting ardor, and collected a considerable library of curious books and manuscripts, with a variety of instruments; most of which were afterwards destroyed by the mob, as belonging to one who dealt with the devil. In 1578, the queen being much indisposed, Mr Dee was sent abroad to consult with German physicians and philosophers (astrologers no doubt) on the occasion. We now behold him again in England, where he was soon after employed in a more rational service. Her majesty, desirous to be informed concerning her title to those countries which had been discovered by her subjects,

Dec.

jects, commanded Mr Dee to consult the ancient records, and furnish her with proper geographical descriptions. Accordingly, in a short time he presented to the queen, in the gardens at Richmond, two large rolls, in which the discovered countries were geographically described and historically illustrated. These rolls are preserved in the Cotton library, *Augustus* 1. His next employment was the reformation of the calendar, on which subject he wrote a rational and learned treatise, preserved in the Ashmolean library at Oxford.

Hitherto the extravagancies of our eccentric philosopher seem to have been counterpoised by a tolerable proportion of reason and science; but henceforward we consider him as a mere necromancer, and credulous alchymist. In the year 1581, he became acquainted with one Edward Kelley, by whose assistance he performed diverse incantations, and maintained a frequent imaginary intercourse with spirits. He was particularly intimate, it seems, with the angels Raphael and Gabriel. One of them made him a present of a black speculum, in which his angels and demons appeared as often as he had occasion for them; they answered his questions, and Kelley's business was to record their dictates:

Kelley did all his feats upon
The devil's looking-glass, a stone.

HV D18. part II. cant. III. v. 631.

In 1583, they were both introduced to a certain Polish nobleman, then in England, named *Albert Laski*, palatine of Siradia, a person equally addicted to the same ridiculous pursuits. He was so charmed with Dee and his companion, that he persuaded them to accompany him to his native country. They embarked for Holland in Sept. 1583; and travelling over land, arrived at the town of Laski, in February following. Their patron, however, finding himself abused by their idle pretensions, persuaded them to pay a visit to Rodolph king of Bohemia; who, tho' a credulous man, was soon disgusted with their nonsense. They were afterwards introduced to the king of Poland, but with no better success. Soon after this, they were invited by a rich Bohemian nobleman, to his castle of Trebona, where they continued for some time in great affluence; owing, as they asserted, to their art of transmutation by means of a certain powder in the possession of Kelley.

Dee, now quarrelling with his companion in iniquity, quitted Bohemia, and returned to England, where he was once more graciously received by the queen; who, in 1595, made him warden of Manchester college, in which town he resided several years. In 1604, he returned to his house at Mortlake, where he died in the year 1608, aged 81; leaving a large family, and many works, behind him.—The black stone into which Dee used to call his spirits, was in the collection of the earls of Peterborough, whence it came to lady Elizabeth Germaine. It was next the property of the late duke of Argyll, and is now Mr Walpole's. It appears upon examination to be nothing but a polished piece of cannel-coal.—That Dee was a man of considerable acquirements, is beyond a doubt; his mathematical knowledge is generally allowed; but, unless we suppose him a wicked impostor, which is by no means improbable, we must transmit him to posterity as one of the most foolish, superstitious, necromancers of his

time. Nevertheless, the celebrated Dr Hook, many years after Dee's death, took it into his head to prove that his journal, published by Casaubon, was entirely cryptographical, concealing his political transactions, and that he was employed by queen Elizabeth as a spy.

DEE, the name of several rivers in Scotland and England; as those whereon the cities of Chester in England, and New Aberdeen in Scotland, are situated.

DEED, an instrument written on paper or parchment, comprehending some contract, bargain or agreement between the parties thereto, in relation to the matter therein contained.

DEEMSTERS, or DEMSTERS; (from the Saxon *dema*, judge or umpire). All controversies in the life of Man are decided without process, writings, or any charges, by certain judges, chosen yearly from among themselves, called *deemsters*; there being two of them for each division of the island: they sit judges in all courts, either for life or property; and with the advice of 24 keys, declare what is law in uncommon emergencies.

DEEPING, a town of Lincolnshire in England, seated on the river Weland, in a sunny ground. W. Long. o. 20. N. Lat. 52. 35.

DEER, in zoology. See CERVUS.—The method of hunting deer in the island of Ceylon, is very particular. The huntmen go out in the night, and only two usually go together: the one of these carries upon his head an earthen vessel, in which there is some fire burning and flaming; the ingredients are generally small sticks cut into pieces, and common rosin. Of this the other man carries a supply about him to replenish the pot when it grows low. The person who has the fire upon his head, carries in one hand a staff, on which there are fixed eight bells; and the larger these are, the better. This man goes first into the woods, and the other follows close behind with a spear in his hand. As soon as the deer hears the noise of the bells, he turns towards the place whence the sound comes; and seeing the fire, he eagerly runs up to it, and stands gazing at a small distance: the second man has then nothing to do but to kill him with the spear; for he sees neither of them.—Not only deer, but even elks and hares, are thus taken; for they gaze at the fire, and never fee the men. The profits of this sort of hunting are very large, and the danger nothing; for tho' there are numbers of tygers, elephants, and wild boars, in these woods, the huntmen are in no danger from them while the fire burns, for they all run away from it.

DE FACTO, something actually in fact, or existing; in contradistinction to *de jure*, where a thing is only so in justice, but not in fact: as a king *de facto*, is a person who is actually in possession of a crown, but has no legal right to the same; and a king *de jure*, is the person who has a just right to the crown, though he is out of possession thereof.

DEFAMATION, the speaking slanderous words of another; for which the slanderer is punishable, according to the nature of his offence, either by action upon the case at common law, or by statute in the ecclesiastical court.

DEFAULT, in law, is generally taken for non-appearance in court, at a day assigned; but imports any omission of that which we ought to do, for which

Deed

Default.

Defeasance judgment may be given against the default.

DEFEASANCE. See DEFEASANCE.

DEFECATE, or DEFECATE, in chemistry, a term applied to a body freed and purged from feces and impurities.

DEFECTION, the act of abandoning or relinquishing a party or interest a person had been engaged in.—The word is formed of the Latin *deficio*, to fall of.

DEFECTIVE, in general, an appellation given to things which want some of the properties that naturally they ought to have. Thus,

DEFECTIVE or *Deficient Nouns*, in grammar, are such as want either a whole number, a particular case, or are totally indeclinable. See *NOUN*.

The term *defective* is also applied to a verb that has not all its moods and tenses. See *VERB*, *MOOD*, &c.

DEFEISANCE, in law, a condition relating to some certain deed, which being performed, the deed is defeated and rendered void, as if it had never been made.

DEFENCE, in fortification, all sorts of works that cover and defend the opposite posts, as flanks, casements, parapets, and saussebrays. See *FORTIFICATION*.

Line of DEFENCE, a supposed line drawn from the angle of the curtain, or from any other part in the curtain, to the flanked angle of the opposite bastion.

DEFEND, in general, signifies much the same with *protecting*, or keeping off injuries offered to any person either by enemies or otherwise.

DEFEND, in our ancient laws and statutes, signifies to prohibit or forbid : as, *Usurarius defendit quoque rex Edwardus ne remaneant in regno*. L. L. Edw. Conf. c. 37. & 5 Rich. 2. c. 7. In which sense Chaucer also uses it in the following passage :

“Where can you fay in any manner age,

“That ever God defended marriage.”

In 7 Edw. I. there is a statute, intitled, “*Statutum de defensione portandi arma*,” &c. And “it is defended by law to distrain on the highway ;” *Coke on Littl.* fol. 161.

DEFENDANT, in law, the person sued in an action personal ; as *tenant* is he who is sued in an action real. See *ACTION*.

DEFENDERS, were anciently notable dignities both in church and state, whose business was to look to the preservation of the public weal, to protect the poor and helpless, and to maintain the interests and causes of churches and religious houses. See *PROTECTOR*.—The council of Chalcedon, can. 2. calls the *defender* of a church *Ephesus*. Codin, *de officiis aule Const.* makes mention of *defenders* of the palace. There were also a defender of the kingdom, *defensor regni* ; defenders of cities, *defensores civitatis* ; defenders of the people, *defensores plebis* ; of the poor, fatherless, widows, &c.

About the year 420, each patriarchal church began to have its defender ; which custom was afterwards introduced into other churches, and continued to later days under other names ; as those of *Advocate*, and *Advocæ*.

In the year 407, we find the council of Carthage asking the emperor for defenders, of the number of *Scholaſtici*, i. e. advocates who were in office ; and that it might be allowed them to enter and search

the cabinets and papers of the judges and other civil magistrates, whenever it should be found necessary for the interest of the church. The emperor still retains the quality of advocate of the church ; and the kings of Great Britain preserve the title of *Defender of the Faith*, granted to Henry VIII. by pope Leo X. in 1521, on occasion of that prince's writing against Luther, and afterwards confirmed by Clement VII. Tho. Chamberlayne says, the title belonged to the kings of England before that time ; and for proof hereof appeals to several charters granted to the university of Oxford : So that pope Leo's bull was only a renovation of an ancient right. *Pres. Stat. l. 1. c. 2.*

DEFILE, in fortification, a straight narrow passage, through which a company of horse or foot can pass only in file, by making a small front.

DEFINITE, in grammar, is applied to an article that has a precise determinate signification ; such as the article *the* in English, *le* and *la* in French, &c. which fix and ascertain the noun they belong to, to some particular ; as *the king*, *le roy* : whereas, in the quality of *king*, *de roy*, the articles *of* and *de* mark nothing precise, and are therefore indefinite.

DEFINITION, in general, a short description of a thing by its properties ; or, in logic, the explication of the essence of a thing by its kind and difference. See *LOGIC*, n° 6.—24. 51, 52.

DEFINITIVE, a term applied to whatever terminates a process, question, &c. ; in opposition to provisional and interlocutory.

DEFLAGRATION, in chemistry, the kindling or setting fire to a salt or mineral, &c. either alone or mixed for that purpose with a sulphureous one, in order to purify it. See *CHEMISTRY*, n° 83.

This short process has been often recommended to the world as of great use in trying the strength of brandies and other vinous spirits, and has been greatly improved in this respect by Mr Geoffroy.

The common way of trying spirits by deflagration, is to measure out any quantity of it, then to heat it, and set it on fire. If, after it will no longer burn, the remainder is half as much as the quantity measured out for the trial was, then the spirit tried is found to consist of half water, and half totally inflammable spirit ; that is, it is somewhat below what we understand by the term *perfect proof*.—This method is much more certain than that by the crown of bubbles which arises upon shaking the spirit in a vial. Monſ. Geoffroy's method is this : Take a cylindric vessel two inches high, and as much in diameter, consisting of thin plate silver, that metal being much less liable to rust than copper ; this vessel must be fitted with a little rectangular gage exactly graduated into lines, half lines, &c. then the vessel being set level upon a copper case made to contain it, a parcel of the brandy to be examined is poured in, to the height of 16 lines. This height is to be exactly hit by pouring in more than enough at first, and then sucking out the overplus with a very small tube. Then the vessel being heated a little, so as just to make the liquor fume, it is to be set on fire, and left to go out of itself ; at the instant when the flame expires, the gage is plunged perpendicularly into the vessel, and the lines and quarters exactly noted which the liquor wants of its former height : this difference

Defile
Deflagration.

Deflection, ference gives the precise quantity of alcohol or pure spirit contained in the liquor. Thus, if eight lines of phlegm are found remaining, this being the half of the 16 lines of the original filling, it is plain, that the liquor contained one half spirit, or was something below proof. If only four lines remained, it was nearly double proof, or of a middle nature betwixt alcohol and common proof-spirit.

DEFLECTION of the RAYS of LIGHT, a property which Doctor Hook observed in 1675, and read an account of before the Royal Society, March 18, the same year. He says he found it different both from reflection and refraction, and that it was made towards the surface of the opaque body, perpendicularly. This is the same property, which Sir Isaac Newton calls *inflection*. See the article **INFLECTION**.

DEFLOURATION, or **DEFLOWERING**, the act of violating or taking away a woman's virginity. See **VIRGINITY**.—Death, or marriage, are decreed by the civil law in case of defloration.

The ancients had so much respect for virgins, that they would not put them to death, till they had first procured them to be deflowered. It is said, the natives of the coast of Malabar pay strangers to come and deflower their brides.

In Scotland, and the northern parts of England, it was a privilege of the lords of the manor, granted them by king Ewen, that they should have the first night's lodging with their tenants wives. King Malcolm III. allowed the tenants to redeem this service at a certain rate, called *marcbeta*, consisting of a certain number of cows: Buchanan says it was redeemed with half a mark of silver. The same custom had place in Wales, Flanders, Friseland, and some parts of Germany.

DEFLUXION, in medicine, the falling of the humours from a superior to an inferior part of the body.

DE FOE (Daniel), a writer famous for politics and poetry, was bred a hofier; which profession however he soon forsook, and became one of the most enterprising authors that any age produced. When dissenters ran high at the Revolution, and king William was obliged to dismiss his Dutch guards, De Foe, who had true notions of civil liberty, ridiculed the enemies of government in his well-known poem, called *The True-born Englishman*, which had a prodigious sale. The next satire he wrote was intitled, *Reformation of Manners*; aimed at some persons of high rank, who rendered themselves a disgrace to their country. When the ecclesiastics in power breathed too much of a spirit of persecution, De Foe wrote a tract called *The Short-cut away with the Dissenters*; for which he was called to account, and explained himself with great firmness. He was afterward sentenced to the pillory for attacking some public measures; which so little intimidated him, that, in defiance of their usage, he wrote *A Hymn to the Pillory*. It would be endless to enumerate all his publications: but as he is perhaps best known for his admirable *History of Robinson Crusoe*, it may be worth while to give the history of that work; which does the author of it no credit as to the better part of a writer's character, honestly. When captain Woods Rogers touched at the island of Juan Fernandez, in the South Sea, he brought away Alexander Selkirk, a Scots sailor, who had been left ashore there, and had lived on that desolate place above four years. When Selkirk

came back to England, he wrote a narrative of his adventures, and put the papers into the hands of De Foe, to digest for publication; who ungenerously converted the materials into the *History of Robinson Crusoe*, and returned Selkirk his papers again! A fraud for which, in a humane view, the distinguished merit of that romance can never atone. Daniel de Foe died at Ilfington, in 1731.

DEFOLIATION, (from *de*, and *folium* a leaf); the fall of the leaves. A term opposed to *frondeſcentia*, the annual renovation of the leaves, produced by the unfolding of the buds in spring. See **FRONDESCENTIA**.

Molt plants in cold and temperate climates shed their leaves every year: this happens in Autumn, and is generally announced by the flowering of the common meadow saffron. The term is only applied to trees and shrubs; for herbs perish down to the root every year, losing stem, leaves, and all.

All plants do not drop their leaves at the same time. Among large trees, the ash and walnut, although latest in unfolding, are soonest divested of them: the latter seldom carries its leaves above five months.

On the oak and horn-beam, the leaves die, and wither, as soon as the colds commence; but remain attached to the branches till they are pushed off by the new ones, which unfold themselves the following spring. These trees are doubtless a kind of ever-greens: the leaves are probably destroyed only by cold; and perhaps would continue longer on the plant, but for the force of the spring-fap, joined to the moisture.

In mild and dry seasons, the lilac, privet, yellow jessamine of the woods, and maple of Crete, preserve their leaves green until spring, and do not drop them till the new leaves are beginning to appear. The fig-tree, and many other trees that grow between the tropics, are of this particular class of ever-greens. The trees in Egypt, says Doctor Hasselquist, cast their leaves in the latter end of December and beginning of January, having young leaves ready before all the old ones are fallen off; and, to forward this operation of nature, few of the trees have buds: the sycamore and willow, indeed, have some, but with few and quite loose *ſtipule* or scales. Nature did not imagine buds to be necessary in the southern as in the northern countries; this occasions a great difference between them.

Lastly, some trees and shrubs preserve their leaves constantly through the whole year: and are not in the least influenced by the clemency or inclemency of seasons. Such are the fir, juniper, yew, cedar, cypress, and many other trees, hence denominated *ever-greens*. These preserve their old leaves a long time after the formation of the new, and do not drop them at any determinate time. In general, the leaves of ever-greens are harder, and less succulent, than those which are renewed annually. The trees are generally natives of warm climates: as the alaternuses of France and Italy, the ever-green oak of Portugal and Suabia.

Some herbaceous perennials, as the house-leeks and navel-worts, enjoy the same privilege with the ever-green trees, and resist the severities of winter: some even can dispense with the earth for some time; being replete with juices, which the leaves imbibe from the humidity of the atmosphere, and which, in such plants, are, of themselves, sufficient for effecting the purposes of vegetation. It is for this reason, that, unless in excessive

Defoliation
Deforce-
ment.

cessive hot weather, gardeners are seldom wont to water fat succulent plants, as the aloes, which rot, when they are moistened, if the sun does not quickly dry them up.

The leaves of all the ever-green shrubs and trees, have a thin compact skin, or cover, over their surface; as is easily discovered by macerating them in water, in order to separate the parenchyma, or pulp, from the vessels of the leaves; which cannot be effected in any of these ever-greens, till a thin parchment-like cover is taken off. These trees and shrubs are found by experiment to perspire but little, when compared with others which shed their leaves; and it is, perhaps, principally owing to this close covering, as also to the small proportion of moisture contained in their vessels, that they retain their verdure, and continue thro' the winter on the trees. The nutritive juices of these plants always abound, more or less, with an oily quality, which secures them from being injured by severe frosts; so that many of these ever-green trees are adapted to grow in the coldest parts of the habitable world.

With respect to deciduous trees, the falling off of the leaves seems principally to depend on the temperature of the atmosphere, which likewise serves to hasten or retard the appearance in question. An ardent sun contributes to hasten the dropping of the leaves. Hence in hot and dry summers, the leaves of the lime-tree and horse-chestnut turn yellow about the first of September; whilst in other years, the yellowness does not appear till the beginning of October. Nothing, however, contributes more to hasten the fall of the leaves, than immoderate cold or moist weather in autumn; moderate droughts, on the other hand, serve to retard it. As a proof of this position, Mr Adanson relates, that in the year 1759, the leaves of the elm-tree, which generally fall off about the 25th of November, continued in verdure and vigour at Paris, where the autumn was remarkably dry, till the 10th of the following month.

The following table, respecting the mean times in which different trees shed their leaves, is founded upon observations.

Gooseberry-tree, and bladder-sena,	} Generally quit their leaves about	October 1st.
Walnut and ash,		—— 15th.
Almond-tree, horse - chestnut, and lime-tree,		—— 20th.
Maple, hazel-nut, black-poplar, and aspen tree,		—— 25th.
Birch, plane-tree, mountain-osier, false-acacia, pear, and apple-tree,		November 1st.
Vine, mulberry, fig, sumac, and angelica-tree,		—— 10th.
Elm-tree, and willow,		—— 15th.
Apricot, and elder-trees,		—— 20th.

Milne's
Bot. Dist.

It deserves to be remarked, that an ever-green tree grafted upon a deciduous, determines the latter to retain its leaves. This observation is confirmed by repeated experiments; particularly by grafting the laurel, or cherry-bay, an ever-green, on the common cherry; and the ilex, or ever-green oak, on the oak.

DEFORCEMENT, in law, the casting any one out of his land, or with-holding of lands and tenements by force from the right owner.

DEFORCEMENT, in Scots law, the opposing or resisting of the officers of the law in the execution of their office. See LAW, N° clxxxvi. 15.

DEFORMITY, the want of that uniformity necessary to constitute the beauty of an object *.

DEFOSSION, DEFOSSIO, the punishment of burying alive, inflicted among the Romans on veital virgins guilty of incontinency. It is also a custom among the Hungarians to inflict this punishment on women convicted of adultery. Heretics were also punished in this manner. See BURYING-Alive.

DEGENERATION, or DEGENERATING, in general, denotes the growing worse, or losing some valuable qualities whereof a thing was formerly possessed. Some naturalists have been of opinion, that things are capable of degenerating into quite a distinct species; but this is a mere chimera. All that happens in the degeneration of a plant, for instance, is the losing its usual beauty, colour, smell, &c. a misfortune entirely owing to its being planted in an improper soil, climate, &c.

DEGLUTITION, the action of swallowing. See ANATOMY, n° 368.

A difficulty of swallowing may be caused, 1st, By ulcers of the oesophagus; in which case, there will be frequent vomiting of blood, and other kinds of matter. 2dly, A scirrhus bronchocele. 3dly, A thickening of the mucus in the oesophagus. 4thly, Indurations of the oesophagus. 5thly, A fungus in the oesophagus. 6thly, A sacculus formed by some hard substance lodging a little time in the oesophagus, and weakening its coats. 7thly, By spasms.

When any thing sticks in its passage into the stomach, the best method is to relieve the patient with the greatest speed, by drawing it up, or pushing it down into the stomach.

DEGRADATION, the act of depriving a person for ever of a dignity or degree of honour, and taking away the title, badge, and privileges of it.

DEGRADATION, in painting, expresses the lessening the appearance of distant objects in a landscape, in the same manner as they would appear to an eye placed at that distance from them.

DEGREE, in geometry, a division of a circle, including a three hundred and sixtieth part of its circumference.

DEGREE of Latitude. See LATITUDE.

DEGREE of Longitude. See LONGITUDE.

A degree of the meridian on the surface of the globe is variously determined by various observers. Mr Picart measured a degree in the latitude of 49° 21', and found it equal to 57060 French toises. But the French mathematicians, who have lately examined Mr Picart's operations, assure us, that the degree in that latitude is 57183 toises. Our countryman, Mr Norwood, measured the distance between London and York, and found it 905751 English feet; and finding the difference of latitudes 2° 28', determined the quantity of one degree to be 367196 English feet, or 69 English miles and 288 yards. Mr Maupertuis measured a degree in Lapland, in the latitude of 66° 20', and found it 57438 toises. A degree was likewise measured at the equator by other French mathematicians, and found to contain 56767.8 toises. Whence it appears, that the earth is not a sphere, but an oblate spheroid.

DEGREE,

Deforce-
ment
||
Degre e.

See Beauty.

Degree
Deity.

DEGREE, in the civil and canon law, denotes an interval in kinship, by which proximity and remoteness of blood are computed. See **CONSANGUINITY**, and **DESCENT**.

DEGREES, in music, are the little intervals whereof the concords or harmonical intervals are composed.

DEGREE, in universities, denotes a quality conferred on the students or members thereof, as a testimony of their proficiency in the arts or sciences, and intitling them to certain privileges.

DEJANIRA, in fabulous history, daughter of Oeneus king of Etolia, and wife to Hercules. The centaur Nessus endeavouring to ravish her, was slain by Hercules with a poisoned arrow. Nessus, when dying, gave his bloody shirt to Dejanira; assuring her, that it was a sovereign remedy to cure her husband if ever he proved unfaithful. Some time after, Dejanira thinking he had reason to suspect his fidelity, sent him the shirt; which he had no sooner put on, than he was seized with the most excruciating torments; when being unable to support his pains, he retired to mount Oeta, and erecting a pile of wood set fire to it, and threw himself into the flames; upon which Dejanira killed herself in despair.

DEJECTION, in medicine, the act of voiding the excrements by the anus.—When the feces are accumulated in the intestinum rectum * in sufficient quantity to become troublesome either by their weight or acrimony, they excite a certain uneasiness, which produces an inclination to go to stool. The efforts for this purpose are begun by a considerable inspiration, in consequence of which the diaphragm is carried down towards the lower belly; the abdominal muscles are at the same time contracted in obedience to the will; and the intestines being compressed on all sides, the resistance of the sphincters is overcome, and the feces pass out at the anus; which is afterwards drawn up by its longitudinal fibres, which are called *levatoris ani*, and then by means of its sphincters is again contracted: but it sometimes happens, as in dysenteries, for instance, that the feces are very thin, and have considerable acrimony; and then the irritation they occasion is more frequent, so as to promote their discharge without any pressure from the diaphragm or abdominal muscles; and sometimes involuntarily, as is the case when the sphincters become paralytic.

DEIFICATION, in antiquity. See **APOTHEOSIS**.

DEISM, the system of religion acknowledged by the deists.

DEISTS, in the modern sense of the word, are those persons in Christian countries, who, acknowledging all the obligations and duties of natural religion, disbelieve the Christian scheme of revealed religion. They are so called from their belief in God alone, in opposition to Christians. The learned Dr Clarke taking the denomination in the most extensive signification, distinguishes deists into four sorts. 1. Such as pretend to believe the existence of an eternal, infinite, independent, intelligent Being; and who teach, that this supreme Being made the world, though they fancy he does not at all concern himself in the management of it. 2. Those who believe not only the being, but also the providence, of God with respect to the natural world; but who, not allowing any difference between moral good and evil, deny that God takes any

notice of the morally good or evil actions of men; these things depending, as they imagine, on the arbitrary constitutions of human laws. 3. Those who having right apprehensions concerning the natural attributes of God, and his all-governing providence, and some notion of his moral perfections also; yet, being prejudiced against the notion of the immortality of the human soul, believe that men perish entirely at death, and that one generation shall perpetually succeed another, without any future restoration or renovation of things. 4. Such as believe the existence of a supreme Being, together with his providence in the government of the world, as also the obligations of natural religion; but so far only as these things are discoverable by the light of nature alone, without believing any divine revelation. These last are the only true deists; but as the principles of these men would naturally lead them to embrace the Christian revelation, the learned author concludes there is now no consistent scheme of deism in the world.

DEITY, a term frequently used in a synonymous sense with God.

DELEGATE, in a general sense, a deputy or commissioner.

DELEGATES, commissioners appointed by the king, under the great seal, to hear and determine appeals from the ecclesiastical court.

Court of DELEGATES, the great court of appeal in all ecclesiastical causes. These delegates are appointed by the king's commission under his great seal, and issuing out of chancery, to represent his royal person, and hear all appeals to him made by virtue of the statute 25 Henry VIII. c. 19. This commission is usually filled with lords spiritual and temporal, judges of the courts at Westminster, and doctors of the civil law. Appeals to Rome were always looked upon by the English nation, even in the times of Popery, with an evil eye, as being contrary to the liberty of the subject, the honour of the crown, and the independence of the whole realm; and were first introduced in very turbulent times, in the 16th year of king Stephen (A. D. 1151), at the same period (Sir Henry Spelman observes) that the civil and canon laws were first imported into England. But in a few years after, to obviate this growing practice, the constitutions made at Clarendon, 11 Hen. II. on account of the disturbances raised by archbishop Becket and other zealots of the holy see, expressly declare, that appeals in causes ecclesiastical ought to lie from the archdeacon to the diocesan; from the diocesan to the archbishop of the province; and from the archbishop to the king; and are not to proceed any farther without special license from the crown. But the unhappy advantage that was given in the reign of king John, and his son Hen. III. to the encroaching power of the Pope, who was ever vigilant to improve all opportunities of extending his jurisdiction to Britain, at length rivetted the custom of appealing to Rome in causes ecclesiastical so strongly, that it never could be thoroughly broken off, till the grand rupture happened in the reign of Hen. VIII. when all the jurisdiction usurped by the Pope in matters ecclesiastical was restored to the crown, to which it originally belonged: so that the statute 25 Hen. VIII. was but declaratory of the ancient law of the realm. But in case the king himself be party in any of these

Deity,
Delegate.

Blackst.
Comment.

suits,

* See Ana-
tomy, n^o 334.

Delegation, suits, the appeal does not lie to him in chancery, which would be absurd; but, by the 24 Henry VIII. c. 12. to all the bishops of the realm, assembled in the upper house of convocation.

DELEGATION, a commission extraordinary given by a judge to take cognizance of and determine some cause which ordinarily does not come before him.

DELEGATION, in Scots Law. See LAW, N^o cxxvii. 8.

DELETERIOUS, an appellation given to things of a destructive or poisonous nature. See POISON.

DELFT, a town of the united provinces, and capital of Delfland in Holland. It is a pretty large place, very clean and well built, with canals in the streets, planted on each side with trees. The public buildings, especially the town-house, are very magnificent. Here are two churches: in one is the tomb of the prince of Orange, who was assassinated; and in the other, that of admiral Tromp. It has a fine arsenal, well furnished; is about two miles in circumference, and is defended against inundations by three dams or dikes. Here is made a prodigious quantity of fine earthen ware called *delft-ware*; but the town has no other trade. It is pleasantly situated among the meadows on the river Schie, in E. Long. 4. 13. N. Lat. 32. 6.

DELFT-Ware, a kind of pottery of baked earth, covered with an enamel or white glazing, which gives it the appearance and neatness of porcelain.—Some kinds of this enamelled pottery differ much from others, either in their sustaining sudden heat without breaking, or in the beauty and regularity of their forms, of their enamel, and of the painting with which they are ornamented. In general, the fine and beautiful enamelled potteries, which approach the nearest to porcelain in external appearance, are at the same time those which least resist a brisk fire. Again, those which sustain a sudden heat, are coarse, and resemble common pottery.

The basis of this pottery is clay, which is to be mixed, when too fat, with such a quantity of sand, that the earth shall preserve enough of its ductility to be worked, moulded, and turned easily; and yet that its fatness shall be sufficiently taken from it, that it may not crack or shrink too much in drying or in baking. Vessels formed of this earth must be dried very gently, to avoid cracking. They are then to be placed in a furnace to receive a slight baking, which is only meant to give them a certain consistence or hardness. And, lastly, they are to be covered with an enamel or glazing; which is done, by putting upon the vessels thus prepared, the enamel, which has been ground very fine, and diluted with water.

As vessels on which the enamel is applied are but slightly baked, they readily imbibe the water in which the enamel is suspended, and a layer of this enamel adheres to their surface: these vessels may then be painted with colours composed of metallic calces, mixed and ground with a fusible glass. When they are become perfectly dry, they are to be placed in the furnace, included in cases of baked earth called *seggars*, and exposed to a heat capable of fusing uniformly the enamel which covers them.—This heat given to fuse the enamel being much stronger than that which was applied at first to give some consistence to the ware, is also the heat necessary to complete the baking of it. The furnace and the colours used for painting this ware, are the

same as those employed for PORCELAIN. The glazing, which is nothing but white enamel, ought to be so opaque as not to shew the ware under it. There are many receipts for making these enamels: but all of them are composed of sand or flints, vitrifying salts, calx of lead, and calx of tin; and the sand must be perfectly vitrified, so as to form a glass considerably fusible. Somewhat less than an equal part of alkaline salt, or twice its weight of calx of lead, is requisite to effect such vitrifications of sand. The calx of tin is not intended to be vitrified, but to give a white opaque colour to the mass; and one part of it is to be added to three or four parts of all the other ingredients taken together. From these general principles, various enamels may be made to suit the different kinds of earths. To make the enamel, lead and tin are calcined together with a strong fire; and the sand is also to be made into a frit with the salts or ashes. The whole is then to be well mixed and ground together. This matter is then to be placed under the furnace, where it is melted and vitrified during the baking of the ware. It is next to be ground in a mill, and applied as above directed.

The preparation of the white enamel is a very essential article in making delft-ware, and one in which many artists fail. M. Bosc. d'Antic, in a Memoir concerning this kind of ware, published in the *Mém. des Savans Etrangers*, tom. 6. recommends the following proportions. An hundred pounds of calx of lead are to be mixed with about a seventh part of that quantity of calx of tin for common delft-ware, or a fourth part of calx of tin for the finest kind; an hundred, or an hundred and ten, pounds of fine sand; and about 20 or 30 pounds of sea-salt.—Concerning the earth of which the ware is made, he observes, that pure clay is not a proper material when used alone. Different kinds of earths mixed together are found to succeed better. Pieces of ware made of clay alone, are found to require too much time to dry; and they crack, and lose their form, unless they are made exceedingly thick. An addition of marle diminishes the contraction of the clay; renders it less compact; and allows the water to escape, without altering the form of the ware in drying. It affords also a better ground for the enamel; which appears more glossy and white, than when laid on clay alone.—The kinds of clay which are chiefly used in the composition of delft-ware, are the blue and green. A mixture of blue clay and marle would not be sufficiently solid, and would be apt to scale, unless it were exposed to a fire more intense than what is commonly used for the burning of delft-ware. To give a greater solidity, some red clay is added; which, on account of its ferruginous matter, possesses the requisite binding quality. The proportions of these ingredients vary in different works, according to the different qualities of the earths employed. Three parts of blue clay, two parts of red clay, and five parts of marle, form the composition used in several manufactories. M. d'Antic thinks, that the best delft-ware might be made of equal parts of pure clay and pure calcareous earth; but this composition would require that the fire should be continued twice as long as it generally is.

DELIA, in antiquity, feasts celebrated by the Athenians in honour of Apollo, surnamed *Delius*.

DELIA was also a quinquennial festival in the island of

Delia.

Chem. Dist.

Delibamenta

Deliquium.

of Delos, instituted by Theseus at his return from Crete, in honour of Venus, whose statue, given him by Ariadne, he erected in that place, having by her assistance met with success in his expedition.

DELIBAMENTA, in antiquity, a libation to the infernal gods, always offered by pouring downwards. See **LIBATION**.

JUS DELIBERANDI. See **LAW**, N° clxxx. 23.

DELIBERATIVE, an appellation given to a kind or branch of rhetoric, employed in proving a thing, or convincing an assembly thereof, in order to persuade them to put it in execution.

To have a **DELIBERATIVE** voice in the assembly, is when a person has a right to give his advice and his vote therein. In councils, the bishops have *deliberative* voices; those beneath them have only consultative voices.

DELICT, in Scots law, signifies such small offences or breaches of the peace as are punishable only by fine or short imprisonment.

DELINQUENT, a guilty person, or one who has committed some fault or offence for which he is punishable. See **BRITAIN**, N° 97.

DELIQUESCENTE, in chemistry, signifies the property which certain bodies have of attracting moisture from the air, and becoming liquid thereby. This property is never found but in saline substances, or matters containing them. It is caused by the great affinity which these substances have with water. The more simple they are, according to Mr Macquer, the more they incline to deliquescence. Hence, acids, and certain alkalis, which are the most simple, are also the most deliquescent salts. Mineral acids are so deliquescent, that they strongly imbibe moisture from the air, even though they are already mixed with a sufficient quantity of water to be fluid. For this purpose, it is sufficient that they be concentrated only to a certain degree.—Many neutral salts are deliquescent, chiefly those whose bases are not saline substances. Salts formed by the vitriolic acid, with fixed or volatile alkalis, earths, or most metallic substances, are not deliquescent; although this acid is the strongest of all, and, when disengaged, attracts the moisture of the air most powerfully.

Though the immediate cause of deliquescence is the attraction of the moisture of the air, as we have already observed; yet it remains to be shewn why some salts attract this moisture powerfully, and others, though seemingly equally simple, do not attract it at all. The vegetable alkali, for instance, attracts moisture powerfully; the mineral alkali, though to appearance equally simple, does not attract it at all. The acid of tartar by itself does not attract the moisture of the air; but if mixed with borax, which has a little attraction for moisture, the mixture is exceedingly deliquescent.—Some theories have been suggested, in order to account for these and other similar facts; but we are as yet too little acquainted with the nature of the atmosphere, and the relation its constituent parts have to those of terrestrial substances, to determine any thing with certainty on this head.

DELIQUIM, a term frequently employed by chemists to characterise a body which is resolved into a liquor by exposure to the air. In this sense they talk of the *deliquium* of a salt, as of salt of tartar for in-

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stance. This word is also frequently used instead of **DELIQUESCENTE**.

DELIRIUM, from *deliro*, to rave or talk idly. When the ideas excited in the mind do not correspond to the external objects, but are produced by the change induced on the common sensory, the patient is said to be delirious. The Greeks call it *paraphrenesis*. In the English there is no word for it, except *light-headedness* be admitted.

The paraphrenesis, or delirium, differs from a madness, in not being perpetual, which happens in deliriums without a fever.—The proximate cause of a delirium is an affection of the brain; but the remote causes may be an irritation, sometimes a very slight one, of any part of the nervous system. See (the *Index* subjoined to) **MEDICINE**.

DELIVERY, or **CHILD-BIRTH**. See **MIDWIFERY**.

DELLY, or **DELHI**, a kingdom and city of the Mogul's empire, in Asia. The city is one of the capitals of the empire. The road between it and *Agra* the other capital, is that famous alley or walk planted with trees by Jehan Ghir, and 150 leagues in length. Each half league is marked with a kind of turret; and at every stage there are little sarays, or caravanseras, for the benefit of travellers. The road, though pretty good, has many inconveniences. It is not only frequented by wild beasts, but by robbers. The latter are so dextrous at casting a noose about a man's neck, that they never fail, if within reach, to seize and strangle him. They gain their point likewise by means of handsome women; who, feigning great distress, and being taken up behind the unwary traveller, choke him with the same snare.—The capital consists of three cities, built near one another. The first, now quite destroyed, is said to have had 52 gates; and to have been the residence of king Porus, conquered by Alexander the Great. The second, which is also in ruins, was demolished by Shah Jehan, to build *Jehanabad* with the materials. This makes the third city, and joins the ruins of the second. This city stands in an open plain country, on the river *Jamna*, which rises in this province. It is encompassed with walls, except towards the river. These are of brick, flanked with round towers; but without a ditch, and terraced behind, four or five feet thick. The circumference of the walls may be about nine miles. The fortrefs, which is a mile and an half in circuit, has good walls and round towers, and ditches full of water, faced with stone. It is surrounded with fine gardens, and in it is the Mogul's palace. See **INDOSTAN**. E. Long. 79. 25. N. Lat. 28. 20.

DELMENHORST, a strong town of Germany, in the circle of Westphalia, and county of Oldenburg, belonging to Denmark; seated on the river Delm near the Weser. E. Long. 8. 37. N. Lat. 53. 10.

DELOS, an island of the Archipelago, very famous in ancient history. Originally it is said to have been a floating island, but afterwards it became fixed and immovable. It was held sacred on account of its being the birth-place of Apollo and Diana.—Anciently this island was governed by its own kings. Virgil mentions one Anius reigning here in the time of the Trojan war. He was, according to that poet, both king and high-priest of Apollo, and entertained Æneas with great kindness. The Persians allowed the De-

14 B

Iians

Delirium

Delos.

Delos.

lians to enjoy their ancient liberties, after they had reduced the rest of the Grecian islands. In after ages, the Athenians made themselves masters of it; and held it till they were driven out by Mithridates the Great, who plundered the rich temple of Apollo, and obliged the Delians to side with him. Mithridates was in his turn driven out by the Romans, who granted the inhabitants many privileges, and exempted them from all sorts of taxes. At present it is quite abandoned; the lands being covered with ruins and rubbish, in such a manner as to be quite incapable of cultivation. The inhabitants of Mycone hold it now, and pay but ten crowns land-tax to the Grand Signior for an island which was once one of the richest in the world.—Strabo and Callimachus tell us that the island of Delos was watered by the river Inapus: but Pliny calls it only a spring; and adds, that its waters swelled and abated at the same time with those of the Nile. At present there is no river in the island, but one of the noblest springs in the world; being twelve paces in diameter, and inclosed partly by rocks, and partly by a wall. Mount Cynthus, whence Apollo had the surname of *Cynthius*, is by Strabo placed near the city, and said to be so high, that the whole island was covered by its shadow; but our modern travellers speak of it as an hill of a very moderate height. It is but one block of granite of the ordinary sort, cut, on that side which faced the city, into regular steps, and inclosed on both sides by a wall. On the top of the mountain are still to be seen the remains of a stately building, with a mosaic pavement, many broken pillars, and other valuable monuments of antiquity. From an inscription discovered there some time ago, and which mentions a vow made to Serapis, Isis, and Anubis, some have conjectured, that on this hill stood a temple dedicated to these Egyptian deities, though no where mentioned in history.—The city of Delos, as is manifest from the magnificent ruins still extant, took up that spacious plain reaching from one coast to the other. It was well peopled, and the richest city in the Archipelago, especially after the destruction of Corinth; merchants flocking thither from all parts, both in regard of the immunity they enjoyed there, and of the convenient situation of the place between Europe and Asia. Strabo calls it one of the most frequented empories in the world; and Pliny tells us, that all the commodities of Europe and Asia were sold, purchased, or exchanged there. It contained many noble and stately buildings; as, the temples of Apollo, Diana, and Latona; the porticoes of Philip of Macedon, and Dionysius Eutyches; a gymnasium; an oval basin made at an immense expence, for the representation of sea-fights; and a most magnificent theatre. The temple of Apollo was, according to Plutarch, begun by *Eryciston* the son of *Cecrops*; but afterwards enlarged and embellished at the common charges of all the states of Greece. Plutarch tells us, that it was one of the most stately buildings in the universe; and speaks of an altar in it, which, in his opinion, deserved a place among the wonders of the world. It was built with the horns of various animals, so artificially adapted to one another, that they hunged together without any cement. This altar is said to have been a perfect cube; and the doubling it was a famous mathematical problem among the ancients. This went under the name of *Problema*

Deliacum; and is said to have been proposed by the oracle, for the purpose of freeing the country from a plague. The distemper was to cease when the problem was solved.—The trunk of the famous statue of Apollo, mentioned by Strabo and Pliny, is still an object of great admiration to travellers. It is without head, feet, arms, or legs; but from the parts that are yet remaining, it plainly appears, that the ancients did not exaggerate when they commended it as a wonder of art. It was of a gigantic size, though cut out of a single block of marble; the shoulders being six feet broad, and the thighs nine feet round. At a small distance from this statue lies, amongst confused heaps of broken columns, architraves, bases, chapiters, &c. a square piece of marble 15½ feet long, ten feet nine inches broad, and two feet three inches thick; which undoubtedly served as a pedestal for this colossus. It bears, in very fair characters, this inscription in Greek, “The Naxians to Apollo.” Plutarch tells us, in the life of Nicias, that he caused to be set up, near the temple of Delos, an huge palm-tree of brass, which he consecrated to Apollo; and adds, that a violent storm of wind threw down this tree on a colossian statue raised by the inhabitants of Naxos. Round the temple were magnificent porticoes built at the charge of various princes, as appears from inscriptions which are still very plain. The names of Philip king of Macedon, Dionysius Eutyches, Mithridates Euergetes, Mithridates Eupator, kings of Pontus, and Nicomedes king of Bithynia, are found on several pedestals.—To this temple the inhabitants of the neighbouring islands sent yearly a company of virgins to celebrate, with dancing, the festival of Apollo and his sister Diana, and to make offerings in the name of their respective cities.

So very sacred was the island of Delos held by the ancients, that no hostilities were practised here, even by the nations that were at war with one another, when they happened to meet in this place. Of this, Livy gives an instance. He tells us, that some Roman deputies being obliged to put in at Delos, in their voyage to Syria and Egypt, found the galleys of Perseus king of Macedon, and those of Eumenes king of Pergamus, anchored in the same harbour, though these two princes were then making war upon one another.—Hence this island was a general asylum, and the protection extended to all kinds of living creatures; for this reason it abounded with hares, no dogs being suffered to enter it. No dead body was suffered to be buried in it, nor was any woman suffered to lie in there; all dying persons, and women ready to be delivered, were carried over to the neighbouring island of Rhenea.

DELPHINIUM, DOLPHIN-FLOWER, OR LARKSPUR; a genus of the trigynia order, belonging to the polyandria class of plants. There are seven species; four are cultivated in gardens. Two of these are annual, and two perennial. They are herbaceous plants of upright growth, rising from 18 inches to four feet in height, garnished with finely divided leaves, and terminated by long spikes of pentapetalous flowers of blue, red, white, or violet colours.—One species, the *consolida*, is found wild in several parts of Britain, and grows in corn-fields. According to Mr Withering, the expressed juice of the petals, with a little alum, makes a good blue ink. The seeds are acrid and poisonous.

Delphinium.



Fig. 1. DASTUS OF ARMADILLO.



Fig. 3. DEAD EYES.

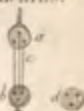


Fig. 4. DELPHINUS or DOLPHIN.



Fig. 9.



Fig. 5. DRACO or FLYING DRAGON.



Fig. 6. DONAX.

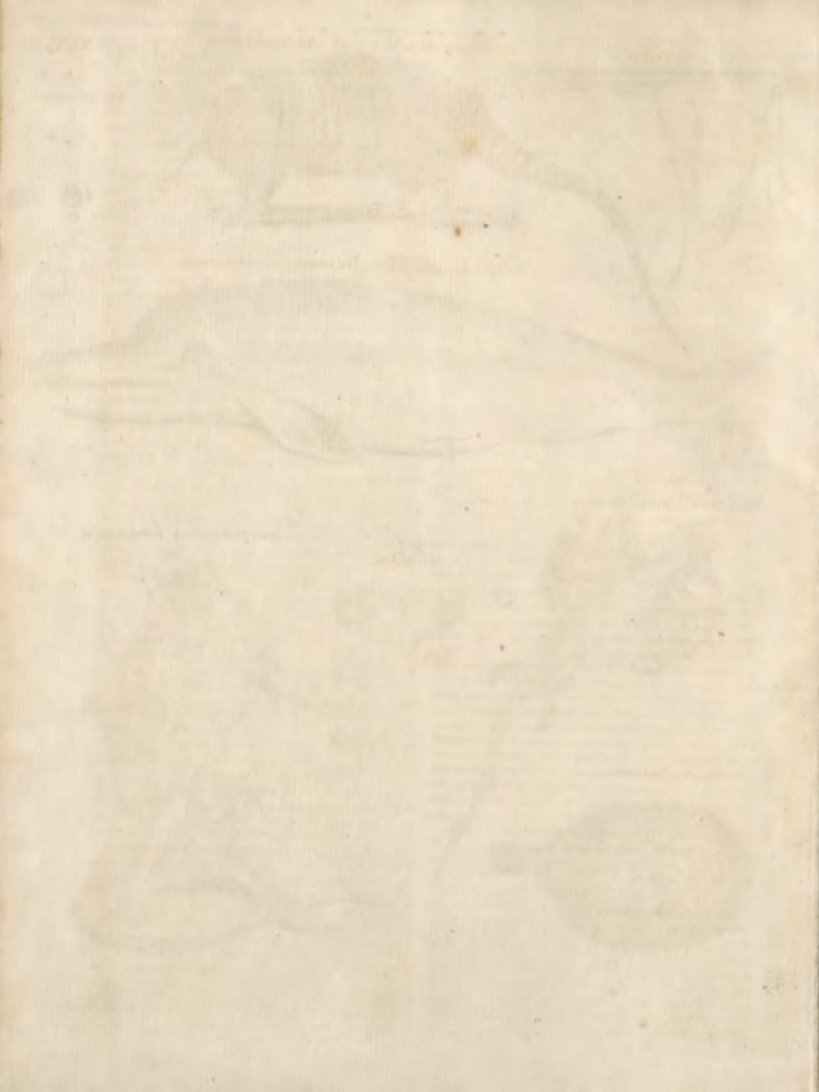


Fig. 7. DIDELPHIS or OPOSSUM.



Fig. 8. DIODON.





Delphinus,
or dolphin.

fonous. When cultivated, the blossoms often become double. Sheep and goats eat this plant; horses are not fond of it; cows and swine refuse it.—The first-mentioned species makes a very fine appearance in gardens, and is easily propagated by seeds; being so hardy, that it thrives in any soil or situation.

DELPHINUS, or DOLPHIN; a genus of fishes belonging to the order of Cete. There are three species.

1. The delphis, or dolphin. Historians and philosophers seem to have contended who should invent most fables concerning this fish. It was consecrated to the gods, was celebrated in the earliest time for its fondness of the human race, was honoured with the title of the *sacred fish*, and distinguished by those of *boy-loving* and *philanthropic*. It gave rise, to a long train of inventions, proofs of the credulity and ignorance of the times. Aristotle steers the clearest of all the ancients from these fables, and gives in general a faithful history of this animal; but the elder Pliny, Ælian, and others, seem to preserve no bounds in their belief of the tales related of this fish's attachment to mankind. Scarce an accident could happen at sea, but the dolphin offered himself to convey to shore the unfortunate. Arion the musician, when flung into the ocean by the pirates, is received and saved by this benevolent fish.

*Inde (sive majus) tergo Delphin recurvo,
Se memorant ovari: supposuisse novo.
Ille sedens citharæque tenens, pretiosum vehendi
Cantat, et æquoreis carmine mulcet aquas.*

OVID. *Festiv.* lib. ii. 113.

But (past belief) a dolphin's arched back
Preserved Arion from his destined wreck;
Secure he sits, and with harmonious strains
Requies his bearer for his friendly pains.

We are at a loss to account for the origin of those fables, since it does not appear that the dolphin shews a greater attachment to mankind, than the rest of the cetaceous tribe. We know that at present the appearance of this fish, and the porpoise, are far from being esteemed favourable omens by the seamen; for their boundings, springs, and frolics, in the water, are held to be sure signs of an approaching gale.

It is from their leaps out of that element, that they assume a temporary form that is not natural to them; but which the old painters and sculptors have almost always given them. A dolphin is scarce ever exhibited by the ancients in a straight shape, but almost always incurvated: such are those on the coin of Alexander the Great, which is preserved by Belon, as well as on several other pieces of antiquity.* The poets describe them much in the same manner, and it is not improbable that the one had borrowed from the other:

*Tumidæque pauda transiit dorso mare
Tyrhæus omni piscis exaltat freta,
Ægæique gyres.* SENECA. *Trag.* Agam. 450.

Upon the swelling waves the dolphins show
Their bending backs; then, swiftly dashing, go,
And in a thousand wreaths their bodies throw.

The natural shape of the dolphin* is almost straight, the back being very slightly incurvated, and the body slender: the nose is long, narrow, and pointed, not much unlike the beak of some birds, for which reason the French call it *P oye de m. r.* It has in all 40 teeth; 21 in the upper jaw, and 19 in the lower; a little above an inch long, conic at their upper end, sharp-pointed, bending a little in. They are placed at

small distances from each other; so that when the mouth is shut, the teeth of both jaws lock into one another: the spout-hole is placed in the middle of the head; the tail is semilunar; the skin is smooth, the colour of the back and sides dusky, the belly whitish: it swims with great swiftness; and its prey is fish. It was formerly reckoned a great delicacy: Dr Caius says, that one which was taken in his time, was thought a present worthy the duke of Norfolk, who distributed part of it among his friends. It was roasted and dressed with porpoise fauce, made of crumbs of fine wheat bread, mixed with vinegar and sugar.

This species of dolphin must not be confounded with that to which seamen give the name; the latter being quite another kind of fish, the *coryphæna hippuris* of Linnæus, and the *dorado* of the Portuguese.

2. The phocæna, or porpoise. This species is found in vast multitudes in all parts of the British seas; but in greatest numbers at the time when fish of passage appear, such as mackerel, herrings, and salmon, which they pursue up the bays with the same eagerness as a dog does a hare. In some places they almost darken the sea as they rise above water to take breath: but porpoises not only seek for prey near the surface, but often descend to the bottom in search of sand-eels, and sea-worms, which they root out of the sand with their noses in the same manner as hogs do in the fields for their food.

Their bodies are very thick towards the head, but grow slender towards the tail, forming the figure of a cone. The nose projects a little, is much shorter than that of the dolphin, and is furnished with very strong muscles, which enables it the readier to turn up the sand. In each jaw are 48 teeth, small, sharp-pointed, and a little moveable: like those of the dolphin, they are so placed as that the teeth of one jaw locks into those of the other when closed. The eyes are small; the spout-hole is on the top of the head; the tail semilunar. The colour of the porpoise is generally black, and the belly whitish; but they sometimes vary: in the river St Laurence there is a white kind; and Dr Borlase, in his voyage to the Scilly isles, observed a small species of cetaceous fish, which he calls *thornbacks*, from their broad and sharp fin on the back; some of these were brown, some quite white, others spotted: but whether they were only a variety of this fish, or whether they were small grampuses, which are also spotted, we cannot determine.

The porpoise is remarkable for the vast quantity of the fat or lard that surrounds the body; which yields a great quantity of excellent oil: from this lard, or from their rooting like swine, they are called in many places *sea-hogs*; the Germans call them *meerschwein*; the Swedes *marjuin*; and the English *porpoise*, from the Italian *porco pesce*.

It would be curious to trace the revolutions of fashion in the article of eatables; what epicure first rejected the sea-gull and heron, and what delicate stomach first nauseated the greasy flesh of the porpoise. This latter was once a royal dish, even so late as the reign of Henry VIII. and from its magnitude must have held a very respectable station at the table; for in a household book of that prince, extracts of which are published in the third volume of the *Archæologia*, it is ordered, that if a porpoise should be too big for a horse-

Delphinus,
or dolphin.

Brit. Zool.

* See Plate
LXXXVII.
fig. 4.

Delphos
Deluge.

load, allowance should be made to the purveyor. This fish continued in vogue even in the reign of Elizabeth: for Doctor Caius, on mentioning a dolphin (that was taken at Shoreham, and brought to Thomas duke of Norfolk, who divided, and sent it as a present to his friends) says, that it eat best with porpessæ sauce, which was made of vinegar, crums of fine bread, and sugar.

3. The orca, or grampus, is found from the length of 15 feet to that of 25. It is remarkably thick in proportion to its length, one of 18 feet being in the thickest place 10 feet diameter. With reason then did Pliny call this "an immense heap of flesh armed with dreadful teeth." It is extremely voracious; and will not even spare the porpessæ, a congenerous fish. It is said to be a great enemy to the whale, and that it will fasten on it like a dog on a bull, till the animal roars with pain. The nose is flat, and turns up at the end. There are 30 teeth in each jaw: those before are blunt, round, and slender; the farthest sharp and thick: between each is a space adapted to receive the teeth of the opposite jaw when the mouth is closed. The spout-hole is in the top of the neck. The colour of the back is black, but on each shoulder is a large white spot; the sides marbled with black and white; the belly of a snowy whiteness.

These fishes sometimes appear on our coasts; but are found in much greater numbers off the North Cape in Norway, whence they are called the *North-Capers*. These and all other whales are observed to swim against the wind; and to be much disturbed, and tumble about with unusual violence, at the approach of a storm.

DELPHINUS, in astronomy, a constellation of the northern hemisphere. See ASTRONOMY, n° 206.

DELPHOS, a town of Turkey in Asia, in the province of Libadia, anciently Phocis. In former times it was famous for an oracle of Apollo. See ORACLE.

DELTA, is a part of Lower Egypt, which takes up a considerable space of ground between the branches of the Nile and the Mediterranean Sea: the ancients called it the *Ile of Delta*, because it is in the shape of a triangle, like the Greek letter of that name. It is about 120 miles along the coast from Damietta to Alexandria, and 70 on the sides from the place where the Nile begins to divide itself. It is the most plentiful country of all Egypt, and it rains more there than in other parts, but the fertility is chiefly owing to the inundation of the river Nile. The principal towns on the coast are, Damietta, Rosetta, and Alexandria; but, within land, Menoufia and Maala, or Elmalâ.

DELTOIDES, in anatomy, See ANATOMY, *Table of the Muscles*.

DELUGE, an inundation or overflowing of the earth, either wholly or in part, by water.

We have several deluges recorded in history; as that of Oggyes, which overflowed almost all Attica; and that of Deucalion, which drowned all Thessaly in Greece: but the most memorable was that called the *Universal Deluge*, or *Noah's Flood*, which overflowed and destroyed the whole earth; and from which only Noah, and those with him in the ark, escaped.

The destruction of the whole earth by water, and its formation anew in the way we see it, is an event so exceedingly remarkable, and so much out of the ordinary

Deluge.

course of nature, that it is no wonder to find the reality of the fact called in question by many. As the giving up this point, however, would utterly destroy the authenticity of the sacred writings, those who have undertaken the defence of revelation, have consequently laboured to bring some positive evidence of the fact, distinct from that of Moses; and not only to shew how by natural means such an event might have happened, but likewise to bring proofs that it actually did happen. There are two principal arguments against the existence of a universal deluge: 1. The want of a sufficient quantity of water to cover the whole earth to the height mentioned by Moses. Or, 2. Supposing this to be obviated, the immutability of the laws of nature are urged; as it is thought, that, during the time of the flood, the great law of gravitation must have been suspended, or rather reversed, and the fluid water have had no tendency to return to the lowest parts of the earth as we see it hath at present.—On the other hand, most of those who maintain the reality of the universal deluge, have had recourse to the waters of the ocean as sufficient in quantity; and to the omnipotence of God, exerted either immediately, or by the mediation of some of the great natural agents, for raising them to the height to which they are said to have risen.

The finding a quantity of water sufficient for an universal deluge, hath however been looked on as a matter of great difficulty, and various hypotheses have been invented to solve it.

1. It hath been asserted, that a quantity of water was created on purpose, and at a proper time annihilated by divine power. This, however, besides its being absolutely without evidence, is directly contrary to the words of the sacred writer whom the asserters of this hypothesis mean to defend: He expressly derives the waters of the flood from two sources; first, the *fountains of the great deep*, which he tells us were all broken up; and secondly, the *windows of heaven*, which he says were opened: and speaking of the decrease of the waters, he says, the *fountains of the deep* and the *windows of heaven were stopped*, and the waters returned continually from off the earth. Here it is obvious, that Moses was so far from having any difficulty about the quantity of water, that he thought the sources from whence it came were not exhausted; since both of them required to be *stopped* by the same Almighty hand who opened them, lest the flood should increase more than it actually did.

2. Dr Burnet, in his *Telluris Theoria Sacra*, endeavours to shew, that all the waters in the ocean are not sufficient to cover the earth to the depth assigned by Moses. Supposing the sea drained quite dry, and all the clouds of the atmosphere dissolved into rain, we should still, according to him, want much the greatest part of the water of a deluge. To get clear of this difficulty, Dr Burnet and others have adopted Descartes's theory. That philosopher will have the antediluvian world to have been perfectly round and equal, without mountains or valleys. He accounts for its formation on mechanical principles, by supposing it at first in the condition of a thick turbid fluid replete with divers heterogeneous matters; which, subsiding by slow degrees, formed themselves into different concentric strata, or beds; by the laws of gravity. Dr Burnet improves on this theory, by supposing the

Deluge.

Deluge.

* See *Abyssi*.

the primitive earth to have been no more than a shell or crust investing the surface of the water contained in the ocean, and in the central abyfs which he and others suppose to exist in the bowels of the earth *. At the time of the flood, this outward crust, according to him, broke in a thousand places; and consequently sunk down among the water, which thus spouted up in vast cataracts, and overflowed the whole surface. He supposes also, that before the flood there was a perfect coincidence of the equator with the ecliptic, and consequently that the antediluvian world enjoyed a perpetual spring; but that the violence of the shock by which the outer crust was broken, shifted also the position of the earth, and produced the present obliquity of the ecliptic. This theory, it will be observed, is equally arbitrary with the former. But it is, besides, directly contrary to the words of Moses, who assures us, that all the *high hills* were covered; while Dr Burnet affirms that there were then no hills in being.

3. Other authors, supposing a sufficient fund of water in the abyfs, or sea, are only concerned for an expedient to bring it forth: accordingly, some have recourse to a shifting of the earth's centre of gravity, which, drawing after it the water out of its channel, overwhelmed the several parts of the earth successively.

4. The inquisitive Mr Whiston, in his *New Theory of the Earth*, shews, from several remarkable coincidences, that a comet descending in the plane of the ecliptic, towards its perihelion, passed just before the earth on the first day of the deluge; the consequences whereof would be, first, that this comet, when it came below the moon, would raise a vast and strong tide, both in the small seas which according to his hypothesis were in the antediluvian earth, (for he allows no great ocean there, as in ours), and also in the abyfs which was under the upper crust of the earth. And this tide would rise, and increase all the time of the approach of the comet towards the earth; and would be at its greatest height when the comet was at its least distance from it. By the force of which tide, as also by the attraction of the comet, he judges, that the abyfs must put on an elliptical figure, whose surface being considerably larger than the former spherical one, the outward crust of the earth, incumbent on the abyfs, must accommodate itself to that figure, which it could not do while it held solid, and conjoined together. He concludes, therefore, that it must of necessity be extended, and at last broke by the violence of the said tides, and attraction; out of which the included water issuing, was a great means of the deluge; this answering to what Moses speaks of the "fountains of the great deep being broke open."—Again, the same comet, he shews, in its descent towards the sun, passed so close by the body of the earth, as to involve it in its atmosphere, and tail, for a considerable time; and of consequence, left a vast quantity of its vapours, both expanded and condensed, on its surface; a great part of which being afterwards rarefied by the solar heat would be drawn up into the atmosphere, and afterwards return in violent rains: and this he takes to be what Moses intimates by "the windows of heaven being opened," and particularly by the "forty days rain." For as the following rain, which with this made the whole time of raining 150

days, Mr Whiston attributes it to the earth coming a second time within the atmosphere of the comet, as the comet was on its return from the sun. Lastly, to remove this vast orb of waters again, he supposes a mighty wind to have arisen, which dried up some, and forced the rest into the abyfs again through the clefts by which it came up: only a good quantity remained in the alveus of the great ocean, now first made, and in lesser seas, lakes, &c.—This theory was at first only proposed as an hypothesis; but, on further consideration, Mr Whiston thought he could actually prove that a comet did at that time pass very near the earth, and that it was the same which afterwards appeared in 1680. After this, he looked upon his theory no longer as an hypothesis, but published it in a particular tract entitled *The cause of the deluge demonstrated*.—But the uncertainty of the comet's return in 1758, when supposed to be absent only 75 or 76 years *, must certainly render Mr Whiston's calculations for such a length of time extremely dubious; and, the great similarity between the tails of comets and streams of electric matter renders his supposition of their being aqueous vapours exceedingly improbable.

5. According to Mr de la Pryme, the antediluvian world had an external sea, as well as land, with mountains, rivers, &c. and the deluge was effected by breaking the subterraneous caverns, and pillars thereof, with dreadful earthquakes, and causing the same to be for the most part, if not wholly, absorbed and swallowed up, and covered by the seas that we now have. Lastly, this earth of ours arose out of the bottom of the antediluvian sea; and in its room, just as many islands are swallowed down, and others thrust up in their stead.—On this, as on all the other hypotheses, it may be remarked, that it is quite arbitrary, and without the least foundation from the words of Moses. The sacred historian speaks not one word of earthquakes; nay, from the nature of the thing, we know it is impossible that the flood could have been occasioned by an earthquake, and the ark preserved, without a miracle. It is certain, that, if a ship sinks at sea, the commotion excited in the water by the descent of such a large body, will swallow up a small boat that happens to come too near. If the pillars of the earth itself then were broken, what must the commotion have been, when the continents of Europe, Asia, and Africa, descended into the abyfs at once? not to mention America, which lying at so great a distance from Noah, he might be supposed out of danger from that quarter. By what miracle was the little ark preserved amidst the tumult of those impetuous waves which must have rushed in from all quarters? Besides, as the ark was built not at sea, but on dry ground; when the earth on which it rested sunk down, the ark must have sunk along with it; and the waters falling in as it were over-head, must have dashed in pieces the strongest vessel that can be imagined. Earthquakes, also, operate suddenly and violently; whereas, according to the Mosaic account, the flood came on gradually, and did not arrive at its height till six weeks, or perhaps five months, after it began.

6. Mr Hutchinson and his followers present us with a theory of the deluge, which they pretend to derive from the word of God itself. This theory hath been particularly enlarged upon and illustrated by Mr Catcott, who in 1768 published a volume on the subject.

This

* See *Astronomy*, vol 50, —55.

Deluge.

This gentleman asserts, that when the world was first created, at the time when it is said to have been "without form and void," the terrestrial matter was then entirely dissolved in the aqueous; so that the whole formed, as it were, a thick muddy water. The figure of the whole was spherical; and on the outside of this sphere, lay the gross dark air. Within the sphere of earth and water, was an immense cavity, called by Moses the *deep*; and this internal cavity was filled with air of a kind similar to that on the outside. On the creation of light, the internal air received elasticity sufficient to burst out through the external covering of earth and water. Upon this the water descended, filled up the void, and left the earth in a form similar to what it hath at present.—Thus, according to him, the antediluvian world, as well as the present, consisted of a vast collection or nucleus of water, called the *great deep*, or the *abyss*; and over this the shell of earth, perforated in many places; by which means the waters of the ocean communicated with the abyss. The breaking up of these fountains was occasioned by a miraculous pressure of the atmosphere, from the immediate action of the Deity himself. So violent was this pressure, that the air defended to where it had been originally; occupied the space of the abyss; and drove out the waters over the whole face of the dry land.—But this account, so far from being infallibly certain, seems inconsistent with the most common observations. No pressure, however violent, will cause water rise above its level, unless that pressure is unequal. If, therefore, the atmosphere entered into the supposed abyss, by a vehement pressure on the surface of the ocean, that pressure must only have been on one place, or on a few places: and even though we suppose the atmosphere to have been the agent made use of, it is impossible, that it could have remained for any time in the abyss, without a continued miracle; as the pressure of the water would immediately have forced it up again, through those holes which had afforded it a passage downwards.

The explication given from Hutchinson by Mr Catcott, of the "windows of heaven," is some what extraordinary. According to him, these windows are not in heaven, but in the bowels of the earth; and mean no more than the cracks and fissures by which the *airs*, as he calls them, found a passage through the shell or covering of earth, which they utterly dissolved, and reduced to its original state of fluidity. It is, however, difficult to conceive how the opening of such windows as these could cause a violent rain for 40 days and nights.

It is not to be supposed, that we can pretend to ascertain any thing on the subject more than others have done. The following conjectures, however, may be offered on the manner in which the deluge might have happened without any violence to the established laws of nature.

1. If we consider the quantity of water requisite for the purpose of the deluge, it will not appear so very extraordinary as has been commonly represented. The height of the highest hills is not thought to exceed three miles. It will therefore be deemed a sufficient allowance, when we suppose the waters of the deluge to have been four miles deep on the surface of the ground. Now, it is certain, that water, or any other matter, when spread out at large upon the

Deluge.

ground, seems to occupy an immense space in comparison of what it does when contained in a cubical vessel, or when packed together in a cubical form. Suppose we wanted to overflow a room 16 feet every way, or containing 256 square feet, with water, to the height of one foot, it may be nearly done by a cubical vessel of six feet, filled with water. A cube of eight feet will cover it two feet deep, and a cube of ten feet will very nearly cover it four feet deep. It makes not the least difference, whether we suppose feet or miles, to be covered. A cube of ten miles of water, would very nearly overflow 256 square miles of plain ground, to the height of four miles. But if we take into our account the vast number of eminences with which the surface of the earth abounds, the abovementioned quantity of water would do a great deal more. If, therefore, we attempt to calculate the quantity of water sufficient to deluge the earth, we must make a very considerable allowance for the bulk of all the hills on its surface. To consider this matter, however, in its utmost latitude. The surface of the earth is supposed, by the latest computations, to contain 199,512,595 square miles. To overflow this surface to the height of four miles, is required a parallelopiped of water 16 miles deep, and containing 49,878,143 square miles of surface. Now, considering the immense thickness of the globe of the earth, it can by no means be improbable, that this whole quantity of water may be contained in its bowels; without the necessity of any remarkable abyss, or huge collection of water, such as most of our theorists suppose to exist in the centre. It is certain, that as far as the earth has been dug, it hath been found not dry, but moist; nor have we the least reason to imagine, that it is not at least equally moist all the way down to the centre. How moist it really is, cannot be known, nor the quantity of water requisite to impart to it the degree of moisture it has; but we are sure it must be immense. The earth is computed to be near 8000 miles in diameter. The ocean is of an unfathomable depth; but there is no reason for supposing it more than a few miles. To make all reasonable allowances, however, we shall suppose the whole solid matter in the globe to be only equal to a cube of 5000 miles; and even on this supposition we shall find, that all the waters of the deluge would not be half sufficient to moisten it. The above mentioned parallelopiped of water would indeed contain 798,050,368 cubic miles of that fluid; but the cube of earth containing no less than an hundred and twenty-five thousand millions of cubic miles, it is evident, that the quantity assigned for the deluge would scarce be known to moisten it. It could have indeed no more effect this way, than a single pound of water could have upon 150 times its bulk of dry earth. We are persuaded therefore, that any person who will try by experiment how much water a given quantity of earth contains, and from that experiment will make calculations with regard to the whole quantity of water contained in the bowels of the earth, must be abundantly satisfied, that though *all* the water of the deluge had been thence derived, the diminution of the general store would, comparatively speaking, have been next to nothing.

2. It was not from the bowels of the earth only that the waters were discharged, but also from the air; for we are assured by Moses, that it rained 40 days and

and 40 nights. This source of the diluvian waters hath been considered as of small consequence by almost every one who hath treated on the subject. The general opinion concerning this matter we shall transcribe from the Universal History, Vol. I. where it is very fully expressed. "According to the observations made of the quantity of water that falls in rain, the rains could not afford one ocean, nor half an ocean, and would be a very inconsiderable part of what was necessary for a deluge. If it rained 40 days and 40 nights throughout the whole earth at once, it might be sufficient to lay all the lower grounds under water, but it would signify very little as to the overflowing of the mountains; so that it has been said, that if the deluge had been made by rains only, there would have needed not 40 days, but 40 years to have brought it to pass. And if we suppose the whole atmosphere condensed into water, it would not all have been sufficient for this effect; for it is certain that it could not have risen above 32 foot, the height to which water can be raised by the pressure of the atmosphere: for the weight of the whole air, when condensed into water, can be no more than equal to its weight in its natural state, and must become no less than 800 times denser; for that is the difference between the weight of the heaviest air, and that of water."

On this subject we must observe, that there is a very general mistake with regard to the air, similar to the afore-mentioned one regarding the earth. Because the earth below our feet appears to our senses firm and compact, therefore the vast quantity of water, contained even in the moist solid parts of it, and which will readily appear on proper experiment, is overlooked, and treated as a non-entity. In like manner, because the air does not always deluge with excessive rains, it is also imagined that it contains but very little water. Because the pressure of the air is able to raise only 32 feet of water on the surface of the earth, it is therefore supposed we may know to what depth the atmosphere could deluge the earth if it was to let fall the *whole* water contained in it. But daily observations shew, that the pressure of the atmosphere hath not the least connection with the quantity of water it contains. Nay, if there is any connection, the air seems to be lightest when it contains most water. In the course of a long summer's drought, for instance, the mercury in the barometer will stand at 30 inches, or little more. If it does so at the beginning of the drought, it ought to ascend continually during the time the dry weather continues; because the air is all the while absorbing water in great quantity from the surface of the earth and sea. This, however, is known to be contrary to fact. At such times the mercury does not ascend, but remains stationary; and what is still more extraordinary, when the drought is about to have an end, the air, while it yet contains the whole quantity of water it absorbed, and hath not discharged one single drop, becomes suddenly lighter, and the mercury will perhaps sink an inch before any rain falls. The most surprising phenomenon, however, is yet to come. After the atmosphere has been discharging for a number of days successively a quantity of matter 800 times heavier than itself, instead of being *lightened* by the discharge, it becomes *heavier*, nay *specifically* heavier, than it was before. It is also certain, that very dry

air, provided it is not at the same time very hot, is always heavier; and the drier air which we are acquainted with, namely Dr Priestley's *dephlogisticated* air, is considerably heavier than the air we commonly breathe. For these reasons we think the quantity of water contained in the whole atmosphere ought to be considered as *indefinite*, especially as we know that by whatever agent it is suspended, that agent must counteract the force of gravity, otherwise the water would immediately descend; and while the force of gravity in any substance is counteracted, that substance cannot appear to us to gravitate at all.

3. The above considerations render it *probable* at least, that there is in nature a quantity of water sufficient to deluge the world, provided it was applied to the purpose. We must next consider whether there is any natural agent powerful enough to effectuate this purpose. We shall take the phrases used by Moses in their most obvious sense. The breaking up of the fountains of the deep we may reasonably suppose to have been the opening of all the passages whether small or great, thro' which the subterraneous waters possibly could discharge themselves on the surface of the earth. The opening of the windows of heaven we may also suppose to be the pouring out the water, contained in the atmosphere, thro' those invisible passages by which it enters in such a manner as totally to elude every one of our senses, as when water is absorbed by the air in evaporation. As both these are said to have been opened at the same time, it seems from thence probable, that one natural agent was employed to do both. Now it is certain, that the industry of modern inquirers hath discovered an agent unknown to the former ages, and whose influence is so great, that with regard to this world it may be said to have a kind of *omnipotence*. The agent we mean is electricity. It is certain, that, by means of it, immense quantities of water can be raised to a great height in the air. This is proved by the phenomena of water-spouts. Mr Forster relates, that he happened to see one break very near him, and observed a flash of lightning proceed from it at the moment of its breaking. The conclusion from this is obvious. When the electric matter was discharged from the water, it could no longer be supported by the atmosphere, but immediately fell down. Though water-spouts do not appear in this country, yet every one must have made an observation somewhat similar to Mr Forster's. In a violent storm of thunder and rain, after every flash of lightning, or discharge of electricity from the clouds, the rain pours down with increased violence; thus shewing, that the cloud, having parted with so much of its electricity, cannot longer be supported in the form of vapour, but must descend in rain. It is not indeed yet discovered that electricity is the cause of the suspension of water in the atmosphere; but it is certain that evaporation is promoted by electrifying the fluid to be evaporated*. It may therefore be admitted as a *possibility*, that the electric fluid contained in the air is the agent by which it is enabled to suspend the water which rises in vapour. If therefore the air is deprived of the due proportion of this fluid, it is evident that rain must fall in prodigious quantities.

Again, we are assured, from the most undeniable observations, that electricity is able to swell up water on the surface of the earth. This we can make it do even

* See Electricity, and Evaporation.

Deluge.

See Earth-quake.

in our trifling experiments; and much more must the whole force of the fluid be supposed capable of doing it, if applied to the waters of the ocean, or any others. The agitation of the sea in earthquakes is a sufficient proof of this †. It is certain, that at these times there is a discharge of a vast quantity of electric matter from the earth into the air; and as soon as this happens, all becomes quiet on the surface of the earth.

From a multitude of observations, it also appears, that there is, at all times, a passage of electric matter from the atmosphere into the earth, and *vice versa* from the earth into the atmosphere. There is therefore no absurdity in supposing the Deity to have influenced the action of the natural powers in such a manner that for 40 days and nights the electric matter contained in the atmosphere should descend into the bowels of the earth;—if indeed there is occasion for supposing any such immediate influence at all, since it is not impossible that there might have been, from some natural cause, a descent of this matter from the atmosphere for that time. But by whatever cause the descent was occasioned, the consequence would be, the *breaking up of the fountains of the deep, and the opening the windows of heaven*. The water contained in the atmosphere being left without support, would descend in impetuous rains; while the waters of the ocean, those from which fountains originate, and those contained in the solid earth itself, would rise from the very centre, and meet the waters which descended from above. Thus the breaking up of the fountains of the deep, and the opening the windows of heaven, would accompany each other, as Moses tells us they actually did; for, according to him, both happened on the same day.

In this manner the flood would come on quietly and gradually, without that violence to the globe which Burnet, Whiston, and other theorists, are obliged to suppose. The abatement of the waters would ensue on the ascent of the electric fluid to where it was before. The atmosphere would then absorb the water as formerly; that which had ascended through the earth would again subside; and thus every thing would return to its pristine state.

Thus, we think, the Mosaic account of the deluge may reasonably enough be received as a *possibility*, even by the most rigid inquirers: it remains now to take notice of those proofs which have been brought for it as a *matter of fact*. These may be reduced to two: 1. The general consent of all nations; and, 2. The existence of vast quantities of marine productions on the tops of mountains, and under the surface of the ground, at great distances from the sea.—The latter of these hath been most insisted on, and till lately was generally reckoned decisive. The observations, however, of the latest philosophers, on volcanoes, have furnished an evasion of this argument. Sir William Hamilton first shewed, that volcanoes are capable of forming mountains of very considerable size; that the fire of them lies very deep, and often below the water of the ocean itself. Hence, it is easy to see, how marine substances may be found at all depths on these volcanic mountains, and yet afford no proof of a deluge. Others have improved on this, and seem inclined to suppose that *all* the mountains, nay, *all* the habitable parts of the globe, were originally thrown up

by volcanic explosions from the bottom of the ocean. But for a particular consideration of these matters, see the articles *EARTH, MOUNTAIN, and VOLCANO*.

DEMADES, a famous Athenian, who, from being a mariner, became a great orator, and appeased Philip by his eloquence, after the famous victory over the Athenians at Cheronea, in the 338th year B. C.

DEMAIN, or DEMESNE, in its common acceptance, is used for the lands round a manor-house, occupied by the lord.

DEMAIN, or *Demefne*, in law, is commonly understood to be the lord's chief manor-place, with the lands thereto belonging, which he and his ancestors have, time out of mind, kept in their own manual occupation.

DEMAND, in its popular sense, denotes a calling for or requiring one's due.

DEMAND, in law, has a more special signification, as contradicting with *plaint*: for all civil actions are pursued either by demands or plaints; according to which the pursuer is called either *demandant* or *plaintiff*: viz. in real actions, *demandant*; and in personal actions, *plaintiff*. See PLAINTIFF.

Where the party pursuing is called *demandant*, the party pursued is called *tenant*; and where *plaintiff*, *defendant*. See DEFENDANT.

There are two kinds of demands: the one in *deed, de facto*, as in every precept; the other in *law, de jure*; such is entry in land, distress for rent, &c.

DEMEBRE, in heraldry, is said of dismembered animals, or those with their limbs cut off.

DEMEMBRATION, in Scots law. See LAW, N° clxxvi. 17.

DEMESNE. See DEMAINE.

DEMETRIA, a festival celebrated by the Greeks in honour of Ceres, wherein it was usual for the devotees to lash themselves.

DEMETRIOWITZ, a city of the duchy of Smolensko, in the Russian empire, situated upon the river Ugra, in E. Long. 37. O. N. Lat. 53. 20.

DEMETRIUS PHALEREUS, a celebrated orator and peripatetic philosopher, the scholar of Theophrastus. He acquired so much authority at Athens, that he governed the city for ten years; and ruled with so much wisdom and virtue, that they set up 36 statues in honour of him. By the slanders of some malicious persons, in his absence, he was, however, condemned to die; and his images were pulled down: which when Demetrius heard, he said, they could not pull down that virtue for which those images were set up. He escaped into Egypt, and was protected by Ptolemy Lagos. This king, it is said, asked his advice concerning the succession of his children to the throne; viz. whether he ought to prefer those he had by Eurydice to Ptolemy Philadelphus whom he had by Berenice; and Demetrius advised him to leave his crown to the former. This displeased Philadelphus so much, that, his father being dead, he banished Demetrius; who was afterwards killed by the bite of an asp. Demetrius composed more works in prose and verse than any other peripatetic of his time; and his writings consisted of poetry, history, politics, rhetoric, harangues, and embassies. None of them are extant except his rhetoric, which is usually printed among the *Rhetores Selecti*.

DEMETRIUS POLIORETES, that is, the Taker of Towns, king of Macedonia, was the son of Antigonus,

Demades
Demetrius

Demi-
Democritus

gonus, one of the generals and successors of Alexander the Great. See (History of) MACEDONIA.

DEMI, a word of the same use and effect in the French language, with *semi* in the Latin and English, being formed from *dimidium*; and used, in composition with other words, to signify *half*. In words borrowed from the Latins, we use *semi*; and in those from the French, we retain their *demi*. See SEMI.

DEMI-CULVERIN, a piece of ordnance usually 4½ inches bore, 2700 pound weight, ten feet long, and carrying point blank 175 paces.

DEMI-CULVERIN of the *least size*, is 4½ inches bore, ten feet long, and 2000 pounds weight. It carries a ball of 4 inches diameter, and of 9 pounds weight, and its level range is 174 paces.

DEMI-CULVERIN of the *largest sort*, is 4½ inches bore, 10½ feet long, and weighs 3000 pounds weight. It carries a ball 4½ inches diameter, weighing 12 pounds 11 ounces, point blank 178 paces.

DEMI-GOD. See HERO.

DEMI-GORGE, in fortification, is that part of the polygon which remains after the flank is raised, and goes from the curtain to the angle of the polygon. It is half of the vacant space or entrance into a bastion.

DEMI-QUAVER, a note in music, two of which are equal to a quaver.

DEMI-SEMI-QUAVER, in music, the shortest note, two of them being equal to a semi-quaver.

DEMOCRACY, from *δημος*, *people*, and *κρατος*, to *command* or *govern*; the same with a popular government, wherein the supreme power is lodged in the hands of the people: such were Rome and Athens of old; but as to our modern republics, Basil only excepted, their government comes nearer to aristocracy than democracy. See LAW, § 14.

DEMOCRITUS, one of the greatest philosophers of antiquity, was born at Abdera, a town of Thrace, about the 80th Olympiad; that is, about 460 years before Christ. His father, says Valerius Maximus, was able to entertain the army of Xerxes; and Diogenes Laertius adds, upon the testimony of Herodotus, that the king, in requital, presented him with some Magi and Chaldeans. From these Magi and Chaldeans, Democritus received the first part of his education; and from them, whilst yet a boy, he learned theology and astronomy. He next applied to Leucippus, and learned from him the system of atoms and a vacuum. His father dying, for so many there were, divided the estate. Democritus made choice of that part which consisted in money, as being, though the least share, the most convenient for travelling; and it is said, that his portion amounted to above 100 talents, which is near 20,000. Sterling. His extraordinary inclination for the sciences and for knowledge, induced him to travel into all parts of the world where he hoped to find learned men. He went to visit the priests of Egypt, from whom he learned geometry; he consulted the Chaldeans and the Persian philosophers; and it is said, that he penetrated even into India and Ethiopia, to confer with the Gymnosophists. In these travels, he wasted his substance; after which, at his return, he was obliged to be maintained by his brother; and if he had not given proofs of the greatest understanding, and thereby procured to himself the highest honours, and the strongest interest in his country, he would have

Demon-
strable
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Demost-
henes.

incurred the penalty of that law which denied the interment in the family-sepulchre to those who had spent their patrimony. After his return from travelling, he lived at Abdera, and governed there in a most absolute manner, by virtue of his consummate wisdom. The magistrates of that city made him a present of 500 talents, and erected statues to him even in his lifetime: but being naturally more inclined to contemplation, than delighted with public honours and employments, he withdrew into solitude and retirement. Democritus incessantly laughed at human life, as a continued farce, which made the inhabitants of Abdera think he was mad; on which they sent for Hippocrates to cure him: but that celebrated physician having discoursed with the philosopher, told the Abderians, that he had a great veneration for Democritus; and that, in his opinion, those who esteemed themselves the most healthy were the most distempered. Democritus died, according to Diogenes Laertius, in the 361st year before the Christian æra, aged 109. It is said that he blinded himself, that he might meditate more profoundly on philosophical subjects; but this has little probability. He was the author of many books, which are lost; and from these Epicurus borrowed his philosophy.

DEMONSTRABLE, a term used in the schools, to signify that a thing may be clearly proved. Thus, it is demonstrable, that the three angles of a triangle are equal to two right ones.

DEMONSTRATION, in logic, a series of syllogisms, all whose premises are either definitions, self-evident truths, or propositions already established. See LOGIC, n^o 27. 102—113.

DEMONSTRATIVE, in grammar, a term given to such pronouns as serve to indicate or point out a thing. Of this number are *hic*, *hæc*, *hoc*, among the Latins; and *this*, *that*, *these*, *those*, in English.

DEMOSTHENES, the famous Athenian orator, was born at Athens 381 B. C. He lost his father at seven years of age; and was placed under the conduct of guardians, who robbed him of his substance, and neglected his education. Demosthenes repaired this loss by his love of eloquence and his extraordinary abilities. He became the disciple of Iſocrates, Plato, and Iſæus; and made such progress under those excellent masters, that, at 17 years of age, he pleaded against his guardians, and caused them to be sentenced to pay him 30 talents. This was the first time that he distinguished himself by his eloquence, in which he arrived at the highest excellence; though he set out under the greatest disadvantages. For he had an impediment in his speech, which for a long time would not suffer him to pronounce the letter R. He had a weak voice, short breath, and a very uncouth manner. However, by dint of resolution, and infinite pains, he overcame all these defects: See DECLAMATION, N^o II. It is universally agreed, that no orator ever spoke with less force, or had the passions of others so much in his power, as Demosthenes. He could dress a thing up in any light he pleased, and give it whatever colouring best answered his purpose; and that with such force of oratory, as bore down, like a thunder-bolt, all before it. Hence Philip king of Macedon said, his eloquence was of more weight against him, than all the fleets and armies of the Athenians; and that he had no enemy but Demosthenes. After the death of Philip, he op-

Dempster
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Demurrage.

posed Alexander the Great; on which account he was obliged to leave the city: but, after the death of that conqueror, he returned to Athens, where he was received in the most glorious manner, and continued declaiming against the Macedonians. Antipater being informed of this, desired the Athenians to deliver up to him all the orators who had spoken against him; on which Demosthenes withdrew into the life of Celauria. Archas coming hither to seize him in behalf of Antipater, he pretended a desire to write to some of his friends; and sucking some poison he had concealed in a pen, died 322 B. C. Many of his orations are still extant, the style of which is grand, sublime, and nervous; and they are all of them master-pieces of eloquence.

DEMPSTER (Thomas), a very learned man, but of a singular character. He was born in Scotland, but we do not find in what year. He went over to France, for the sake of embracing the catholic religion; and taught classical learning at Paris about the beginning of the 17th century. Tho' his business was to teach school; yet he was as ready to draw his sword, and as quarrelsome, as if he had been a duellist by profession: and it is said, that there scarce passed a day but he had something or other of this kind upon his hands. This spirit and turn of temper drew him into many scrapes; and one in particular, which obliged him to quit the country. Grangier, principal of the College of Beauvais at Paris, being obliged to take a journey, appointed Dempster his substitute. Dempster caused whip a scholar, in full school, for challenging one of his fellows to fight a duel. The scholar, to revenge this affront, brought three gentlemen of his relations, who were of the king's life-guards, into the college. Dempster made the whole college take arms; hamstringed the three life guard-men's horses before the college gate; and put himself into such a posture of defence, that the three sparks were forced to ask for quarter. He gave them their lives; but imprisoned them, and did not release them for some days. They sought another way to revenge themselves: they caused an information to be made of the life and moral behaviour of Dempster, and got some witnesses to be heard against him. Upon this he went over to England, where he found refuge; but did not make any long stay. He went abroad again, and read lectures upon polite learning in several universities; in that of Nismes particularly, where he disputed for a professor's chair, and obtained it. He went to Bologna, and was professor there for the remainder of his life; and was then also admitted a member of the Academy della Rotte. He died there in September 1625, leaving behind him several learned works; as Commentaries on *Resinus de Antiquitatibus Romanorum*, and upon Claudian, &c.; four books of Epistles; several dramatic pieces, and other poems; some books of law; an Apparatus to the History of Scotland; a Martyrology of Scotland; and a List of the Scottish Writers.

DEMULCENTS, among physicians, medicines good against acrimonious humours. Such are the roots of marsh-mallows, of white lilies, of liquorice, and of viper-grass, the five emollient herbs, &c.

DEMURRAGE, in commerce, an allowance made to the master of a ship by the merchants, for staying in a port longer than the time first appointed for his de-

parture.

DEMURRER, in law, a stop put to any action upon some point of difficulty which must be determined by the court, before any further proceedings can be had in the suit.

DEN, a syllable which, added to the names of places, shews them to be situated in valleys, or near woods; as Tenterden.

DENARIUS, in Roman antiquity, the chief silver coin among the Romans, worth in our money about seven-pence three farthings. As a weight, it was the seventh part of a Roman ounce.

DENARIUS is also used in our law-books for an English penny.

DENBIGH-SHIRE, a county of Wales, bounded on the south by Merioneth and Montgomery shires; on the north by Flintshire, and the Irish sea; on the west by Carnarvon, and part of Merionethshire. It is about 40 miles long, and 21 broad. The air is wholesome, but sharp; the county being pretty hilly, and the snow lying long on the tops of the mountains. The soil in general is barren; but the vale of Clwyd, so called from its being watered by that river, is a very fertile pleasant spot, of great extent, and well inhabited. The chief commodities are black cattle, sheep, and goats, rye, called here *amelcorn*, and lead-ore. The county sends two members to parliament, viz. a knight for the shire, and a burgess for Denbigh the capital.

DENBIGH, the capital town of Denbigh-shire in N. Wales. It is seated on the side of a rocky hill, on a branch of the river Clwyd, and was formerly a place of great strength, with an impregnable castle, now demolished. It is pretty large, well built, and inhabited by tanners and glovers, and gives the title of Earl to the noble family of Fielding. W. Long. 3. 30. N. Lat. 53. 15.

DENDERMOND, a handsome and strong town of the Austrian Netherlands, in Flanders, with a strong citadel. It was taken by the allies in 1706, and by the French in 1745. It is surrounded by marshes and fine meadows, which the inhabitants can lay under water when they please. It is seated at the confluence of the rivers Deuder and Schelde. E. Long. 4. 3. N. Lat. 51. 3.

DENDRACHATES, in natural history, the name used by the ancients for an extremely elegant and beautiful species of agate, the ground of which is whitish, variegated with veins of a brighter white. These veins are beautifully disposed in a number of various figures; but generally in many concentric irregular circles, drawn round one or more points. It is common also, in various parts of this stone, to find very beautiful delineations of trees, mosses, sea-plants, and the like, so elegantly expressed, that many have erroneously taken them for real plants included in the substance of the stone; whence the name dendrachates.

DENDRANATOMY, a term used by some for a description of the various parts of trees; as root, trunk, branch, bark, wood, pith, flower, fruit, &c. See **PLANTS**, **VEGETATION**, &c.

DENDROPHORIA, in antiquity, the carrying of boughs or branches of trees; a religious ceremony so called, because certain priests called from thence *dendrophori*, tree-bearers, marched in procession, carrying the branches of trees in their hands in honour of some god,

Demurrer
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Dendrophoria.

^{Denb} god, as Bacchus, Cebale, Sylvanus, &c. The college of the dendrophori is often mentioned in ancient marbles; and we frequently see in basso relievo the bacchantes represented as men carrying little shrubs or branches of trees.

^{Denmark.} DENEb, an Arabic term signifying *tail*, used by astronomers to denote several fixed stars. Thus, *deneb elceti*, signifies the bright star in the lion's tail. *Deneb adigece*, that in the swan's tail, &c.

DENHAM (Sir John), an eminent English poet, the only son of Sir John Denham, chief baron of the exchequer in Ireland, and one of the lords commissioners there, was born in Dublin in 1615; but his father, in 1617, being made a baron of the exchequer in England, he received his education in that country. In his youth he followed gaming more than any thing else; but, in 1641, published a tragedy called the *Sophy*, which was much admired by the best judges; and, in 1643, wrote his famous poem called *Cooper's Hill*; which Mr Dryden pronounces will ever be the standard of good writing for majesty of style. Denham was sent ambassador from Charles II. to the king of Poland; and at the Restoration, was made surveyor-general of his majesty's buildings, and created knight of the Bath. On obtaining this post, he is said to have renounced his poetry for more important studies; tho' he afterward wrote a fine copy of verses on the death of Cowley. He died at his office in Whitehall in 1668; and his works have been often since printed.

DENIER, a small French copper-coin, of which twelve make a sol.

There were two kinds of deniers, the one tournois, the other paris, whereof the latter was worth a fourth part more than the former.

DENIZEN, in law, an alien made a subject by the king's letters-patent; otherwise called *denaison*, because "his legitimization proceeds *ex donatione regis*, from the king's gift."

A denizen is in a kind of middle state between an alien and a natural-born subject, and partakes of both of them. He may take lands by purchase or devise, which an alien may not: but cannot take by inheritance; for his parent, through whom he must claim, being an alien, had no inheritable blood, and therefore could convey none to the son: and, upon a like defect of blood, the issue of a denizen born before denization, cannot inherit to him; but his issue born after, may. A denizen is not excused from paying the alien's duty, and some other mercantile burthens. And no denizen can be of the privy council, or either house of parliament, or have any office of trust civil or military, or be capable of any grant of lands, &c. from the crown.

DENMARK, one of the most ancient monarchies in Europe, comprehending the peninsula of Jutland, and the islands of Zeland, Funen, &c. But Denmark, properly so called, is only that part of Scandinavia which formerly went by the name of *Cimbria Chersonesus*, and now is called *Jutland*. Including Holstein, it is bounded by the sea called the *Gategate* on the north; by the Baltic on the east; by the river Elbe, which separates it from Bremen, on the south; and by the duchy of Saxe-Lauenburg towards the south-east; extending from 54. 40. to 58. 20. N. Lat.

The origin of the name *Denmark* is very uncertain.

The most probable conjecture concerning it is that of *Saxo-Grannaticus*, the most ancient and best Danish historian. He derives it from *Dan* the son of *Humble*, the first king, and *Mark*, or *Marc*, signifying a country in several dialects of the Teutonic; according to which etymology, the word *Denmark* signifies the land, or country, of *Dan*.—This *Dan* is thought to have lived about 1038 years before the Christian era. ² *Dan* the Almost all historians agree that he was the son of *Humble*, a native of Zealand. His possessions and influence were very considerable, not only in Zealand, but in the islands of Langland and Mona. It was his courage, however, and skill in the art of war, that induced the inhabitants of Denmark to choose him for their king. He was called to the assistance of the Jutlanders upon an irruption of the Saxons into their territories, and promised the sovereignty of the country if he drove out the enemy. On this he immediately raised an army, gained a complete victory over the Saxons, and obliged them to leave the country; and he was accordingly elected king.

In such early ages as these, we are not to look for any authentic history either of this or any other kingdom. The history of Denmark, for a great number of ages after the reign of *Dan*, is filled with fabulous exploits of heroes, encounters with giants, dragons, &c. ³ *History of this country* One of their kings named *Frotho*, who reigned about 761 years before Christ, is said to have conquered all Britain, Sleswick, Russia, Pomerania, Holstein, &c.; an assertion which cannot easily be credited, considering the difficulty which succeeding warriors, even the greatest in the world, found to subdue the inhabitants of those countries.—It is certain, however, that anciently the kingdom of Denmark made a much more conspicuous figure than it does at present. The Danes appear to have had a very considerable naval force almost from the foundation of their empire; and the conquests they undoubtedly made in our island, are certain proofs of their valour.

The natural enemies of the Danes were the Swedes, Norwegians, and Saxons; especially the first. With one or other of these nations almost perpetual war was carried on. The kingdom was also often rent by civil dissensions; which the neighbouring monarchs did not fail to take advantage of, in order to reduce the kingdom of Denmark under their subjection. As neither party, however, generally came off with advantage, the history of these wars affords nothing interesting or entertaining.—One of the greatest of the Danish monarchs was *Valdemar* I. who obtained the throne in 1157; having defeated and killed his competitor *Swen*, after a ten years civil war. He maintained a long war with the Vandals, whose power he at last entirely broke, and reduced under his subjection the island of Rugen. He also proved victorious over the Norwegians, so that their king and queen came in person to submit to him. In 1165, he also laid the foundations of the city of Dantzic: which, though it hath since become a place of such consequence, consisted at first only of a few poor fishermen's huts; but the privileges and immunities conferred upon it by this monarch, soon proved the means of its becoming a flourishing city.—In 1169, he entirely subdued the Courlanders; and, soon after, was invested with the duchy of Holstein, by the emperor Frederic Barbarossa. He is said

^{Denmark.}

³ *History of this country* many ages.

⁴ *Valdemar* a great monarch.

Denmark. to have been poisoned by a quack medicine, given with a design to recover him from a distemper with which he was seized in 1182.

5
Power of
Denmark
in 1193.

In the year 1195, Canute, Valdemar's successor, caused a multer to be made of all the men fit to bear arms in his dominions; and ordered each province to fit out its proportion of shipping, every way equipped, and ready for action. The whole force of Denmark, at that time, consisted of 670 ships of war, besides the squadrons supplied by vassals, tributary states, and allies. The number of the land-forces is not mentioned. In the reign of this prince, the Danish dominions were enlarged by the entire conquest of Stromar; the districts of Lubeck and Hamburg, formerly known by the name of *Nordalbingia*, but now included under the general name of *Holstein*. He died in 1203, and was succeeded by Valdemar II. who proved a very great and warlike prince. In 1211, he founded the city of Stralfund, opposite to the Isle of Rugen. The same year, his queen died in child-bed; and in memory of her he built the castle of *Dronningholm*, that name importing the *Queen's island*. In 1218, he undertook an expedition against the Livonians, having received advice that they, assisted by the Lithuanians, Muscovites, and other barbarous nations, had driven from their habitations all those in their neighbourhood who had embraced Christianity, and taken an oath of allegiance to the crown of Denmark. Fitting out a powerful fleet, therefore, he immediately set sail for that country; but his troops were no sooner landed, than they were seized with a panic, at the sight of such a powerful army of savages as were assembled to oppose them. The king himself was dismayed at the unusual spectacle of a whole army clothed in skins, and resembling beasts more than human creatures. Encouraged, however, by the bishops who attended him, he ventured an engagement, and overthrew the Barbarians with incredible slaughter. This victory was gained near the fortrefs of *Valdemar*, which received its name on that account.

7
Flourishing
state of the
kingdom.

How potent and flourishing the kingdom of Denmark was at this time, appears from an estimate of the revenues of the tributary provinces, those countries conquered by Valdemar, and the standing forces of the whole kingdom. This account was copied by Pontanus from Wittfeld a writer of those days, who had it from a register kept by Valdemar's steward. From the provinces were daily sent in 24 laits of oats, 24 laits of rye and half that quantity of wheat, 13 *talents* of cheese and butter, and nine of honey; 24 oxen, 300 sheep, 200 hogs; and 600 marks of coined money. This was the certain revenue: but to this was added near an equal sum from adventitious circumstances; such as fines, forfeitures, taxes on law-suits and pleadings, with a variety of other contingencies; the whole amounting to above 100,000 marks a-day, or 23,730,000 *l. per annum*; a sum in those days almost incredible.—With this revenue were kept for constant service 1400 great and small ships for the king's use, each of which at a medium carried 121 soldiers; making the whole of the standing forces, besides garrisons, consist of 169,400 fighting men.

8
Valdemar
taken pri-
soner.

In 1223, a very great misfortune befel Valdemar, notwithstanding all his power. Henry earl of Swerin, otherwise called *Henry Palatine*, a German prince,

having been deprived of part of his dominions by Valdemar, surprised and carried off the king himself, and kept him close prisoner for three years. The conditions on which he at last obtained his liberty, were very hard. He was obliged to pay a prodigious sum of money; to relinquish Holstein, Swerin, Hamburg, and all his possessions on the other side of the Elbe; and lastly, solemnly to swear that he would maintain this compulsive contract, and never take any measures to punish Henry or his associates. This treaty was signed on the 25th of March 1226.

Besides these territories which the Danish monarch had been obliged to cede by treaty, many tributary princes took the opportunity of his captivity, to recover their liberty; and among the rest, the inhabitants of Lubeck revolted, and entered into alliance with Albert duke of Saxony against Valdemar. The latter, however, was not of a disposition to submit tamely to such treatment. He obtained a dispensation from the Pope to break his engagements with Henry, and immediately entered Holstein at the head of a numerous army. Here he was met by several German princes, at the head of a very numerous army; and a desperate engagement ensued. Valdemar at first had the advantage; but being wounded in the eye, his troops were at last defeated with great slaughter. It doth not appear, that ever the king of Denmark was able to revenge himself of his enemies, or to recover the dominions he had lost. So far from this, he was obliged, in 1228, to cede Lawenberg to the duke of Saxony, who had already seized on Ratzburg and Molna. Soon after this, his eldest son Valdemar was accidentally killed as he was hunting, and his two other sons married the daughters of his two greatest enemies. Abel, the third son, married the daughter of Adolphus duke of Holstein; and Eric, the second, married the duke of Saxony's daughter. These misfortunes are supposed to have hastened his death, which happened in the month of April 1242.

On the death of Valdemar, the kingdom was divided between the two young princes; and between them a war commenced the very next year. A peace was concluded the year following, and war renewed the year after; but how long it continued, we are not informed. In 1250, Eric paid a visit to his brother Abel, intreating his mediation between him and the princes of Holstein, with whom he was then at war. Abel received him, in appearance, with great kindness, and promised that his utmost endeavours to procure a reconciliation should not be wanting; but in the mean time, laid a plan for having him murdered at sea: this was effected, and Abel became master of the whole kingdom.

The new king did not long enjoy the sovereignty he had so wickedly obtained. He was tormented by his own conscience; especially when he found, among his brother's papers, one by which he was left heir to the whole kingdom on the decease of Eric, and many kind expressions with regard to himself. He was at last killed in a battle with his own subjects, in 1252; on account of some taxes he intended to impose.

From this time to the year 1333, the kingdom of Denmark gradually declined. Usurpers established themselves in different provinces; while the kings of Sweden did not fail to avail themselves of the distracted

Denmark.

9
Released on
condition of
ceding part
of his territories.

10
He breaks
the treaty
but is de-
feated.

11
Civil war
between his
two sons.

12
Kingdom
divided a-
mong a
number of
petty ty-
rants.

Denmark. ted state of the Danish affairs. In 1333, died Christopher II. who possessed only the cities of Scanderburg in Jutland, and Neoburg in Fionia; with some few other inconsiderable places, of all the hereditary dominions of Denmark. Halland, Holbec, Calemberg, and Samsoe, were held by Canute Porcius; Schonen, Lyttre, and Bleking, by the king of Sweden, to whom they had been lately sold: John, earl of Wagria, had the jurisdictions of Zealand, Falstie, Laaland, and Femmerin; Gerhard of Jutland and Fionia; and Lawrence Jonea of Lang-land and Arras.

After the death of Christopher, an interregnum of seven years ensued.—The first attempt for the sovereignty was made by Otho, second son to the late king, who laid a scheme for driving Gerhard out of Jutland; but not being able to accomplish it, he was taken prisoner, and closely confined by Gerhard.—The king of Sweden next wrote to Pope Benedict XIII. beseeching his Holiness to confirm to him the provinces of Schonen and others which he possessed; and to allow him to subdue the rest of the kingdom, which was now usurped and rendered miserable, by a set of petty princes, who knew not how to govern. To influence him the more powerfully, he also promised to hold this kingdom of the Pope; and to pay him the usual tax collected by the church. This request, however, was refused.—Valdemar of Slefwic, nephew to Gerhard, then aspired to the sovereignty. He had formerly been elected king; but had given over all thoughts of enjoying the sovereignty, on account of the superior influence of Christopher; but now resumed his ambitious views, at the instigation of his uncle. Several of the nobility also cast their eyes on young Valdemar Christopher's son, now at the emperor's court. But, while each of these princes were laying

¹³
Distressed
state of the
kingdom.

schemes to aggrandise themselves, the unhappy Danes were distressed by exorbitant taxes, famine, and pestilence; and the two last, in consequence of the former. The peasants neglected to cultivate the lands, which they held on a very precarious tenure; the consequence of this was poverty, and an unwholesome diet; and this, co-operating with the peculiar disposition of the air, produced a plague, which destroyed more than half the inhabitants of the country. The poor dropped down dead on the streets with disease and hunger, and the gentry themselves were reduced to a state of wretchedness; yet, though the whole kingdom was evidently on the verge of ruin, ambitious projects employed the great, as if every thing had been in the most profound tranquillity.

In the midst of these grievous calamities, Gerhard, sovereign of Jutland, proposed to his nephew Valdemar an exchange of territories, which he believed would prove favourable to the designs of the latter on the crown. A treaty for this purpose was actually drawn up and signed; but the inhabitants, notwithstanding their distressed situation, so highly resented their being disposed of like cattle, from one master to another, that they refused to pay the usual taxes. Gerhard resolved to compel them; and therefore led 10,000 men, whom he had levied in Germany, into the heart of the province. Providence, however, now raised up an enemy to this tyrant. One Nicholas Norevi, a man greatly esteemed for his courage, public spirit, and prudence, beheld with sorrow the condition to which Denmark was reduced. He had long meditated a variety of

¹⁴
Nicholas
Norevi re-
covers the
liberty of
Jutland.

Denmark. projects for its relief, and at last imagined things were in such a situation that the whole depended on his single arm. Young Valdemar, Christopher's son, had a number of adherents in the kingdom; his most dangerous enemy was Gerhard; and could he be removed, the Jutlanders would at least be free from an oppressor, and might choose Valdemar, or any other they thought proper, for their sovereign. Collecting a body of chosen horse, therefore, he marched in the night to Rander-shusen, where Gerhard had fixed his head-quarters; and having forced open the tyrant's quarters, immediately put him to death. He then fled with the utmost expedition; but was pursued and overtaken by a party of the enemy's horse, through which he forced his way and escaped. Gerhard's sons, hearing of his death, retired into Holstein from whence they had come; leaving the army, composed chiefly of Holsteiners, to be cut in pieces by the enraged peasants, who fell upon them from every quarter.

Still, however, the Holsteiners kept possession of the citadels and fortified places, from whence Nicholas resolved to dislodge them. He accordingly raised a body of forces; attacked and took Landen, a castle situated on the river Scherne: after which he laid siege to Alberg; but the garrison making an obstinate defence, he turned the siege into a blockade, by which they were soon reduced to great extremity. The governor sent an express to the sons of Gerhard, acquainting them with the impossibility of his holding out more than a few days, without being relieved. This determined them to march to the relief of so important a place. They came up with Nicholas just as the governor was ready to surrender, but were defeated; ¹⁵ed. He is killed. though Nicholas was unfortunately killed in the engagement.

Jutland having thus regained its liberty, the rest of the kingdom followed its example. Zealand first openly declared itself. Here Henry, Gerhard's son, maintained several garrisons; and resolved to defend his possessions in spite of all the power of the inhabitants. For this purpose he drew together an army; but, in the mean time, a tumult arose among the peasants on account of a Danish nobleman slain by the Holsteiners. By this the people were at last so irritated, that, falling upon the Holsteiners sword in hand, they killed 300 of them; drove the rest out of the island; and chose Valdemar, Christopher's son, for their sovereign.

The Danes now resumed their courage; the lands were cultivated, the famine and pestilence ceased, and the kingdom began to flourish as formerly. Matters continued in a prosperous way till 1387, when Margaret mounted the throne. She raised the kingdom to its highest pitch of glory, as partly by her address, and partly by hereditary right, she formed the union of Sweden, Denmark, and Norway. She held her dignity with such firmness and courage, that she was justly stiled the *Semiramis of the North*. Her successors being destitute of her great qualifications, the union of Calmar fell to nothing: but Norway still continued annexed to Denmark. About the year 1448, the crown of Denmark fell to Christian, count of Oldenburg, from whom the present royal family of Denmark is descended; and, in 1536, the protestant religion was ¹⁶esta- Margaret unites the crowns of Denmark, Sweden, and Nor- way.

Denmark established in Denmark, by that wife and politic prince Christian III.

Christian IV. of Denmark, in 1629, was chosen for the head of the Protestant league, formed against the house of Austria: but, though brave in his own person, he was in danger of losing his dominions; when he was succeeded in that command by the famous Gustavus Adolphus, king of Sweden. The Dutch having obliged Christian, who died in 1648, to lower the duties of the Sound, his son Frederic III. consented to accept of an annuity of 150,000 florins for the whole. The Dutch, after this, persuaded him to declare war against Charles Gustavus, king of Sweden, which had almost cost him his crown in 1657. Charles stormed the fortrefs of Fredericksstadt; and in the succeeding winter, he marched his army over the ice to the island of Funen, where he surprised the Danish troops, took Odensee and Nyburg and marched over the Great Belt to besiege Copenhagen itself. Cromwell, the English usurper interposed: and Frederic defended his capital with great magnanimity, till the peace of Roschild; by which Frederic ceded the provinces of Halland, Bleking, and Scania, the island of Bornholm, Bahus, and Drontheim, in Norway, to the Swedes. Frederic fought to elude those severe terms; but Charles took Cronenburg, and once more besieged Copenhagen by sea and land. The steady intrepid conduct of Frederic under these misfortunes, endeared him to his subjects; and the citizens of Copenhagen made an admirable defence, till a Dutch fleet arrived in the Baltic, and beat the Swedish fleet. The fortune of war was now entirely changed in favour of Frederic: who shewed on every occasion great abilities, both civil and military; and having forced Charles to raise the siege of Copenhagen, might have carried the war into Sweden, had not the English fleet, under Montague, appeared in the Baltic. This enabled Charles to besiege Copenhagen a third time: but France and England offering their mediation, a peace was concluded in that capital; by which the island of Bornhold returned to the Danes; but the island of Rugen, Bleking, Halland, and Schonen, remained with the Swedes.

17
Several provinces ceded to Sweden.

18
Perpetual wars with that kingdom.

Though this peace did not restore to Denmark all she had lost, yet the magnanimous behaviour of Frederic, under the most imminent dangers, and his attention to the safety of his subjects, even preferably to his own, endeared him so much in their eyes, that they rendered him absolute. Frederic was succeeded, in 1670, by his son Christian V. who obliged the duke of Holstein Gottorp to renounce all the advantages he had gained by the treaty of Roschild. He then recovered a number of places in Schonen; but his army was defeated in the bloody battle of Lundén, by Charles XI. of Sweden. This defeat did not put an end to the war; which Christian obstinately continued, till he was defeated entirely at the battle of Landseroon; and he had almost exhausted his dominions in his military operations, till he was in a manner abandoned by all his allies, and forced to sign a treaty on the terms prescribed by France, in 1679. Christian, however, did not desist from his military attempts; and at last he became the ally and subsidiary of Lewis XIV. who was then threatening Europe with chains. Christian, after a vast variety of treating and fighting with

the Holsteiners, Hamburgers, and other northern powers, died in 1699. He was succeeded by Frederic IV. who, like his predecessors, maintained his pretensions upon Holstein; and probably must have become masters of that duchy, had not the English and Dutch fleets raised the siege of Tonningen; while the young king of Sweden, Charles XII. who was no more than 16 years of age, landed within eight miles of Copenhagen, to assist his brother-in-law the duke of Holstein. Charles probably would have made himself master of Copenhagen, had not his Danish majesty agreed to the peace of Travendahl, which was entirely in the duke's favour. By another treaty concluded with the States-General, Frederic obliged himself to furnish a body of troops, who were to be paid by the confederates; and who afterwards did great service against the French.

Notwithstanding this peace, Frederic was perpetually engaged in wars with the Swedes; and while Charles was an exile at Bender, he marched through Holstein into Swedish Pomerania; and in the year 1712, into Bremen, and took the city of Stade. His troops, however, were totally defeated by the Swedes at Gadebusch, who laid his favourite city of Altona in ashes. Frederic revenged himself, by seizing great part of the ducal Holstein, and forcing the Swedish general, count Steinbock, to surrender himself prisoner, with all his troops. In the year 1716, the successes of Frederic was so great, by taking Tonningen and Stralfund, by driving the Swedes out of Norway, and reducing Wismar and Pomerania, that his allies began to suspect he was aiming at the sovereignty of all Scandinavia. Upon the return of Charles of Sweden from his exile, he renewed the war against Denmark, with a most embittered spirit; but on the death of that prince, who was killed at the siege of Frederickschal, Frederic durst not refuse the offer of his Britannic majesty's mediation between him and the crown of Sweden; in consequence of which, a peace was concluded at Stockholm, which left him in possession of the duchy of Sleswick. Frederic died in the year 1730, after having, two years before, seen his capital reduced to ashes, by an accidental fire. His son and successor, Christian Frederic, made no other use of his power, and the advantages with which he mounted the throne, than to cultivate peace with all his neighbours, and to promote the happiness of his subjects, whom he eased of many oppressive taxes.

In 1734, after guarantying the Pragmatic Sanction, Christian sent 6000 men to the assistance of the emperor, during the dispute of the succession to the crown of Poland. Though he was pacific, yet he was jealous of his rights, especially over Hamburg. He obliged the Hamburgers to call in the mediation of Prussia, to abolish their bank, to admit the coin of Denmark as current, and to pay him a million of silver marks. He had, two years after, viz. 1738, a dispute with his Britannic majesty, about the little lordship of Steinhort, which had been mortgaged to the latter by the duke of Holstein Lawenburg, and which Christian said belonged to him. Some blood was spilt during the contest; in which Christian, it is thought, never was in earnest. It brought on, however, a treaty, in which he availed himself of his Britannic majesty's predilection for his German domi-

19
An advantageous treaty with Great Britain; tain.

Denmark. nions; for he agreed to pay Christian a subsidy of 70,000 *l.* Sterling a-year, on condition of keeping in readiness 7000 troops for the protection of Hanover: this was a gainful bargain for Denmark. And two years after, he seized some Dutch ships, for trading without his leave, to Iceland: but the difference was made up by the mediation of Sweden. Christian had so great a party in that kingdom, that it was generally thought he would revive the union of Calmar, by procuring his son to be declared successor to his then Swedish majesty. Some steps for that purpose were certainly taken: but whatever Christian's views might have been, the design was frustrated by the jealousy of other powers, who could not bear the thoughts of seeing all Scandinavia subject to one family. Christian died in 1746, with the character of being the father of his people.

His son and successor, Frederic V. had, in 1743, married the princess Louisa, daughter to his Britannic majesty. He improved upon his father's plan, for the happiness of his people; but took no concern, except that of a mediator, in the German war. For it was by his intervention, that the treaty of Closter-seven was concluded between his royal highness the late duke of Cumberland, and the French general Richlieu. Upon the death of his first queen, who was mother to his present Danish majesty, he married a daughter of the duke of Brunswick Wolfenbuttel; and died in 1766. He was succeeded by his son Christian VII. his present Danish majesty, who married the princess Carolina Matilda of England.

²⁰ Division of the kingdom. The kingdom of Denmark at present is divided into six grand districts or provinces; *viz.* 1. Denmark properly so called, comprehending the islands of Zealand, Funen, Langeland, Laaland, Falstria, Mona, Samsoe, Arroe, Bornholm, Auhoult, Leflaw, and that part of the continent called *North Jutland*. 2. The dutchy of Sleswick, or South Jutland. 3. The dutchy of Holstein. 4. The earldoms of Oldenburg and Delmenhorst. 5. The kingdom of Norway; and 6. Iceland, with the islands lying in the Northern Seas; for a particular description of which see these articles.

²¹ Language, religion, &c. The language of Denmark is a dialect of the Teutonic, and bears a strong affinity to the Norwegian tongue; but is disagreeable to strangers, on account of the drawing tone with which it is pronounced. They have borrowed many words from the Germans; and, indeed, the high Dutch is used in common discourse by the court, the gentry, and the burghers. The better sort likewise understand French, and speak it fluently. The Lutheran doctrine is universally embraced through all Denmark, Sweden, and Norway; so that there is not another sect in these kingdoms. Denmark is divided into six dioceses, one in Zealand, one in Funen, and four in Jutland: but the bishops are, properly speaking, no other than superintendants, or *primi inter pares*. They have no cathedrals, ecclesiastical courts, or temporalities. Their business is to inspect the doctrine and morals of the inferior clergy. The revenue of the bishop of Copenhagen amounts to about 2000 rixdollars; and this is the richest benefice in the kingdom. The clergy are wholly dependant on the government. They never intermeddle, nor are employed or consulted in civil affairs. They, nevertheless, have acquired great influence, and erected a fort

of spiritual tyranny over the minds of the common people, by whom they are much revered. They are, generally speaking, men of exemplary lives, and some erudition. Their churches are kept more clean, and better adorned, than those of England: the people are great lovers of music, and their organs commonly entertain the congregation for half an hour before or after service. The state of literature is very low in Denmark. There is, indeed, an university at Copenhagen; but meanly endowed, and very ill supplied with matters. Taste and the belles lettres are utterly unknown in this country, which yet has produced some men of great eminence in mathematics and medicine; such as Tycho Brahe, Borrichius, and the Bartholines.

²² The constitution of Denmark was heretofore of the free Gothic original. The convention of the estates, even including the representatives of the boors or peasants, elected a king for his personal virtues, having still a regard to the son of their late monarch, whom, however, they made no scruple of setting aside, if they deemed him unworthy of the royal dignity. They enacted laws; conferred the great offices of state; debated all affairs relating to commerce, peace, war, and alliances; and occasionally gave their consent to the imposition of necessary taxes. The king was no other than chief magistrate, generalissimo, and as it were prime minister to his people. His business was to see justice administered impartially; to command the army in time of war; to encourage industry, religion, arts, and sciences; and to watch over the interests of his subjects.

²³ King, how rendered absolute. Such was the constitution of Denmark, till the year 1660, when it underwent a very strange and surprising revolution. At that time peace was concluded with Sweden, and the nation reformed with the clamour of misery and discontent. There was nothing left in the public treasury, to pay off and disband the army; which therefore became insolent and licentious. The common people, and even the burghers, had been exhausted by the long, expensive war: the clergy were unsatisfied with their condition and want of importance; and the nobility were become proud and tyrannical. When the estates assembled to deliberate and redress the grievances of the nation, the commons proposed that an equal tax should be laid upon all persons, without distinction, in proportion to their circumstances. The nobles pleaded their privilege of being exempted from all imposition. The burghers alleged, that as the nobility engrossed all the lands and riches in the kingdom, it was reasonable that they should bear their share of the common burden. Violent disputes ensued. At length a nobleman, called *Otto Craeg*, stood up, and in a transport of passion told the commons, that they neither understood the privileges of the nobility, who were always exempted from such impositions, nor the condition of themselves, who were no other than their *slaves*. This inglorious term produced an immediate ferment in the assembly; and the hall resounded with murmurs and altercation. Nan-son, speaker of the commons, starting up in a rage of indignation, swore that the nobility should repent their having branded the commons with such an opprobrious epithet. He had previously concerted the design with the bishop of Copenhagen, and the court was not ignorant of their intention. The clergy and burghers, breaking

Denmark

breaking up in disorder, marched, under the auspices of these leaders, to the brewer's hall; where, after much debate, they agreed to make a solemn tender of their freedom and services to the king, that he might become absolute monarch of the realm, and see the right of hereditary succession established in his family. Next morning they marched in couples, each burgher being paired with a clergyman, through the streets, which were filled with the populace, who shouted as they passed, to the council-hall, where the nobles had re-assembled. There Nanfon, in a short harangue, signified the intention of the clergy and commons, demanded the concurrence of the nobles, and threatened, that, in case of a refusal, they would forthwith proceed without them to the palace. The nobles were confounded and abashed. They endeavoured to gain time: they professed a desire of concurring with the other estates; but desired that an affair of such consequence might not be precipitated. The others being deaf to their remonstrances and intreaties, continued their procession to the palace; where they were met by the prime minister, who conducted them to the hall of audience. There the bishop of Copenhagen, in a florid speech, as deputy from the two orders, made a solemn tender to the king of an absolute and hereditary dominion; assuring his majesty, that he might command their purges and arms, to support a measure so necessary to the welfare of his people. The king received them graciously, assented to the proposal, thanked them for their zeal and confidence, and assured them they might depend upon his royal favour and protection. The city-gates were immediately shut, that none of the senators should escape: a precaution by which the nobles were so intimidated, that they signified their readiness to concur with the step which the other two orders had taken. Preparations were forthwith made for this strange inauguration. Scaffolds were raised in the open space before the castle; and the troops and burghers received orders to appear in arms, under their respective officers. On the 16th day of October, in the year 1660, the king, queen, and royal family, ascended an open theatre; and placing themselves on chairs of state, under canopies of velvet, received in public the homage of all the senators, nobility, clergy, and commons, couched in an oath of allegiance composed for the purpose. Thus the people, with a rash and desperate hand, from motives of revenge, fomented by an artful ministry and ambitious clergy, resigned their liberty and independence, and invested their sovereign with a despotic power over their lives and fortunes. The king of Denmark is now so absolute, that he not only can impose what tolls and taxes he shall think convenient; but also, by a maxim in the present jurisprudence of that nation, he enjoys the prerogative of explaining the law, and even of altering it occasionally.

24
Laws, &c.

The laws of Denmark are so concise, that the whole body is contained in one quarto volume, written in the language of the country. Every man may plead his own cause, without employing either council or attorney: but there are a few advocates for the benefit of those who cannot or will not speak in their own defence. The proceedings are so summary, that a suit may be carried through all the courts, and finally decided, in 13 months. There are three courts in Den-

Denmark

mark, and an appeal lies from the inferior to the superior tribunal. The lowest of these is, in cities and towns, denominated the *Byfogtids Court*; and in the country, the *Herredsfogtids*. Causes may be appealed from this to the *Landsting*, or general head court for the province: but the final appeal lies to the court of *High-right* in Copenhagen, where the king presides in person, assisted by the prime nobility. The judges of the two other courts are appointed by his majesty's letters patent, to sit and determine causes *durante bene placito*. These are punishable for any misdemeanours of which they may be guilty; and when convicted of having passed an unjust sentence, they are condemned to make reparation to the injured party. Their salaries are very inconsiderable, and paid out of the king's treasury, from the fines of delinquents, besides a small gratuity from the plaintiff and defendant when sentence is passed. Such is the peculiar privilege enjoyed by the city of Copenhagen, that causes appealed from the *Byfogtids court*, instead of passing through the provincial court, are tried by the burgo-master and common-council; from whence they proceed immediately to the highest court, as the last resource. Affairs relating to the revenue are determined in the rent-chamber of Denmark, which is analogous to our court of exchequer. To another tribunal, composed of some members from this rent-chamber, from the admiralty, and college of commerce, merchants appeal for redress, when their commodities are seized for non-payment of duties. All disputes relating to the sea are determined by the court of admiralty, constituted of commissioners appointed for these purposes. The chancery may be more properly termed a *secretary's office*. It consists of clerks, who write and issue all the king's decrees and citations, transcribe papers, and, according to the directions they receive, make draughts of treaties and alliances with other nations. The government of Denmark is very commendable for the excellent policy it maintains. Justice is executed upon criminals with great severity; and such regulations are established as effectually prevent those outrages that are daily committed in other countries. No man presumes to wag his tongue against the government, far less to hatch schemes of treason. All the subjects are, or seem to be, attached to their sovereign by the ties of affection. Robbery on the high-way, burglary, coining or clipping, are crimes seldom or never heard of in Denmark. The capital crimes usually committed are theft and manslaughter. Such offenders are beheaded very dexterously with one stroke of a sword. The executioner, though infamous, is commonly rich; because, over and above the functions of his office, he is employed in other scandalous occupations, which no other person will undertake. He, by means of his undertrapper, called the *pracher*, empties all the jakes, and removes from houses, stables, or streets, dead dogs, horses, &c. which no other Dane will vouchsafe to touch on any consideration whatsoever.

In Copenhagen there is a master of the police, who superintends the economy of that city. No torches are allowed to be carried through the streets of this city, because great part of the houses are of timber, and the wind is generally high. In lieu of flambeaux, the court and quality use large round lanterns, fixed to the end of long poles. In a word, the master of
the

Denmark. the police regulates every thing that relates to the decency, good order, quiet, and security, of the capital. The apothecaries in this kingdom are under excellent regulations : their number at Copenhagen is restricted to two ; and one is allowed to every other town of importance. They are examined and appointed by the college of physicians, and confirmed by the king himself ; otherwise they cannot exercise the profession. Their shops are visited three times a-year by the magistrates, accompanied with physicians, who inspect their medicines and regulate the prices. They are obliged to keep an exact account of every thing they sell, to specify the name of the person who bought it, and that of the doctor by whom it was prescribed ; so that accidents are prevented, and murders by poison easily discovered.

22
Slavish condition of the Danish subjects.

The Danish nobility and gentry are all included in the term *noblesse* ; and formerly there were no distinctions of title : but, within these 60 or 70 years, some few favourites have been dignified with the titles of *count* and *baron*. These, and these only, enjoy the privilege of disposing of their estates by will ; though others may make particular dispositions, provided they have sufficient interest to procure the king's approbation and signature. The noblesse of Denmark formerly lived at their own seats with great magnificence ; and at the conventions of estates met the king with numerous and superb retinues : but since he became absolute, they are so impoverished by exorbitant taxes, that they can hardly procure subsistence ; and, for the most part, live obscurely in some corner of their ruined country palaces, unless they have interest enough to procure some employment at court. They no longer inherit the spirit and virtues of their ancestors ; but are become ferile, indolent, ostentatious, extravagant, and oppressive.

Their general character is a strange composition of pride and meanness, insolence and poverty. If any gentleman can find a purchaser for his estate, the king, by the Danish law, has a right to one third of the purchase-money : but the lands are so burdened with impositions that there would be no danger of an alienation, even tho' this restriction was not in force. Nay, some gentlemen in the Island of Zealand have actually offered to make a surrender to the king of large tracts of very fertile land in the Island of Zealand, if his majesty would be pleased to accept of them in place of the impositions laid on them. The reason of this is, because, by the law of Denmark, if any estate is burdened beyond what it can bear, the owner must make up the deficiency out of his other estates, if he has any. Hence the king generally refuses such offers ; and some gentlemen have been transported with joy when they heard that his majesty had been " graciously pleased to accept their whole estates."

This oppression of the nobles by the king produces in them a like disposition to oppress the commons ; and the consequence of all this is, that there is no part of the world where extravagance and dissipation reigns to such a degree. The courtiers maintain splendid equipages, wear fine clothes, drink a vast quantity of French wine, and indulge themselves with eating to excess. Such as derive money from their employments, instead of purchasing land in Denmark, remit their cash to the banks of Hamburg and Amsterdam. The merchants and burghers tread in the steps of their superiors : they

spend all their gains in luxury and pleasure, afraid of incurring the suspicion of affluence, and being stripped by taxation. The peasant, or boor, follows the same example. No sooner has he earned a rix-dollar than he makes haste to expend it in brandy, lest it should fall into the hands of his oppressive landlord. This lower class of people are as absolute slaves as the negroes in the West Indies, and subsist upon much harder fare. The value of estates is not computed by the number of acres, but by the stock of boors, who, like the timber, are reckoned a parcel of the freehold ; and nothing can be more wretched than the state of these boors. They feed upon stock-fish, salted meats, and other coarse diet : there is not the least piece of furniture of any value in their houses, except feather-beds, of which there is great plenty in Denmark ; and which are used not only as beds to lie on, but as blankets for covering. After the boor has toiled like a slave to raise the king's taxes, he must pay the overplus of his toil to his needy landlord. Should he improve his ground and repair his farm-house, his cruel master will immediately transplant him to a barren farm and a naked habitation, that he may let the improved ground to another tenant at a higher price. The peasants likewise sustain a great deal of damage and violence from the licentious soldiers that are quartered in their houses. They are moreover obliged to furnish horses and waggons for the royal family and all their attendants when the king makes a progress through the country, or removes his residence from one palace to another. On such occasions the neighbouring boors are summoned to assemble with their cattle and carriages, and not only to live at their own expence, but to bear every species of outrage from the meanest lacquies of those who attend his majesty. The warlike spirit of the Danes no longer subsists : the common people are mean-spirited, suspicious, and deceitful ; nor have they that talent for mechanics so remarkable in some northern nations. While the peasants are employed in their labour without doors, the women are occupied at home in spinning yarn for linen, which is here made in great perfection.

27
Dress, &c.

In Denmark, all persons of any rank above the vulgar dress in the French taste, and affect finery ; the winter-dress of the ladies is peculiar to the country, very neat, warm, and becoming. The common people are likewise remarkably neat, and pride themselves in different changes of linen. They are very little addicted to jollity and diversion : their whole amusements consist in running at the goose on Shrove Tuesday, and in winter in being drawn in sleds upon the ice. They also feast and make merry at weddings and funerals. With respect to marriage, the man and woman frequently cohabit together on contract long before the ceremony is performed. The nobility and gentry pique themselves on sumptuous burials and monuments for the dead : the corpse is very often kept in a vault, or in the chancel of a church, for several years, before an opportunity offers of celebrating the funeral.

The taverns in this country are poorly supplied ; and he who diets in them must be contented to eat in a public room, unless he will condescend to pay an extravagant price for a private apartment. The metropolis is but indifferently furnished with game. The wild-ducks and plover are hardly eatable ; but the hares are good, and the markets sometimes produce tolerable

Denmark. roebuck. Their sea-fish are not to be commended; but the rivers produce plenty of delicious carp, perch, and craw-fish. The gardens of the gentry are well provided with melons, grapes, peaches, and all sorts of greens and salads in perfection.

23
Forces by sea and land. The naval power of Denmark, formerly so great, is now become much less considerable. Of late, however, commerce has considerably increased; a considerable East India trade has been carried on; they have also extended their commerce to the West Indies, where they have settled the island of St Thomas; to the coast of Guinea, where they maintain the fort of Chrikianburgh; to the Mediterranean; and to Greenland. The navy consists of about 30 ships of the line; besides frigates, bombs, tenders, and yachts. The land-forces, including 5000 reserves, which form a kind of militia, amount to near 40,000 men, horse, dragoons, and infantry. These last, officers as well as soldiers, consist chiefly of strangers, Germans, Poles, Courlanders, Dutch, Swedes, Scots, and Irish. The cavalry are generally natives.

24
Revenue. The revenue of his Danish majesty arises from taxes laid on his own subjects; from the duties paid by foreigners, from his own estate, crown-lands, and confiscations. The taxes are altogether arbitrary, and therefore fluctuating; but they are always grievous to the subject. They commonly consist of customs or toll, for export and import; of excise upon the consumption of wine, salt, tobacco, and all kinds of provisions; of taxes upon marriages, paper, brewing, grinding, and the exercise of different professions; of impositions on land, poll-money, ground-rent for all houses in Copenhagen and elsewhere; of money raised for maintaining fortifications, and for a portion to the king's daughter when she happens to be married; but this seldom exceeds 100,000 rix-dollars. One considerable article in the revenue is the toll paid by foreign ships that pass through the Sound, or *Ore-Sound* (the strait between Schonen and Zealand), into the Baltic. This was originally no other than a small contribution, which trading nations agreed to make for maintaining lights at certain places, to direct their course through the passage in dark and stormy weather. At the same time these trading nations agreed, that every ship should pass this way and pay its share of the expence, rather than use the Great Belt, which is the other passage, but unprovided with any such convenience. In process of time the Danes converted this voluntary contribution into an exorbitant toll, and even exacted arbitrary sums, in proportion to the weakness of the nation whose ships they visited. These exactions sometimes involved them in quarrels with their neighbours, and the toll was regulated in repeated treaties.

25
Orders of knighthood. To the court of Copenhagen belong two orders of knighthood; namely, that of the elephant, and that of Danebrugh: the badge of the former, which they deem the most honourable, is an elephant surmounted with a castle, set in diamonds, and suspended to a sky-coloured watered ribbon, worn like the George in England. This order is conferred only on persons of the highest quality, and the most extraordinary merit. The order of Danebrugh is bestowed as an honorary reward upon the noblest of an inferior rank, who have distinguished themselves in the service. Its insignia consist of a white ribbon with red edges, worn over the left

shoulder, from which depends a small cross of diamonds, and an embroidered star on the breast of the coat, surrounded with the motto *pietate & justitia*.

DENNIS, or **ST DENNIS**, a famous town of the Isle of France, with a Benedictine abbey, wherein are the tombs of the kings of France, with a considerable treasure. E. Long. 2. 26, N. Lat. 48. 56.

DENNIS (John), the celebrated critic, was the son of a reputable tradesman in London, and born in the year 1657. He received the first branches of education at the great school in Harrow on the Hill, where he commenced acquaintance and intimacy with many young noblemen and gentlemen, who afterwards made considerable figures in public affairs, whereby he laid the foundation of a very strong and extensive interest, which might, but for his own fault, have been of infinite use to him in future life. From Harrow he went to Caius-college Cambridge; where, after his proper standing, he took the degree of bachelor of arts. When he quitted the university, he made the tour of Europe; in the course of which he conceived such a detestation for despotism, as confirmed him still more in those Whig principles which he had from his infancy imbibed.

On his return to England he became early acquainted with Dryden, Wycherly, Congreve, and Southerne; whose conversation inspiring him with a passion for poetry, and a contempt for every attainment that had not something of the *belles lettres*, diverted him from the acquisition of any profitable art, or the exercise of any profession. This, to a man who had not an independent income, was undoubtedly a misfortune; however, his zeal for the Protestant succession having recommended him to the patronage of the duke of Marlborough, that nobleman procured him a place in the customs worth 120l. per annum; which he enjoyed for some years, till from profuse and want of economy, he was reduced to the necessity of disposing of it to satisfy some very pressing demands. By the advice of Lord Halifax, however, he reserved to himself, in the sale of it, an annuity for a term of years; which term he outlived, and was, in the decline of his life, reduced to extreme necessity.

Mr Theo. Cibber relates an anecdote of him, which we cannot avoid repeating, as it is not only highly characteristic of the man whose affairs we are now considering, but also a striking and melancholy instance, among thousands, of the distressful predicaments into which men of genius and literary abilities are perhaps apter than any others to plunge themselves, by paying too slight an attention to the common concerns of life, and their own most important interests. "After that he was worn out, (says that author,) with age and poverty, he resided within the verge of the court, to prevent danger from his creditors. One Saturday night, he happened to saunter to a public house, which in a short time he discovered to be without the verge. He was sitting in an open drinking-room, when a man of a suspicious appearance happened to come in. There was something about the man which denoted to Mr Dennis that he was a bailiff. This struck him with a panic; he was afraid his liberty was at an end; he sat in the utmost solicitude, but durst not offer to stir lest he should be seized upon. After an hour or two had passed in this painful anxiety, at last the clock struck

Dennis.

Denomina-
tor
||
Dentaria.

struck twelve; when Mr Dennis, in an ecstasy, cried out, addressing himself to the suspected person, "Now, Sir, bailiff or no bailiff, I don't care a farthing for you, you have no power now." The man was astonished at his behaviour; and when it was explained to him, was so much affronted with the suspicion, that had not Mr Dennis found his protection in age, he would probably have smarted for his mistaken opinion. A strong picture of the effects of fear and apprehension, in a temper naturally so timorous and jealous as Mr Dennis's; of which the following is a still more whimsical instance. In 1704, came out his favourite tragedy, *Liberty Asserted*; in which were so many strokes on the French nation, that he thought they were never to be forgiven. He had worked himself into a persuasion that the king of France would insist on his being delivered up, before he would consent to a peace: and full of this idea of his own importance, when the congress was held at Utrecht, he is said to have waited on his patron the duke of Marlborough, to desire that no such article might be stipulated. The duke told him he really had no interest then with the ministry; but had made no such provision for his own security, though he could not help thinking he had done the French as much injury as Mr Dennis himself. Another story relating to this affair is, that being at a gentleman's house on the coast of Suffex, and walking one day on the sea-shore, he saw a ship sailing, as he fancied, towards him: he instantly set out for London, in the fancy that he was betrayed; and, congratulating himself on his escape, gave out that his friend had decoyed him down to his house, to surrender him up to the French.

Mr Dennis, partly through a natural peevishness and petulance of temper, and partly perhaps for the sake of procuring the means of subsistence, was continually engaged in a paper-war with his contemporaries, whom he ever treated with the utmost severity: and, though many of his observations were judicious, yet he usually conveyed them in language so scurrilous and abusive, as destroyed their intended effect; and as his attacks were almost always on persons of superior abilities to himself, viz. Addison, Steele, and Pope; their replies usually turned the popular opinion so greatly against him, that, by irritating his testy temper the more, it rendered him a perpetual torment to himself; till at length, after a long life of vicissitudes, disappointments and turmoils, rendered wretched by indigestion, and hateful by malevolence, having outlived the reversion of his estate, and reduced to distress, from which his having been daily creating enemies had left him scarcely any hopes of relief, he was compelled to what must be the most irksome situation that can be conceived in human life, the receiving obligations from those whom he had been continually treating ill. In the very close of his days, a play was acted for his benefit at the little theatre in the Hay-market, procured through the united interests of Messrs Thompson, Mallet, and Pope; the last of whom, notwithstanding the gross manner in which Mr Dennis had on many occasions used him, and the long warfare that had subsisted between them, interested himself very warmly for him; and even wrote an occasional prologue to the play, which was spoken by Mr Cibber. Not long after this, viz. on the 6th of January 1733, he died, being then in the 77th year of his age.

Mr Dennis certainly was possessed of much erudition, and a considerable share of genius. In prose, he is far from a bad writer, where abuse or personal scurrility does not mingle itself with his language. In verse, he is extremely unequal; his numbers being at some times spirited and harmonious, and his subjects elevated and judicious; and at others, flat, harsh, and puerile.—As a dramatic author, he certainly deserves not to be held in any consideration. It was justly said of him by a wit, that he was the most complete instructor for a dramatic poet, since he could teach him to distinguish good plays by his *precepts*, and bad ones by his *examples*.

DENOMINATOR, in arithmetic, a term used in speaking of fractions. See ARITHMETIC, n° 21.

DENS CANIS, or *Dog's-tooth*, in botany. See ERYTHRONIUM.

DENS LEONIS. See LEONTODON.

DENSITY of Bodies, is that property directly opposite to rarity, whereby they contain such a quantity of matter under such a bulk.

Accordingly, a body is said to have double or triple the density of another body, when, their bulk being equal, the quantity of matter is in the one double or triple the quantity of matter in the other.

DENSITY of the Air, is a property that has employed the later philosophers, since the discovery of the Toricellian experiment.

It is demonstrated, that in the same vessel, or even in vessels communicating with each other, at the same distance from the centre, the air has every where the same density. The density of air, *ceteris paribus*, increases in proportion to the compressing powers. Hence the inferior air is denser than the superior; the density, however, of the lower air is not proportional to the weight of the atmosphere on account of heat and cold, and other causes perhaps which make great alterations in density and rarity. However, from the elasticity of the air, its density must be always different at different heights from the earth's surface; for the lower parts being pressed by the weight of those above, will be made to accede nearer to each other, and the more so as the weight of the incumbent air is greater. Hence, the density of the air is greatest at the earth's surface, and decreases upwards in geometrical proportion to the altitudes taken in arithmetical progression.

If the air be rendered denser, the weight of bodies in it is diminished; if rarer, increased, because bodies lose a greater part of their weight in denser than in rarer mediums. Hence, if the density of the air be sensibly altered, bodies equally heavy in a rarer air, if their specific gravities be considerably different, will lose their equilibrium in the denser, and the specifically heavier body will preponderate. See PNEUMATICS.

DENTALIUM, in natural history, a shell-fish belonging to the order of vermes testacea. The shell consists of one tubulous straight valve, open at both ends. There are eight species, distinguished by the angles, striæ, &c. of their shells.

DENTARIA, TOOTH-WORT, or *Tooth-violet*; a genus of the siliquosa order, belonging to the tetradynamia class of plants. There are three species, all of them hardy perennials; producing annual stalks 12 or 18 inches high, adorned with many-lobed leaves, and spikes of quadrupetalous cruciform flowers of a red or purple colour.

Dentated
||
Deodand.

colour. They delight in shady places; and are propagated either by seeds, or parting the roots. The seeds may be sown in autumn, or early in the spring, in a shady border of light earth; and when the plants are three inches high, they may be planted where they are to remain. The time for parting the roots is in October or November, or early in the spring.

DENTATED LEAF. See BOTANY, p. 1296.

DENTATUS (Curius), a renowned disinterested Roman general; whose virtues render him more memorable than even his great military reputation, flourished 272 years B. C. He was thrice consul; he conquered the Samnites, Sabines, and Lucanians; and gave each citizen 40 acres of land, allowing himself no more. The ambassadors of the Samnites making him a visit, found him boiling turnips in a pipkin; upon which, they offered him gold to come over to their interest; but he told them, his design was not to grow rich, but to command those who were so. He defeated Pyrrhus near Tarentum, and received the honour of a triumph.

DENTEX, in ichthyology. See SPARUS,

DENTILES, or DENTILS, in architecture, an ornament in corniches bearing some resemblance to teeth, particularly used in the Ionic and Corinthian orders. See ARCHITECTURE.

DENTIFRICE, in medicine, a remedy for the teeth. There are various kinds; generally made of earthy substances finely pounded, and mixed with alum, or some other saline substances; but these are pernicious, on account of their wearing away the enamel of the teeth; but more especially by the septic quality with which these earthy substances are endowed. On this account, a portion of Peruvian bark finely pounded is now commonly added, which answers the double purpose of cleaning the teeth, and preserving them afterwards from corruption.

DENTILLARIA. See PLUMBAGO.

DENTISCALPRA, in surgery, an instrument for scouring yellow, livid, or black teeth; to which being applied near the gums, it scrapes off the foul morbid crust.

DENTITION, the breeding or cutting the teeth in children. See (*Index* subjoined to) MEDICINE.

DENUNCIATION, a solemn publication or promulgation of any thing.

All vessels of enemies are lawful prizes, after denunciation or proclamation of war. The design of the denunciation of excommunicated persons, is that the sentence may be the more fully executed by the person's being more known.

DENUNCIATION *at the Horn*, in Scots law. See LAW, Part III. N^o clxvi. 14.

DENYS (the Little), a Scythian, became abbot of a monastery at Rome: he was the first who computed time from the birth of Dionysius to Christ, and fixed that great event, according to the vulgar æra. He was also a learned canon-law writer, and died about the year 540.

DEOBSTRUENTS, in pharmacy, such medicines as open obstructions. See DETERGENT.

DEODAND, in our customs, a thing given or forfeited as it were to God, for the pacification of his wrath in a case of misadventure, whereby a Christian soul comes to a violent end, without the fault of any

reasonable creature.

As, if a horse strike his keeper and kill him: if a man, in driving a cart, falls so as the cart-wheel runs over him, and presses him to death: if one be felling a tree, and gives warning to the standers-by to look to themselves; yet a man is killed by the fall thereof: in the first place, the horse; in the second, the cart-wheel, cart, and horses; and in the third, the tree, is *Deo dandus*, "*to be given to God*," that is, to the king, to be distributed to the poor by his almoner, for expiation of this dreadful event; though effected by irrational, nay, senseless and dead creatures.

Omnia que movent ad mortem sunt Deodanda.

What moves to death, or kills him dead, is Deodand, and forfeited.

This law seems to be an imitation of that in Exodus, chap. xxi. "If an ox gore a man, or a woman, with his horns, so as they die; the ox shall be stoned to death, and his flesh not be eat; so shall his owner be innocent."

Fleta says, the Deodand is to be sold, and the price distributed to the poor, for the soul of the king, his ancestors, and all faithful people departed this life.

DEPHLEGMATION, is an operation by which the superabundant water of a body is taken from it; and it is principally effected by evaporation or distillation. Dephlegmation is also called *concentration*, particularly when acids are the subject. See CONCENTRATION.

DEPILATORY MEDICINES, those applied in order to take off the hair: such are lime and orpiment known to be, but which ought to be used with great caution.

DEPONENT, in Latin grammar, a term applied to verbs which have active significations, but passive terminations or conjugations, and want one of their participles passive.

DEPONENT, in the law of Scotland, a person who makes a deposition. See DEPOSITION.

DEPOPULATION, the act of diminishing the number of people in any country, whether by war or bad politics.

DEPORTATION, a sort of banishment used by the Romans, whereby some island or other place was allotted to a criminal for the place of his abode, with a prohibition not to stir out of the same on pain of death.

DEPOSIT, among civilians, something that is committed to the custody of a person, to be kept without any reward, and to be returned again on demand.

DEPOSITARY, in law, a person intrusted as keeper or guardian of a deposit.

DEPOSITION, in Scots law. See LAW, N^o clxxiii. 8.

DEPOSITION, in law, the testimony given in court by a witness upon oath.

DEPOSITION also signifies the sequestring or depriving a man of some dignity and office.

DEPRECATION, in rhetoric, a figure whereby the orator invokes the aid and assistance of some one; or prays for some great evil or punishment to befall him who speaks falsely, either himself or his adversary.

DEPRECATORY, or DEPRECATIVE, in theology, a term applied to the manner of performing some ceremonies in the form of prayer.

Deodand
||
Deprecatory.

Depression
||
Deputatus.

The form of abso- lution is depre- cative in the Greek church, being conceived in these terms, *May God ab- solve you*: whereas it is in the declarative form in the Latin church, and in some of the reformed churches, *I absolve you*.

DEPRESSION of the POLE. When a person sails or travels towards the equator, he is said to depress the pole; because as many degrees as he approaches nearer the equator, so many degrees will the pole be nearer the horizon. This phenomenon arises from the spher- ical figure of the earth.

DEPRESSOR, or DEPRIMENS, in anatomy, a name applied to several muscles, because they depress the parts they are fastened to.

DEPRIVATION, in the canon-law, the deposing a bishop, parson, vicar, &c. from his office and preferment.

DEPTFORD, a town three miles east of London, on the southern banks of the Thames; chiefly con- siderable for its fine docks for building ships, and the king's yard. E. Long. o. 4. N. Lat. 51. 30.

DEPTH, the measure of any thing from the sur- face downwards.

Measuring of DEPTHS by the Barometer, depends on the same principles on which heights are measured by the same instrument. The mensuration of depths, being chiefly applied to mines, is still more precarious than the mensuration of heights, on account of the various kinds of vapours with which these subterranean regions are filled. But for a particular account of these difficulties, with the best methods of obviating them, see the articles **BAROMETER** and **MINES**.

DEPTH of a Squadron, or Battalion, is the number of men in a file; which in a squadron is three, and in a battalion generally six. See **SQUADRON**, **FILE**, &c.

We say, the battalion was drawn up *six deep*; the enemies horse were drawn up *six deep*.

DEPURATION is the freeing of any fluid from its heterogeneous matter or feculence. It is of three kinds. 1. Decantation; which is performed by letting the liquid to be depurated stand for some time in a pretty deep vessel, till the gross sediment has fallen to the bottom; after which the clear fluid is poured off. 2. Depumation; which is performed by means of the whites of eggs, or other viscid matter, and is also called **CLARIFICATION**. 3. Filtration. See **CHEMISTRY**, n° 69.

DEPURATORY FEVER, a name given by Syden- ham to a fever which prevailed much in the years 1661, 1662, 1663, and 1664. He called it depuratory, be- cause he supposed that nature regulated all the symp- toms in such a manner, as to fit the febrile matter, pre- pared by proper concoction, for expulsion in a certain time, either by a copious sweat, or a freer perspira- tion.

DEPUTATION, a mission of select persons out of a company or body, to a prince or assembly, to treat of matters in their name.

DEPUTY, a person sent upon some business, by some community.

DEPUTY is also one that exercises an office in an- other's right; and the forfeiture or misdemeanour of such deputy shall cause the person whom he represents to lose his office.

DEPUTATUS, among the ancients, a name ap-

plied to persons employed in making of armour; and likewise to brisk active people, whose business was to take care of the wounded in engagements, and carry them off the field.

DERBEND, a strong town of Asia, in Persia, said to have been founded by Alexander the Great. The walls are built with stones as hard as marble; and near it are the remains of a wall which reached from the Caspian to the Black sea. It is seated near the Cas- pian sea, at the foot of Mount Caucasus. E. Long. 50. o. N. Lat. 42. 8.

DERBY, the capital of a county of the same name in England. It is thought to have received its name from being formerly a park or shelter for deer; and what makes this supposition more probable is, that the arms of the town consist of a buck couchant in a park. It is very ancient, having been a royal borough in the time of Edward the Confessor. At present it is a neat town, very populous, and sends two members to par- liament. In digging for foundations of houses, hu- man bones of a monstrous size have sometimes been found. The trade consists in wool, corn, malt, and ale, of which considerable quantities are sent to Lon- don. Here also is that curious machine for throwing silk, the model of which Sir Thomas Lombe, at the hazard of his life, brought from Italy. Before that time, the English merchants used to purchase thrown silks of the Italians for ready money. But by the help of this wonderful machine, one hand-mill will twist as much silk as 50 people could do without it. It works 73,726 yards of silk every time the water-wheel goes round, which is thrice in a minute. The houlc in which it is contained, is five or six stories high, and half a quarter of a mile in length. When Sir Thomas's patent expired in 1732, the parliament was so sensible of the value and importance of the machine, that they granted him a further recompence of 14,000*l.* for the hazard and expence he had incurred in introducing and erecting it, upon condition he should allow an exact model of it to be taken. This model is deposited in the Tower of London, in order to prevent so curious and important an art from being lost.—The town of Derby is watered by a river and a brook; the latter of which has nine bridges over it, the former only one. W. Long. 1. 45. N. Lat. 52. 57.

DERBY-SHIRE, a county of England, bounded on the east by Nottinghamshire, and a part of Leicester- shire, which last bounds it also on the south. On the west it is bounded by Staffordshire, and part of Che- shire; and on the north by Yorkshire. It is near 40 miles in length from south to north; about 30 in breadth on the north side, but on the south no more than six.—The air is pleasant and healthful, especially on the east side; but on the west, about the peaks, it is sharper and more subject to wind and rain. The soil is very different in different parts of the country. In the east and south parts it is very fruitful in all kinds of grain; but, in the west, beyond the Derwent, it is barren and mountainous, producing nothing but a little oats. There is, however, plenty of grass in the val- leys, which affords pasture to a great number of sheep. This part of the county is called the *Peak*, from a Saxon word signifying an eminence. Its mountains are very bleak, high, and barren; but extremely pro- fitable to the inhabitants. They yield great quanti- ties.

Derbend,
Derby.

Derham.

Derivative.

ties of the best lead, antimony, iron, scythe-stones, grind-stones, marble, alabaster, a coarse sort of crystal, azure, spar, and pit-coal. In these mountains are two remarkable caverns, named *Poole's Hole*, and *Elden-Hole*; for a description of which, see these articles.

DEREHAM, a town of Norfolk in England, situated in E. Long. 1. 0. N. Lat. 52. 40. It is pretty large, and the market is noted for woollen yarn.

DERHAM (Doctor William), a very celebrated English philosopher and divine, born in 1657. In 1682, he was presented to the vicarage of Wargrave in Berkshire; and, in 1689, to the valuable rectory of Upminster in Essex; which latter lying at a convenient distance from London, afforded him an opportunity of conversing and corresponding with the greatest virtuosos of the nation. Applying himself there with great eagerness to natural and experimental philosophy, he soon became a distinguished member of the Royal Society, whose Philosophical Transactions contain a great variety of curious and valuable pieces, the fruits of his laudable industry. In his younger years he published his *Artificial Clockmakers*, which has been often printed: and in 1711, 1712, and 1714, he preached those sermons at Boyle's lecture which he afterward digested under the well-known titles of *Physico-Theology* and *Astro-Theology*, and enriched with valuable notes and copper-plates. The last thing he published of his own composition was *Christo-Theology*, a demonstration of the divine authority of the Christian religion, being the substance of a sermon preached at Bath in 1729. This great good man, after spending his life in the most agreeable as well as improving study of nature, died at Upminster in 1735; and, beside many other works, left a valuable collection of curiosities, particularly specimens of birds and insects of this island.—It may be necessary just to observe, that Doctor Derham was very well skilled in medical, as well as in physical, knowledge; and was constantly a physician to the bodies as well as the souls of his parishioners.

DERIVATION, in medicine, is when a humour which cannot conveniently be evacuated at the part affected, is attracted from thence, and discharged elsewhere; thus, a blister is applied to the neck to draw away the humour from the eyes.

The doctrine of derivation and revulsion so much talked of by the ancients is, in their sense of these terms, wholly exploded. By revulsion, they meant the driving back of the fluids from one part to another. The only rational meaning the word *revulsion*, as here applied, can have, is, the preventing too great an afflux of humours to any part, either by contracting the area of the vessels, or diminishing the quantity of what flows from them; the first of these intentions is answered by the application of repellents to the part; the last by bleeding, and other evacuations: thus, any medicines promoting the secretions, may be said to make a revulsion; and in this sense derivation can only be understood.

DERIVATION, in grammar, the affinity one word has with another, by having been originally formed from it. See DERIVATIVE.

DERIVATIVE, in grammar, a word which is derived from another called its PRIMITIVE. Thus, *manhood* is derived from *man*, *deity* from *Deus*, and

lawyer from *law*.

DERMESTES, in zoology, a genus of insects belonging to the order of coleoptera. The antennæ are clavated, with three of the joints thicker than the rest; the breast is convex; and the head is inflexed below the breast. There are thirty species, distinguished by their colour, &c.

DERNIER RESSORT. See RESSORT.

DEROGATION, an act contrary to a preceding one, and which annuls, destroys, and revokes it, either in whole or in part.

DEROGATORY, a clause importing derogation. A derogatory clause in a testament, is a certain sentence, cipher, or secret character, which the testator inserts in his will, and of which he reserves the knowledge to himself alone, adding a condition, that no will he may make hereafter is to be reckoned valid, if this derogatory clause is not inserted expressly and word for word. It is a precaution invented by lawyers against latter-wills extorted by violence, or obtained by suggestion.

DERP, a town of Livonia, and capital of a palatinate of the same name, with a bishop's see, and an university. It is subject to the Russians, and lies near the river Ambeck. E. Long. 31. 55. N. Lat. 30. 40.

DERVIS, a name given to all Mahomedan monks, though of various orders. The most noted among them are the Bektaishi, the Mevelevi, the Kadri, and the Seyah. The Bektaishi, who are allowed to marry and live in cities and towns, are obliged, by the rules of their order, to visit remote lands, and to salute every one they meet with *gazel* or love-songs, and with *efma* or the invocation of the names of God, and humbly to wish him prosperity, which they do by repeating the word *evallah*, a solemn exclamation of the wrestlers, by which the conquered yields the palm to the conqueror. The Mevelevi, so called from Mevelava their founder, are used to turn round for two or three hours together, with such swiftness, that you cannot see their faces. They are great lovers of music: in their monasteries they profess great humility and poverty; and when visited, make no distinction of persons: they first bring their guests coffee to drink; and if the ways have been dirty, they wash their feet and sandals. The Kadri, with a peculiar superstition, emaciate their bodies; they go quite naked, except their thighs, and often join hands and dance, sometimes a whole day, repeating with great vehemence, *bul bul bul* (one of the names of God), till, like madmen, they fall on the ground, foaming at the mouth, and running down with sweat. The prime vizir Kupruli Achmed Pasha, thinking this sect unbecoming the Mahomedan religion, ordered it to be suppressed; but, after his death, it revived, and is at present more numerous than ever, especially at Constantinople. The Seyah are wanderers; and though they have monasteries, yet they often spend their whole life in travelling. When they are sent out, their superiors impose upon them such a quantity of money or provisions, forbidding them to come back till they have procured it and sent it to the monastery; wherefore, when a Seyah comes into a town, he cries aloud in the market-place, *Tu allah fenden*, &c. O God! give me, I pray, five thousand crowns, or a thousand measures of rice. Many of these dervises travel over the whole Mahomedan world, entertaining the people, wherever

Dermest
Dervis

Desaguliers
Defendant

wherever they come, with agreeable relations of all the curiosities they have met with. There are dervises in Egypt, who live with their families, and exercise their trades; of which kind are the dancing dervises at Damascus. They are all distinguished among themselves by the different forms and colours of their habits; those of Persia wear blue; the solitaires and wanderers wear only rags of different colours; others carry on their heads a plume made of the feathers of a cock; and those of Egypt wear an octagonal badge of a greenish white alabaster at their girdles, and a high stiff cap without any thing round it.

DESAGULIERS (John Theophilus), who introduced the practice of reading public lectures in experimental philosophy in the metropolis, and who made several improvements in mechanics; was the son of the reverend John Desaguliers, a French protestant refugee, and was born at Rochelle in 1683. His father brought him to England an infant; and at a proper age placed him at Christ-church college, Oxford: where he succeeded Doctor Keil in reading lectures on experimental philosophy at Hart Hall. The magnificent duke of Chandos made Doctor Desaguliers his chaplain, and presented him to the living of Edgware, near his seat at Cannons; and he was afterward chaplain to Frederic prince of Wales. He read lectures with great success to the time of his death in 1749. He communicated many curious papers printed in the Philosophical Transactions; published a valuable *Course of Experimental Philosophy*, in 2 vols 4to.; and gave an edition of *Gregory's Elements of Catoptrics and Dioptrics*, with an Appendix on reflecting telescopes, 8vo. He was a member of the Royal Society, and of several foreign academies.

DESART, a large extent of country entirely barren, and producing nothing. In this sense some are sandy deserts; as those of Lop, Xamo, Arabia, and several others in Asia; in Africa, those of Libya and Zara: others are stony, as the desert of Pharan in Arabia Petrea.

The DESART, absolutely so called, is that part of Arabia, south of the Holy Land, where the children of Israel wandered forty years.

DESCANT, in music, the art of composing in several parts. See COMPOSITION.

Descant is three-fold, viz. plain, figurative, and double.

Plain DESCANT is the ground-work and foundation of all musical compositions, consisting altogether in the orderly placing of many concords, answering to simple counterpoint. See COUNTERPOINT.

Figurative or Florid DESCANT, is that part of an air of music wherein some discords are concerned, as well, though not so much, as concords. This may be termed the ornamental and rhetorical part of music; in regard that there are introduced all the varieties of points, syncopes, diversities of measures, and whatever is capable of adorning the composition.

DESCANT Double, is when the parts are so contrived, that the treble, or any high part, may be made the bass; and, on the contrary, the bass the treble.

DESCARTES. See CARTES.

DESCENDANT. The issue of a common parent, in *infinitum*, are called his descendants. See article DESCENT.

DESCENSION, in astronomy, is either right or oblique.

Right DESCENSION, is an arch of the equinoctial, intercepted between the next equinoctial point and the intersection of the meridian, passing through the centre of the object, at its setting, in a right sphere.

Oblique DESCENSION, an arch of the equinoctial, intercepted between the next equinoctial point and the horizon, passing through the centre of the object, at its setting, in an oblique sphere.

DESCENT, in general, is the tendency of a body from a higher to a lower place; thus all bodies, unless otherwise determined by a force superior to their gravity, descend towards the centre of the earth. See GRAVITY and MECHANICS.

DESCENT, or *Hereditary Succession*, in law, is the title whereby a man, on the death of his ancestor, acquires his estate by right of representation, as his heir at law. An heir therefore is he upon whom the law casts the estate, immediately on the death of the ancestor: and an estate so descending to the heir, is in law called the *inheritance*.

Descent is either *lineal* or *collateral*. The former is that conveyed down in a right line from the grandfather to the father, and from the father to the son, and from the son to the grandson. The latter is that springing out of the side of the line or blood; as from a man to his brother, nephew, or the like.

The doctrine of descents, or law of inheritances in fee-simple, is a point of the highest importance. (See the article FEE.) All the rules relating to purchases, whereby the legal course of descents is broken and altered, perpetually refer to this settled law of inheritance, as a *datum* or first principle universally known, and upon which their subsequent limitations are to work. Thus a gift in tail, or to a man and the heirs of his body, is a limitation that cannot be perfectly understood, without a previous knowledge of the law of descents in fee-simple. One may well perceive, that this is an estate confined in its descent to such heirs only of the donee, as have sprung or shall spring from his body: but who those heirs are, whether all his children both male and female, or the male only, and (among the males) whether the eldest, youngest, or other son alone, or all the sons together, shall be his heir; this is a point, that we must refer back to the standing law of descents in fee-simple to be informed of.

And, as this depends not a little on the nature of kindred, and the several degrees of consanguinity, it will be necessary to refer the reader to the article CONSANGUINITY, where the true notion of this kindred or alliance in blood is particularly stated.

We shall here exhibit a series of rules or canons of inheritance, with illustrations, according to which, by the law of England, estates are transmitted from the ancestor to the heir.

1. "Inheritances shall lineally descend to the issue "of the person last actually seized, in *infinitum*; but "shall never lineally ascend."

To understand both this and the subsequent rules, it must be observed, that by law no inheritance can vest, nor can any person be the actual complete heir of another, till the ancestor is previously dead. *Nemo est hæres viventis*. Before that time, the person who is next in the line of succession is called an *heir apparent*, or *heir*.

Defension,
Defcent.

Descent.

heir presumptive. Heirs apparent are such, whose right of inheritance is indefeasible, provided they outlive the ancestor; as the eldest son or his issue, who must, by the course of the common law, be heirs to the father whenever he happens to die. Heirs presumptive are such, who, if the ancestor should die immediately, would in the present circumstances of things be his heirs; but whose right of inheritance may be defeated by the contingency of some nearer heir being born: as a brother or nephew, whose presumptive succession may be destroyed by the birth of a child; or a daughter, whose present hopes may be hereafter cut off by the birth of a son. Nay, even if the estate hath descended, by the death of the owner, to such a brother, or nephew, or daughter; in the former cases, the estate shall be devested and taken away by the birth of a posthumous child; and, in the latter, it shall also be totally devested by the birth of a posthumous son.

We must also remember, that no person can be properly such an ancestor, as that an inheritance in lands or tenements can be derived from him, unless he hath had actual seisin of such lands, either by his own entry, or by the possession of his own or his ancestor's lessee for years, or by receiving rent from a lessee of the freehold: or unless he hath what is equivalent to corporal seisin in hereditaments that are incorporeal; such as the receipt of rent, a presentation to the church in case of an advowson, and the like. But he shall not be accounted an ancestor, who hath had only a bare right or title to enter or be otherwise seised. And therefore all the cases, which will be mentioned in the present article, are upon the supposition that the deceased (whose inheritance is now claimed) was the last person actually seised thereof. For the law requires this notoriety of possession, as evidence that the ancestor had that property in himself, which is now to be transmitted to his heir. Which notoriety hath succeeded in the place of the ancient feudal investiture, whereby, while feuds were precarious, the vassal on the descent of lands was formerly admitted in the lord's court (as is still the practice in Scotland); and therefore received his seisin, in the nature of a renewal of his ancestors grant, in the presence of the feudal peers: till at length, when the right of succession became indefeasible, an entry on any part of the lands within the county (which if disputed was afterwards to be tried by those peers) or other notorious possession, was admitted as equivalent to the formal grant of seisin, and made the tenant capable of transmitting his estate by descent. The seisin therefore of any person, thus understood, makes him the root or stock from which all future inheritance by right of blood must be derived: which is very briefly expressed in this maxim, *seisina facit stirpem*.

When therefore a person dies so seised, the inheritance first goes to his issue: as if there be Geoffrey, John, and Mathew, grandfather, father, and son; and John purchases land, and dies; his son Mathew shall succeed him as heir, and not the grandfather Geoffrey; to whom the land shall never ascend, but shall rather escheat to the lord.

2. "The male issue shall be admitted before the female."—Thus sons shall be admitted before daughters; or, as our male lawgivers have somewhat uncomplaisantly expressed it, the worthiest of blood shall

be preferred. As if John Stiles hath two sons, Matthew and Gilbert, and two daughters, Margaret and Charlotte, and dies; first Matthew, and (in case of his death without issue) then Gilbert, shall be admitted to the succession in preference to both the daughters.

3. "Where there are two or more males in equal degree, the eldest only shall inherit; but the females all together."—As if a man hath two sons, Matthew and Gilbert, and two daughters, Margaret and Charlotte, and dies; Matthew his eldest son shall alone succeed to his estate, in exclusion of Gilbert the second son and both the daughters; but, if both the sons die without issue before the father, the daughters Margaret and Charlotte shall both inherit the estate as coparceners.

4. "The lineal descendants, *in infinitum*, of any person deceased, shall represent their ancestor; that is, shall stand in the same place as the person himself would have done, had he been living."—Thus the child, grandchild, or great-grandchild (either male or female) of the eldest son, succeeds before the younger son, and so *in infinitum*. And these representatives shall take neither more nor less, but just so much as their principals would have done. As if there be two sisters, Margaret and Charlotte; and Margaret dies, leaving six daughters; and then John Stiles the father of the two sisters dies, without other issue: these six daughters shall take among them exactly the same as their mother Margaret would have done, had she been living; that is, a moiety of the lands of John Stiles in coparcenary: so that, upon partition made, if the land be divided into twelve parts, three of Charlotte the surviving sister shall have six, and her six nieces, the daughters of Margaret, one a-piece.

5. "On failure of lineal descendants, or issue, of the person last seised, the inheritance shall descend to the blood of the first purchaser; subject to the three preceding rules."—Thus, if Geoffrey Stiles purchases land, and it descends to John Stiles his son, and John dies seised thereof without issue; whoever succeeds to this inheritance must be of the blood of Geoffrey the first purchaser of this family. The first purchaser, *perquisitor*, is he who first acquired the estate to his family, whether the same was transferred to him by sale, or by gift, or by any other method, except only that of descent.

6. "The collateral heir of the person last seised, must be his next collateral kinsman, of the whole blood."

First, he must be his next collateral kinsman, either personally or *jure representationis*; which proximity is reckoned according to the canonical degrees of consanguinity: See CONSANGUINITY. Therefore, the brother being in the first degree, he and his descendants shall exclude the uncle and his issue, who is only in the second.—Thus if John Stiles dies without issue, his estate shall descend to Francis his brother, who is lineally descended from Geoffrey Stiles his next immediate ancestor, or father. On failure of brethren, or sisters, and their issue, it shall descend to the uncle of John Stiles, the lineal descendant of his grandfather George, and so on *in infinitum*.

But, secondly, the heir need not be the nearest kinsman absolutely, but only *sub modo*; that is, he must be the nearest kinsman of the whole blood: for if there

be

Blackst.
Comment.

Descent.

Descent.

be a much nearer kinsman of the *half* blood, a distant kinsman of the whole blood shall be admitted, and the other entirely excluded.—A kinsman of the whole blood is he that is derived, not only from the same ancestor, but from the same couple of ancestors. For, as every man's own blood is compounded of the bloods of his respective ancestors, he only is properly of the whole or entire blood with another, who hath (so far as the distance of degrees will permit) all the same ingredients in the composition of his blood that the other hath. Thus, the blood of John Stiles being composed of those of Geoffrey Stiles his father and Lucy Baker his mother, therefore his brother Francis, being descended from both the same parents, hath entirely the same blood with John Stiles; or he is his brother of the whole blood. But if, after the death of Geoffrey, Lucy Baker the mother marries a second husband, Lewis Gay, and hath issue by him; the blood of this issue, being compounded of the blood of Lucy Baker (it is true) on the one part, but that of Lewis Gay (instead of Geoffrey Stiles) on the other part, it hath therefore only half the same ingredients with that of John Stiles; so that he is only his brother of the half blood, and for that reason they shall never inherit to each other. So also, if the father has two sons, A and B, by different venters or wives; now these two brethren are not brethren of the whole blood, and therefore shall never inherit to each other, but the estate shall rather escheat to the lord. Nay, even if the father dies, and his lands descend to his eldest son A, who enters thereon, and dies seized without issue; still B shall not be heir to this estate, because he is only of the half blood to A, the person last seized: but, had A died without entry, then B might have inherited; not as heir to A his half-brother, but as heir to their common father, who was the person last actually seized.

The rule then, together with its illustration, amounts to this, That, in order to keep the estate of John Stiles as nearly as possible in the line of his purchasing ancestor, it must descend to the issue of the nearest couple of ancestors that have left descendants behind them; because the descendants of one ancestor only are not so likely to be in the line of that purchasing ancestor, as those who are descended from two.

But here a difficulty arises. In the second, third, fourth, and every superior degree, every man has many couples of ancestors, increasing according to the distances in a geometrical progression upwards, the descendants of all which respective couples are (representatively) related to him in the same degree. Thus, in the second degree, the issue of George and Cecilia Stiles and of Andrew and Esther Baker, the two grandfathers and grandmothers of John Stiles, are each in the same degree of propinquity; in the third degree, the respective issues of Walter and Christian Stiles, of Luke and Francis Kempe, of Herbert and Hannah Baker, and of James and Emma Thorpe, are (upon the extinction of the two inferior degrees) all equally entitled to call themselves the next kindred of the whole blood to John Stiles. To which therefore of these ancestors must we first resort, in order to find out descendants to be preferably called to the inheritance? In answer to this, and to avoid the confusion and uncertainty that might arise between the several stocks wherein the purchasing ancestor may be

fought for,—

7. The seventh and last rule or canon is, “that in collateral inheritances the male stocks shall be preferred to the female; (that is, kindred derived from the blood of the male ancestors shall be admitted before those from the blood of the female)—unless where the lands have, in fact, descended from a female.”—Thus the relations on the father's side are admitted *in infinitum*, before those on the mother's side are admitted at all; and the relations of the father's father, before those of the father's mother; and so on.

For the original and progress of the above canons, the reasons upon which they are founded, and their agreement with the laws of other nations, the curious reader may consult *Blackstone's Commentaries*, Vol. II. p. 208—237.

We shall conclude with exemplifying the rules themselves by a short sketch of the manner in which we must search for the heir of a person, as John Stiles, who dies seized of land which he acquired, and which therefore he held as a feud of indefinite antiquity. See the *Table of Descents*, on Plate LXXXVIII.

In the first place succeeds the eldest son, Matthew Stiles, or his issue, (n^o 1.) :—if his line be extinct, then Gilbert Stiles and the other sons, respectively, in order of birth, or their issue, (n^o 2.) :—in default of these, all the daughters together, Margaret and Charlotte Stiles, or their issue, (n^o 3.)—On failure of the descendants of John Stiles himself, the issue of Geoffrey and Lucy Stiles, his parents, is called in: *viz.* first, Francis Stiles, the eldest brother of the whole blood, or his issue, (n^o 4.) :—then Oliver Stiles, and the other whole brothers, respectively, in order of birth, or their issue, (n^o 5.) :—then the sisters of the whole blood all together, Bridget and Alice Stiles, or their issue, (n^o 6.)—In defect of these, the issue of George and Cecilia Stiles, his father's parents; respect being still had to their age and sex; (n^o 7.) :—then the issue of Walter and Christian Stiles, the parents of his paternal grandfather, (n^o 8.) :—then the issue of Richard and Anne Stiles, the parents of his paternal grandfather's father, (n^o 9.) :—and so on in the paternal grandfather's paternal line, or blood of Walter Stiles, *in infinitum*. In defect of these, the issue of William and Jane Smith, the parents of his paternal grandfather's mother, (n^o 10.) :—and so on in the paternal grandfather's maternal line, or blood of Christian Smith, *in infinitum*; till both the immediate bloods of George Stiles, the paternal grandfather, are spent.—Then we must resort to the issue of Luke and Frances Kempe, the parents of John Stiles's paternal grandmother, (n^o 11.) :—then to the issue of Thomas and Sarah Kempe, the parents of his paternal grandmother's father, (n^o 12.) :—and so on in the paternal grandmother's paternal line, or blood of Luke Kempe, *in infinitum*.—In default of which, we must call in the issue of Charles and Mary Holland, the parents of his paternal grandmother's mother, (n^o 13.) :—and so on in the paternal grandmother's maternal line, or blood of Frances Holland, *in infinitum*; till both the immediate bloods of Cecilia Kempe, the paternal grandmother, are also spent.—Whereby the paternal blood of John Stiles entirely failing, recourse must then, and not before, be had to his maternal relations; or the blood of the Bakers (n^o 14, 15, 16.), Willis's (n^o 17.), Thorpes (n^o 18,

Defcent
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Defidera-
tum.

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19.), and Whites (n° 20.); in the same regular fucceffive order as in the paternal line.

The student fhould bear in mind, that during this whole procefs, John Stiles is the perfon fupposed to have been laft actually feifed of the eftate. For if ever it comes to veft in any other perfon, as heir to John Stiles, a new order of fucceffion muft be obferved upon the death of fuch heir; fince he, by his own feifin, now becomes himfelf an anceftor, or *ftipes*, and muft be put in the place of John Stiles. The figures therefore denote the order in which the feveral claffes would fucceed to John Stiles, and not to each other: and before we fearch for an heir in any of the higher figures, (as n° 8.) we muft be firft affured that all the lower claffes (from n° 1 to 7.) were extinct, at John Stiles's deceafe.

DESCENT, or *Succession*, in the law of Scotland. See LAW, Part III. N° clxxx. clxxxi.

DESCENT of the Crown. See SUCCESSION.

DESCENT of *Dignities*. A dignity differs from common inheritances, and goes not according to the rules of the common law: for it defcends to the half-blood; and there is no coparcenerfhip in it, but the eldeft takes the whole. The dignity of peerage is perfonal, annexed to the blood; and fo ineparable, that it cannot be transferred to any perfon, or furrendered even to the Crown: it can move neither forward nor backward, but only downward to pofterity; and nothing but corruption of blood, as if the anceftor be attainted of treason or felony, can hinder the defcent to the right heir.

DESCENT, in genealogy, the order or fucceffion of defcendants in a line or family; or their diftance from a common progenitor: thus we fay, one defcent, two defcents, &c.

DESCENT, in heraldry, is ufed to exprefs the coming down of any thing from above; as, a *lion en defcent* is a lion with his head towards the bafe points, and his heels towards one of the corners of the chief, as if he were leaping down from fome high place.

DESCHAMPS (Francis), a French poet, born in Champagne, was the author of a tragedy intitled *Cato of Utica*, and a hiftory of the French theatre. He died at Paris in 1747.

DESCRIPTION, in literary compofition, is fuch a ftrong and beautiful representation of a thing, as gives the reader a diftinct view and fatisfactory notion of it. See NARRATION and *Description*.

DESCRIPTIVE POETRY. See POETRY, n° 82.

DESEADA, or DESIDERADA, one of the Caribbee iflands, fubject to France, lying eaftward of Guadaloupe.

DESERTER, in a military fenfe, a foldier who, by running away from his regiment or company, abandons the fervice.

A defter is, by the articles of war, punifhable by death; which, after conviction, is executed upon him at the head of the regiment he formerly belonged to, with his crime writ on his breaft.

DESERTION, in law. See LAW, N° clx. 24.

DESHACHE', in heraldry, is where a beaft has its limbs feparated from its body, fo that they ftill remain on the efcutcheon, with only a fmall feparation from their natural places.

DESIDERATUM, is ufed to fignify the defirable perfections in any art or fcience: thus, it is a defide-

ratum with the blackfmith, to render iron fufible by a gentle heat, and yet prefeve it hard enough for ordinary ufes; with the glafsman, and looking-glafs maker, to render glafs malleable; with the clock-maker, to bring pendulums to be ufeul where there are irregular motions, &c.

DESIGN, in a general fenfe, the plan, order, representation, or contruction of a building, book, painting, &c. See ARCHITECTURE, PAINTING, POETRY, ORATORY, and HISTORY.

DESIGN, in the manufactories, expreffes the figures wherewith the workman enriches his ftuff, or filk, and which he copies after fome painter, or eminent draughtfman, as in diaper, damask, and other flowered filk and tapeftry, and the like.

In undertaking of fuch kinds of figured ftuffs, it is neceffary, fays Monf. Savary, that, before the firft ftroke of the fhuttle, the whole design be represented on the threads of the warp, we do not mean in colours, but with an infinite number of little packthreads, which, being difpofed fo as to raife the threads of the warp, let the workmen fee, from time to time, what kind of filk is to be put in the eye of the fhuttle for woof. This method of preparing the work is called *reading the design*, and *reading the figure*, which is performed in the following manner: A paper is provided, confiderably broader than the ftuff, and of a length proportionate to what is intended to be represented thereon. This they divide lengthwife, by as many black lines as there are intended threads in the warp; and crofs thefe lines, by others drawn breadthwife, which, with the former, make little equal fquares: on the paper thus fquared, the draughtfman designs his figures, and heightens them with colours as he fees fit. When the design is finifhed, a workman reads it, while another lays it on the fimblot.

To read the design, is to tell the perfon who manages the loom, the number of fquares, or threads, comprifed in the fpace he is reading, intimating at the fame time, whether it is ground or figure. To put what is read on the fimblot, is to faften little ftirings to the feveral packthreads, which are to raife the threads named; and thus they continue to do till the whole design is read.

Every piece being compofed of feveral repetitions of the fame design, when the whole design is drawn, the drawer, to re-begin the design afrefh, has nothing to do but to raife the little ftirings, with flip-knots, to the top of the fimblot, which he had let down to the bottom: this he is to repeat as often as is neceffary till the whole be manufactured.

The ribbon-weavers have likewife a design, but far more fimple than that now defcribed. It is drawn on paper with lines and fquares, representing the threads of the warp and woof. But inftead of lines, whereof the figures of the former confift, thefe are conftituted of points only, or dots, placed in certain of the little fquares, formed by the interfection of the lines. Thefe points mark the threads of the warp that are to be raifed, and the fpaces left blank denote the threads that are to keep their fituation: the reft is managed as in the former.

DESIGN is alfo ufed, in painting, for the firft idea of a large work, drawn roughly, and in little, with an intention to be executed and finifhed in large.

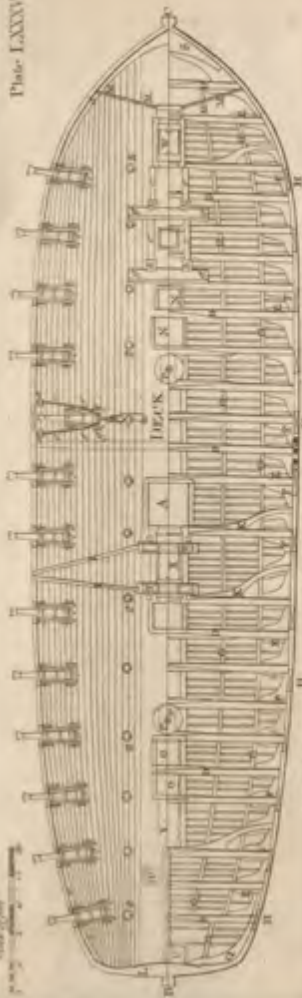
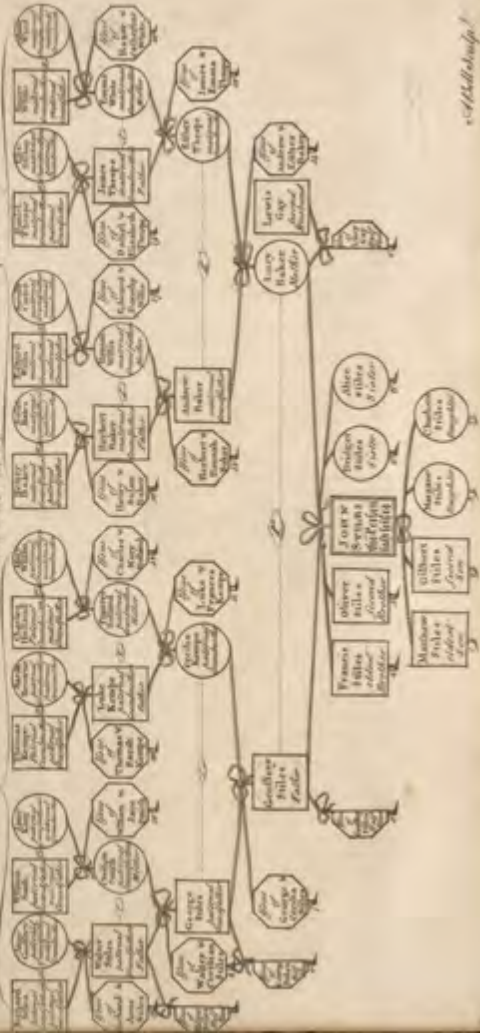


TABLE of DESCENT

Particular Line

Material Line



Design

Desportes.

In this sense, it is the simple contour, or outlines, of the figures intended to be represented, or the lines that terminate and circumscribe them: such design is sometimes drawn in crayons, or ink, without any shadows at all; sometimes it is hatched, that is, the shadows are expressed by sensible outlines, usually drawn across each other with the pen, crayon, or graver. Sometimes, again, the shadows are done with the crayon rubbed so as that there do not appear any lines: at other times, the grains or strokes of the crayon appear, as not being rubbed: sometimes the design is washed, that is, the shadows are done with a pencil in Indian ink, or some other liquor; and sometimes the design is coloured, that is, colours are laid on much like those intended for the grand work.

DESIGN, in music, is justly defined by Rousseau to be the invention and the conduct of the subject, the disposition of every part, and the general order of the whole.

It is not sufficient to form beautiful airs, and a legitimate harmony; all these must be connected by a principal subject, to which all the parts of the work relate, and by which they became one. Thus unity ought to prevail in the air, in the movement, in the character, in the harmony, and in the modulation. All these must indispensably relate to one common idea which unites them. The greatest difficulty is, to reconcile the observation of those precepts with an elegant variety, which, if not introduced, renders the whole piece irksome and monotonous. Without question the musician, as well as the poet, and the painter, may risk every thing in favour of this delightful variety; if, under the pretext of contrailing, they do not endeavour to cheat us with false appearances, and instead of pieces justly and happily planned, present us with a musical minced-meat, composed of little abortive fragments, and of characters so incompatible, that the whole assembled forms a heterogeneous monster.

*Non ut placidis coeant immitia, non ut
Serpentis avibus gementur, tigribus agni.*

Translated thus:

But not that nature should reverse'd appear;
Mix mild with fierce, and gentle with severe;
Profane her laws to contradiction's height;
Tygers with lambs, with serpents birds unite.

It is therefore in a distribution formed with intelligence and taste, in a just proportion between all the parts, that the perfection of design consists; and it is above all, in this point, that the immortal perogee has shown his judgment and his taste, and has left so far behind him all his competitors. His *Stabat Mater*, his *Orfeo*, his *Serva Padrona*, are, in three different species of composition, three master pieces of design equally perfect.

This idea of the general design of a work, is likewise particularly applicable to every piece of which it consists; thus the composer plans an air, a duet, a chorus, &c. For this purpose, after having invented his subject, he distributes it, according to the rules of a legitimate modulation, into all the parts where it ought to be perceived, in such a proportion, that its impression may not be lost on the minds of the audience; yet that it may never be reiterated in their ears, without the graces of novelty. The composer errs in designing who suffers his subject to be forgot; he is still more culpable who pursues it till it becomes trite and tiresome.

DESPORTES (Francis), a French painter of the

18th century, was born in Champagne, in 1661. He acquired great reputation, not only in France, but in England and Poland; he particularly excelled in still life. He was received into the academy of painting, made pictures for the tapestry of the Gobelins, and died at Paris in 1743.

DESPO^T, a term sometimes used for an absolute prince. See the next article.

Under the emperors of Constantinople, *despot* was a title of honour given to the emperor's sons, or sons-in-law; as also to their colleagues and partners in the imperial dignity, in the same manner as Cæsar was at Rome. See CÆSAR.

DESPO^TICAL, in general, denotes any thing that is uncontrolled and absolute; but is particularly used for an arbitrary government, where the power of the prince is unlimited, and his will a law to his subjects: such are those of Turkey, Persia, and most of the eastern governments; and even those of Europe, if we except the republics, our own, and the Swedish government.

DESPOUILLE, in heraldry, the whole case, skin, or slough of a beast, with the head, feet, tail, and all appurtenances, so that being filled and stuffed it looks like the entire creature.

DESSAW, a city of upper Saxony, in Germany, situated on the river Elbe, 60 miles north-west of Dresden, and subject to the prince of Anhalt Dessau: E. Long. 12. 40. N. Lat. 51. 50.

DESSERT, or DESERT, a service of fruits and sweetmeats, usually served up last to table.

DESSICATIVE, or DESICCATIVE, in pharmacy, an epithet applied to such topical medicines as dry up the humours flowing to a wound or ulcer.

DESTINIES, in mythology. See PARCÆ.

DESTINY, among philosophers and divines. See FATE.

DESTRUCTION, in general, an alteration of any thing from its natural state to one contrary to nature; whereby it is deemed the same with CORRUPTION.

A chemical destruction, or corruption, is nothing but a resolution of the whole naturally mixt body into its parts.

DESUDATION, in medicine, a profuse and inordinate sweat, succeeded by an eruption of pustules, called *sudamina*, or *heat-pimples*.

DESULTOR, in antiquity, a vaulter or leaper, who, leading one horse by the bridle, and riding another, jumped from the back of one to the other, as the custom was after they had run several courses or heats. — This practice required great dexterity, being performed before the use of either saddles or stirrups. The custom was practised in the army when necessity required it; but chiefly amongst the Numidians, who always carried with them two horses at least for that purpose, changing them as they tired. The Greeks and Romans borrowed the practice from them; but only used it at races, games, &c. The Sarmatæ were great masters of this exercise, and the Hussars have still some small remains of it.

DETACHMENT, in military affairs, a certain number of soldiers drawn out from several regiments or companies equally, to be employed as the general thinks proper, whether on an attack, at a siege, or in parties to scour the country.

Despot

Detachment.

Detergents
Deucalion.

DETERGENTS, in pharmacy, such medicines as are not only softening and adhesive, but also, by a peculiar activity, conjoined with a suitable configuration of parts, are apt to abrade and carry along with them such particles as they lay hold on in their passage.

DETERIORATION, the impairing or rendering a thing worse: it is just the reverse of **MELIORATION**.

DETERMINATION, in mechanics, signifies much the same with the tendency or direction of a body in motion. See **MECHANICS**.

DETERMINATION, among school-divines, is an act of divine power, limiting the agency of second causes, in every instance, to what the Deity predestinated concerning them. See **PREDESTINATION**.

DETERSIVES, the same with **DETERGENTS**.

DETINUE, in law, a writ or action that lies against one who has got goods or other things delivered to him to keep, and afterwards refuses to deliver them.—In this action, the thing detained is generally to be recovered, and not damages; but if one cannot recover the thing itself, he shall recover damages for the thing, and also for the detainer. Detinue lies for any thing certain and valuable, wherein one may have a property or right; as for a horse, cow, sheep, hens, dogs, jewels, plate, cloth, bags of money, sacks of corn, &c. It must be laid so certain, that the thing detained may be known and recovered: and therefore, for money out of a bag, or corn out of a sack, &c. it lies not; for the money or corn cannot in this case be known from other money or corn; so that the party must have an action on the case, &c. Yet detinue may be brought for a piece of gold of the price of 22 sh. though not for 22 sh. in money.

DETONATION, in chemistry, signifies an explosion with noise made by the sudden inflammation of some combustible body: Such are the explosions of *gun-powder*, *fulminating gold*, and *fulminating powder*. As nitre is the cause of most explosions, the word *detonation* has been appropriated to the inflammation of the acid of this salt with bodies containing phlogiston; and it is frequently given to those inflammations of nitrous acid which are not accompanied with explosion. Thus nitre is said to detonate with sulphur, with coals, with metals; although in the ordinary method of making these operations, that is, in open crucibles, and with small quantities of detonating substances, the nitre does not truly explode. See **NITRE**.

DETRANCHE, in heraldry, a line bend-wise, proceeding always from the dexter-side, but not from the very angle diagonally athwart the shield.

DETTINGEN, a village of Germany, in the circle of the Upper Rhine, and in the territory of Hanau. Here the Austrians and the British, in June 1743, were attacked by the French, who met with a repulse; but as the allies were inferior in number, they did not make the advantage of it they might have done. E. Long. 8. 45. N. Lat. 50. 8.

DEUCALION, king of Thessaly. The flood said to have happened in his time, (1500 B. C.), was no more than an inundation of Thessaly, occasioned by heavy rains, and an earthquake that stopped the course of the river Peneus where it usually discharged itself into the sea. On these circumstances the fable of Deucalion's flood is founded.—According to the fable, he was the son of Prometheus. He governed his peo-

ple with equity; but the rest of mankind being extremely wicked, were destroyed by a flood, while Deucalion and Pyrrha his queen saved themselves by ascending mount Parnassus. When the waters were decreased, they went and consulted the oracle of Themis, on the means by which the earth was to be repopled; when they were ordered to veil their heads and faces, to unloose their girdles, and throw behind their backs the bones of their great mother. At this advice Pyrrha was seized with horror: but Deucalion explained the mystery, by observing, that their great mother must mean the earth, and her bones the stones; when taking them up, those Deucalion threw over his head became men, and those thrown by Pyrrha, women.

DEVENSHRING. See **DEVONSHIRING**.

DEVENTER, a large, strong, trading, and populous town of the United Provinces, in Overijssel, with an university. It is surrounded with strong walls, flanked with several towers, and with ditches full of water. It is seated on the river IJssel, 55 miles east of Amsterdam, and 42 west of Bentheim. E. Long. 5. 8. N. Lat. 52. 18.

DEVEREUX (Robert), earl of Essex, the son of Walter Devereux, viscount Hereford, was born at Netherwood in Herefordshire, in the year 1567. He succeeded to the title of earl of Essex at ten years of age; and about two years after, was sent by his guardian lord Burleigh, to Trinity-college in Cambridge. He took the degree of master of arts in 1582, and soon after retired to his seat at Lampfie in South-Wales. He did not however continue long in this retreat; for we find him, in his seventeenth year, at the court of queen Elizabeth, who immediately honoured him with singular marks of her favour. Authors seem very unnecessarily perplexed to account for this young earl's gracious reception at the court of Elizabeth. The reasons are obvious: he was her relation, the son of one of her most faithful servants, the son-in-law of her favourite Leicester, and a very handsome and accomplished youth. Towards the end of (the following year) 1585, he attended the earl of Leicester to Holland; and gave signal proofs of his personal courage during the campaign of 1586, particularly at the battle of Zutphen, where the gallant Sidney was mortally wounded. On this occasion the earl of Leicester conferred on him the honour of knight banneret.

In the year 1587, Leicester being appointed lord steward of the household, Essex succeeded him in the honourable post of master of the horse; and the year following, when the queen assembled an army at Tilbury to oppose the Spanish invasion, Essex was made general of the horse, and knight of the garter. From this time he was considered as the happy favourite of the queen. And, if there was any mark yet wanting to fix the people's opinion in that respect, it was shewn by the queen's conferring on him the honour of the garter.

We need not wonder, that so quick an elevation, and to so great a height, should affect so young a man as the earl of Essex; who shewed from henceforward a very high spirit, and often behaved petulantly enough to the queen herself, who yet did not love to be controlled by her subjects. His eagerness about this time to dispute her favour with Sir Charles Blunt, afterwards lord

Deven-
shiring
Devereux.

Devereux.

lord Montjoy and earl of Devonshire, cost him some blood; for Sir Charles, thinking himself affronted by the earl, challenged him, and, after a short dispute, wounded him in the knee. The queen, so far from being displeased with it, is said to have sworn a good round oath, that it was fit somebody should take him down, otherwise there would be no ruling him. However, she reconciled the rivals; who, to their honour, continued good friends as long as they lived.

The gallant Essex however was not so entirely captivated with his situation, as to become insensible to the allurements of military glory. In 1589, Sir John Norris and Sir Francis Drake having sailed on an expedition against Spain, our young favourite, without the permission or knowledge of his royal mistress, followed the fleet; which he joined as they were failing towards Lisbon, and acted with great resolution in the repulse of the Spanish garrison of that city. The queen wrote him a very severe letter on the occasion; but she was, after his return, soon appeased. Yet it was not long before he again incurred her displeasure, by marrying the widow of Sir Philip Sidney. In 1591, he was sent to France with the command of 4000 men to the assistance of Henry IV. In 1596, he was joined with the lord high admiral Howard in the command of the famous expedition against Cadiz, the success of which is universally known. In 1597, he was appointed master of the ordnance; and the same year commanded another expedition against Spain, called the *Island voyage*, the particulars of which are also well known.

Soon after his return, he was created earl marshal of England; and on the death of the great lord Burleigh, in 1598, elected chancellor of the university of Cambridge. This is reckoned one of the last instances of this great man's felicity, who was now advanced too high to sit at ease; and those who longed for his honours and employments, very closely applied themselves to bring about his fall. The first great shock he received, in regard to the queen's favour, arose from a warm dispute between her majesty and himself, about the choice of some fit and able person to superintend the affairs of Ireland. The affair is related by Camden; who tells us, that nobody was present but the lord admiral, Sir Robert Cecil secretary, and Windesbank clerk of the seal. The queen looked upon Sir William Knolls, uncle to Essex, as the most proper person for that charge: Essex contended, that Sir George Carew was a much fitter man for it. When the queen could not be persuaded to approve his choice, he so far forgot himself and his duty, as to turn his back upon her in a contemptuous manner; which insolence her majesty not being able to bear, gave him a box on the ear, and bid him go and be hanged: Essex, like a blockhead, put his hand to his sword, and swore revenge. Where was his gallantry on this occasion? Could a stroke from an angry woman tinge the honour of a gallant soldier? This violent storm, however, soon subsided; and they were again reconciled, at least apparently.

The total reduction of Ireland being brought upon the tapis soon after, the earl was pitched upon as the only man from whom it could be expected. This was an artful contrivance of his enemies, who hoped by this means to ruin him; nor were their expectations dis-

appointed. He declined this fatal preferment as long as he could: but, perceiving that he should have no quiet at home, he accepted it; and his commission for lord lieutenant passed the great seal on the 12th of March 1598. His enemies now began to insinuate, that he had fought this command, for the sake of greater things which he then was meditating; but there is a letter of his to the queen, preserved in the Harleian collections, which shews, that he was so far from entering upon it with alacrity, that he looked upon it rather as a banishment, and a place assigned him for a retreat from his sovereign's displeasure, than a potent government bestowed upon him by her favour. "To the Queen. From a mind delighting in sorrow; from spirits waisted with passion; from a heart torn in pieces with care, grief, and travail; from a man that hateth himself, and all things else that keep him alive; what service can your majesty expect, since any service palk deserves no more than banishment and proseription to the curfedeft of all islands? It is your rebels pride and succession must give me leave to range som myself out of this hateful prison, out of my loathed body; which, if it happen so, your majesty shall have no cause to mislike the fashion of my death, since the course of my life could never please you.

"Happy he could finish forth his fate,
"In some unhaunted desert most obscure
"From all society, from love and hate
"Of worldly folk; then should he sleep secure.
"Then wake again, and yield God ever praise,
"Content with hips, and hawes, and brambleberry;
"In contemplation passing out his days,
"And change of holy thoughts to make him merry.
"Who, when he dies, his tomb may be a bush,
"Where harmless robin dwells with gentle thrush.

"Your Majesty's" exiled servant,
"ROBERT ESSEX."

The earl met with nothing in Ireland but ill success and crosses: in the midst of which, an army was suddenly raised in England, under the command of the earl of Nottingham; no-body well knowing why, but in reality from the suggestions of the earl's enemies to the queen, that he rather meditated an invasion on his native country, than the reduction of the Irish rebels. This and other considerations made him resolve to quit his post, and come over to England; which he accordingly did without leave. He burst into her majesty's bed-chamber as she was rising, and she received him with a mixture of tenderness and severity: but she, soon after, thought fit to deprive him of all his employments, except that of master of the horse. He was committed to the custody of the lord-keeper, with whom he continued six months. No sooner had he regained his liberty, than he was guilty of many extravagancies; to which he was instigated by knaves and fools, but perhaps more powerfully by his own passions. He first determined to obtain an audience of the queen by force. He refused to attend the council when summoned. When the queen sent the lord-keeper, the lord chief-justice, and two others, to know his grievances, he confined them; and then marched with his friends into the city, in expectation that the people would rise in his favour; but in that he was disappointed. He was at last besieged, and taken in his house in Essex-street; committed to the Tower; tried

Devereux.

Devereux. by his peers, condemned, and executed. Thus did this brave man, this favourite of his queen, this idol of the people, fall a sacrifice to his want of that dissimulation, that cunning, that court-policy, by which his enemies were enabled to effect his ruin. He was a polite scholar, and a generous friend to literature.

To those, who have not taken the trouble to consult and compare the several authors who have related the story of this unfortunate earl, it must appear wonderful, if, as hath been suggested, he was really beloved by queen Elizabeth, that she could consent to his execution. Now, that she had conceived a tender passion for him, is proved beyond a doubt by Mr Walpole in his very entertaining and instructive *Catalogue of Noble Authors*.—"I am aware," says that author, "that it is become a mode to treat the queen's passion for him as a romance. Voltaire laughs at it; and observes, that when her struggle about him must have been the greatest (the time of his death), she was sixty-eight.—Had he been sixty-eight, it is probable she would not have been in love with him."—"Whenever Essex acted a fit of sickness, not a day passed without the queen's sending often to see him; and once went so far as to sit long by him, and order his *broths and things*. It is recorded by a diligent observer of that court, that in one of his sick moods, he took the liberty of going up to the queen in his night-gown. In the height of these frolic fooleries, there was a mask at Black Fryars on the marriage of lord Herbert and Mrs Ruffel. Eight lady-makers chose eight more to dance the measures. Mrs Fitton, who led them, went to the queen, and wooed her to dance. Her majesty asked what she was?—*Affection*, she said. *Affection!* said the queen; *Affection is false*. Were not these the murmurs of a heart ill at ease? Yet her majesty rose, and danced. She was then sixty-eight. Sure it was as natural for her to be in love."

Mr Walpole farther observes, that her court and contemporaries had an uniform opinion of her passion for Essex, and quotes several instances from a letter written by Sir Francis Bacon to the earl; in which, among other things, he advises him to consult her taste in his very apparel and gestures, and to give way to any other inclination she may have. Sir Francis advised the queen herself, knowing her inclination, to keep the earl about her for *society*. What Henry IV. of France thought of the queen's affection for Essex, is evident from what he said to her ambassador—"Que sa majesté ne laisseroit jamais son cousin d'Essex s'éloigner de son cottillon."—After his confinement, on hearing he was ill, she sent him word, with tears in her eyes, that if she might with her honour, she would visit him.

"If," says Mr Walpole, "these instances are problematic, are the following so? In one of the curious letters of Rowland White, he says, the queen *bath of late used the fair Mrs Bridges with words, and blows of anger*. In a subsequent letter, he says, the earl is again *fallen in love with his fairest B. It cannot chuse but come to the queen's ears, and then he is undone*."—Essex himself says, that her fond parting with him when he set out for Ireland, pierced his very soul.

Probably the reader has now very little doubt as to queen Elizabeth's affection for the unfortunate Essex; but, in proportion to our belief of the existence of this affection, her motives for consenting to his execution

become more inexplicable. Queen Elizabeth had a very high opinion of her beauty and personal attractions, and probably expected more entire adoration than the earl's passion for variety would suffer him to pay. Towards the latter end of her life, she was certainly an object of disgust. He had too much honest simplicity in his nature, to feign a passion which he did not feel. She foolishly gave credit to the stories of his ambitious projects incompatible with her safety; and was informed that he had once inadvertently said, that *she grew old and cankered, and that her mind was become as crooked as her carcase*. If this be true, where is the woman that would not sacrifice such a lover to her resentment?

It is said, however, that, concerning his execution, her majesty was irresolute to the last, and sent orders to countermand it; but, considering his obstinacy in refusing to ask her pardon, afterwards directed that he should die. It is reported, that the queen, in the height of her passion for the earl of Essex, had given him a ring, ordering him to keep it, and that whatever crime he should commit, she would pardon him when he should return that pledge. The earl, upon his condemnation, applied to admiral Howard's lady, his relation, desiring her, by a person whom she could trust, to return it into the queen's own hands; but her husband, who was one of the earl's greatest enemies, and to whom she had imprudently told the circumstance, would not suffer her to acquit herself of the commission; so that the queen consented to the earl's death, being full of indignation against so proud and haughty a spirit, who chose rather to die than implore her mercy. Some time after, the admiral's lady fell sick, and being near her death, she sent word to the queen that she had something of great consequence to communicate before she died. The queen came to her bed-side, and having ordered all her attendants to withdraw, the lady retired, but too late, the ring, desiring to be excused that she did not return it sooner: on which, it is said, the queen immediately retired, overwhelmed with grief.

The earl of Essex died in the thirty-fourth year of his age; leaving by his lady, one son and two daughters.

DEVICE, among painters. See DEVISE.

DEVIL, an evil angel, one of those celestial spirits cast down from heaven for pretending to equal himself with God. The Ethiopians paint the devil white, to be even with the Europeans who paint him black.

There is no mention of the word *devil* in the Old Testament, but only of the word *Satan* and *Belial*: nor do we meet with it in any heathen authors, in the sense it is taken among Christians, that is, as a creature revolted from God. Their theology went no farther than to evil genii, or demons.

Some of the American idolaters have a notion of two collateral independent beings, one of whom is good, and the other evil; which last they imagine has the direction and superintendence of this earth, for which reason they chiefly worship him: whence those that give us an account of the religion of these savages give out, with some impropriety, that they worship the devil. The Chaldeans, in like manner, believed both a good principle and an evil one; which last they imagined was an enemy to mankind.

Devil
Devon-
shire.

Isaiah, speaking, according to some commentators, of the fall of the devil, calls him Lucifer, from his former elevation and state of glory: but others explain this passage of Isaiah in reference to the king of Babylon, who had been precipitated from his throne and glory. The Arabians call Lucifer, *Eblis*; which some think is only a diminutive or corruption of the word *Diabolus*.

DEVIL on the Neck, a tormenting engine made of iron, straitening and wincing the neck of a man, with his legs together, in a horrible manner; so that the more he striveth in it, the straiter it presseth him; formerly in use among the persecuting papists.

DEVINCTION, in antiquity, a kind of love-charm, described by Virgil in his eighth eclogue: it consisted in tying certain knots, and repeating a formula of words.

DEVISE, or **DEVICE**, in heraldry, painting, and sculpture, any emblem used to represent a certain family, person, action, or quality; with a suitable motto, applied in a figurative sense. See **MOTTO**.

The essence of a device consists in a metaphorical similitude between the things representing and represented: thus, a young nobleman, of great courage and ambition, is said to have borne for his devise, in a late carousal at the court of France, a rocket mounted in the air, with this motto in Italian, "*a poco dari purehe m'inalzi*"; expressing, that he preferred a short life, provided he might thereby attain to glory and eminence.

The Italians have reduced the making of devices into an art, some of the principal laws of which are these. 1. That there be nothing extravagant or monstrous in the figures. 2. That figures be never joined which have no relation or affinity with one another; excepting some whimsical unions established in ancient fables, which custom has authorized. 3. That the human body be never used. 4. The fewer figures the better. 5. The motto should be every way suitable.

DEVISE, in law, the act whereby a person bequeaths his lands or tenements to another by his last will or testament.

DEUNX, in Roman antiquity, 11 ounces, or $\frac{1}{12}$ of the **LIBRA**.

DEVOLUTION, in law, a right acquired by succession from one to another.

DEVONSHEERING, a term used by the farmers to express the burning of land by way of manure: the method is to cut off the turf about four inches thick, and burn it in heaps, and then spread the ashes upon the land. The name is probably derived from its having been earliest practised in Devonshire.

DEVONSHIRE, a county of England, bounded on the south by the English channel, on the north by the Bristol channel, on the east by Somersetshire, and on the west by Cornwall. It is about 69 miles long, and 66 broad. The soil is various; in the western parts of the county it is coarse and moorish, bad for sheep, but proper for black cattle. In the northern parts, the dry soil and downs are well adapted to sheep, with numerous flocks of which they are well covered. Tolerable crops of corn are also produced there when the land is well manured. The soil of the rest of the county is rich and fertile both in corn and pasture, yielding also in some places plenty of marle for ma-

nuring it. In other places they pare off and burn the surface, making use of the ashes as a manure. Dr Campbell styles it a rich and pleasant country; as in different parts it abounds with all sorts of grain, produces abundance of fruit, has mines of lead, iron, and silver, in which it formerly exceeded Cornwall, though now it is greatly inferior. On the coast also they have herring and pilchard fisheries.

DEVOTION, **DEVOTIO**, a sincere ardent worship of the Deity. See **PRAYER**, **ADORATION**, **WORSHIP**, &c.

Devotion, as defined by Jurieu, is a softening and yielding of the heart, with an internal consolation, which the souls of believers feel in the practice or exercise of piety. By devotion is also understood certain religious practices, which a person makes it a rule to discharge regularly; and with reason, if the exactitude be founded on solid piety, otherwise it is vanity or superstition. That devotion is vain and trifling, which would accommodate itself both to God and to the world. *Trepoux*.

DEVOTION, among the Romans, was a kind of sacrifice, or ceremony, whereby they consecrated themselves to the service of some person. The ancients had a notion, that the life of one might be ransomed by the death of another, whence those devotions became frequent for the lives of the emperors. Devotion to any particular person, was unknown among the Romans till the time of Augustus. The very day after the title of Augustus had been conferred upon Octavius, Pacuvius, a tribune of the people, publicly declared, that he would devote himself to Augustus, and obey him at the expence of his life, (as was the practice among barbarous nations), if he was commanded. His example was immediately followed by all the rest; till, at length, it became an established custom never to go to salute the emperor, without declaring that they were devoted to him.—Before this, the practice of the Romans was that of devoting themselves to their country.*

DEUTEROCANONICAL, in the school-theology, an appellation given to certain books of holy scripture, which were added to the canon after the rest; either by reason they were not wrote till after the compilation of the canon, or by reason of some dispute as to their canonicity. The word is Greek, being compounded of *deuteros*, second, and *kanonikos*, canonical.

The Jews, it is certain, acknowledged several books in their canon, which were put there later than the rest. They say, that under Esdras, a great assembly of their doctors, which they call by way of eminence the *great synagogue*, made the collection of the sacred books which we now have in the Hebrew Old Testament. And they agree that they put books therein which had not been so before the Babylonish captivity; such are those of Daniel, Ezekiel, Haggai, &c. and those of Esdras and Nehemiah.

And the Romish church has since added others to the canon, that were not, nor could not be, in the canon of the Jews; by reason some of them were not composed till after. Such is the book of Ecclesiasticus; with several of the apocryphal books, as the Maccabees, Wisdom, &c. Others were added still later, by reason their canonicity had not been yet examined; and till such examen, and judgment, they might be set aside at pleasure.—But since that church has pronounced

Devotion,
Deutero-
canon-
ical.

* See *De-
cius*.

Deutero-
nomy
Dew.

ced as to the canonicity of these books, there is no more room now for her members to doubt of them, than there was for the Jews to doubt of those of the canon of Eldras. And the deuteronical books are with them as canonical, as the proto-canonical; the only difference between them consisting in this, that the canonicity of the one was not generally known, examined, and settled, so soon as that of the others.

The deuteronical books in the modern canon, are the book of Esther, either the whole, or at least the seven last chapters thereof. The epistle to the Hebrews; that of James; and that of Jude; the second of St Peter; the second and third of St John; and the Revelation. The deuteronical parts of books, are, in Daniel, the hymn of the three children; the prayer of Azariah; the histories of Sufannah, of Bel and the Dragon; the last chapter of St Mark; the bloody sweat, and the appearance of the angel, related in St Luke, chap. xxii; and the history of the adulterous woman in St John, chap. viii.

DEUTERONOMY, one of the sacred books of the Old Testament; being the last of those written by Moses: (See *PENTATEUCH*.) The word is Greek, compounded of *δευτερος* second, and *νομος*, law.

Deuteronomy was written the 40th year after the delivery from Egypt, in the country of the Moabites beyond Jordan; Moses being then in the 120th year of his age. It contains, in Hebrew, 11 parafches, though only 10 in the edition of the rabbins at Venice; XX chapters, and 955 verses. In the Greek, Latin, and other versions, it contains XXXIV chapters. The last is not of Moses. Some say it was added by Joshua immediately after Moses's death; which is the most probable opinion. Others will have it added by Eldras.

DEUTEROPOTMI, in Grecian antiquity, a designation given to such of the Athenians as had been thought dead, and, after the celebration of the funeral rites, unexpectedly recovered. It was unlawful for the deuteropotmi to enter into the temple of the Eumenides, or to be admitted to the holy rites, till after they were purified, by being let through the lap of a woman's gown, that they might seem to be new born.

DEUTEROSIS, the Greek name by which the Jews called their Mischnah, or second law. See *MISCHNAH*.

DEW, a dense, moist vapour, found on the earth in spring and summer mornings, in form of a misting rain, being collected there chiefly while the sun is below the horizon.

It hath been disputed whether the dew is formed from the vapours *ascending* from the earth during the night-time, or from the *descent* of such as have been already raised through the day. The most remarkable experiments adduced in favour of the first hypothesis are those of Mr Dufay of the Royal Academy of Sciences at Paris. He supposed, that if the dew *ascended*, it must wet a body placed low down sooner than one placed in a higher situation: and, if a number of bodies were placed in this manner, the lowermost would be wetted first; and the rest in like manner, gradually up to the top.

To determine this, he placed two ladders against one another, meeting at their tops, spreading wide a-

funder at the bottom, and so tall as to reach 32 feet high. To the several steps of these he fastened large squares of glass like the panes of windows, placing them in such a manner that they should not overhade one another. On the trial it appeared exactly as Mr Dufay had apprehended. The lower surface of the lowest piece of glass was first wetted, then the upper, then the lower surface of the pane next above it; and so on, till all the pieces were wetted to the top. Hence it appeared plain to him, that the dew consisted of the vapours ascending from the earth during the night-time; which, being condensed by the coldness of the atmosphere, are prevented from being dissipated as in the day-time by the sun's heat. He afterwards tried a similar experiment with pieces of cloth instead of panes of glass, and the result was quite conformable to his expectations. He weighed all the pieces of cloth next morning, in order to know what quantity of water each had imbibed, and found those that had been placed lowermost considerably heavier than such as had been placed at the top; tho' he owns that this experiment did not succeed so perfectly as the former.

M. Muschenbroek, who embraced the contrary opinion, thought he had invalidated all Mr Dufay's proofs, by repeating his experiments, with the same success, on a plane covered with sheet-lead. But to this Mr Dufay replied, that there was no occasion for supposing the vapour to rise through the lead, nor from that very spot; but that as it arose from the adjoining open ground, the continual fluctuation of the air could not but spread it abroad, and carry it thither in its ascent.

But though this experiment of M. Muschenbroek's is not sufficient to overthrow those of Mr Dufay, it must still remain dubious whether the dew *rises* or *falls*. One thing which seems to favour the hypothesis of its *descent* is, that in cloudy weather there is little or no dew to be observed. From this M. de Luc brings an argument in favour of the hypothesis just now mentioned. He accounts for it in the following manner. When there are no clouds in the air, the heat of the inferior air and that which rises from the earth, dissipates itself into the superior regions; and then the vapours which are dispersed throughout the air, condense, and fall down in dew: But, when the clouds continue, they separate the inferior from the superior part of the atmosphere, and thus prevent the dissipation of the heat, by which means the vapours remain suspended. When the sky grows cloudy, some hours after sun-set, although the heat has been sensibly diminished, it is again increased; because, continuing to rise out of the earth, it is accumulated in the inferior air. But neither can this be reckoned a positive proof of the *descent* of the dew; since we may as well suppose the heat of the atmosphere to be great enough to dissipate it in its ascent, as to keep it suspended after its ascent through the day.

On the other hand, its being found in greater quantities on bodies placed low down than on such as are high up, is no proof of the *ascent* of the dew; because the same thing is observed of rain. A body placed low down receives more rain than one placed in an elevated situation; and yet the rain certainly descends from the atmosphere. The reason why the dew appears first on the lower parts of bodies may be, that, in the evening, the

Dew.

Phil. Tran.
vol. 63.
part 2.

lower

Dew.

lower part of the atmosphere is first cooled, and consequently most disposed to part with its vapour. It is also certain, that part of the water contained in the air may be condensed at any time on the sides of a glass, by means of cold, so as to run down its sides in small drops like dew. It seems, therefore, that this subject is not sufficiently determined by such experiments as have yet been made; nor indeed does it appear easy to make such experiments as shall be perfectly decisive on the matter.

Several substances, exposed to the same dew, receive and charge themselves with it in a very different manner; some more, others less, and some even not at all. The drops seem to make a sort of choice of what bodies they shall affix themselves to: glass and crystals are those to which they adhere in the most ready manner, and in the largest quantity; but metals of all kinds never receive them at all, nor do the drops ever adhere to them. The reason of this is probably because metals promote evaporation more than glass does. Thus, if a piece of metal and a piece of glass are both made equally moist, the former will be found to dry in much less time than the latter. Hence it would seem, that there is between metals and water some kind of repulsion: and this may be sufficient to keep off the very small quantity that falls in dew; for whatever tends to make water evaporate after it is actually in contact with any substance, also tends to keep the water from ever coming into contact with it.

SUBSTANCES of a very different kind from the usual dew, are said to have sometimes fallen from the atmosphere. In the Phil. Trans. we are told, that in the year 1695 there fell in Ireland, in the provinces of Leinster and Munster, for a considerable part of the winter and spring, a fatty substance resembling butter, instead of the common dew. It was of a clammy texture, and dark yellow colour; and was, from its great resemblance, generally called *dew-butter* by the country people. It always fell in the night, and chiefly in the moorish low grounds; and was found hanging on the tops of the grass, and on the thatch of the houses of the poor people. It was seldom observed to fall twice in the same place; and usually, wherever it fell, it lay a fortnight upon the ground before it changed colour; but after that it gradually dried up, and became black. The cattle fed in the fields where it lay as well as in others, and received no harm by it. It fell in pieces of the bigness of one's finger-end; but they were dispersed scatteringly about, and it had an offensive smell like a church-yard. There were in the same places very stinking fogs during the winter, and some people supposed this no other than a sediment from the fog. It would not keep very long, but never bred worms.

May-Dew whitens linen and wax; the dew of autumn is converted into a white frost. Out of dew putrified by the sun, arise divers insects, which change apace from one species into another: what remains is converted into a fine white salt, with angles like those of salt-petre, after a number of evaporations, calcinations, and fixations.

There is a spirit drawn from May-dew, which has wonderful virtues attributed to it. The method of collecting and preparing it, is prescribed by Hanneman, physician at Kiel. It is to be gathered in clean linen cloths; exposed to the sun in close vials; then di-

stilled, and the spirit thrown upon the caput mortuum; this is to be repeated till the earth unite with the spirit, and become liquid; which happens about the seventh or eighth cohobation, or distillation. By such means you gain a very red, odoriferous spirit. Stolterfoht, a physician of Lubec, thinks May-dew may be gathered in glass-plates, especially in still weather, and before sun-rise. And Etmuller is of the same sentiment. It might likewise be collected with a glass funnel, exposed to the air, having a crooked neck to bring the dew into a vial in a chamber. See Phil. Transl. n° 3. Hoffman, and others. It is apparently from the preparation of this dew, that the brothers of the Rosy-Crofs took their denomination *.

Dew-Born, in country affairs, a distemper in cattle, being a swelling in the body, as much as the skin can hold, so that some beasts are in danger of bursting. This distemper proceeds from the greediness of a beast to feed, when put into a rank pasture; but commonly when the grass is full of water. In this case the beast should be stirred up and down, and made to purge well: but the proper cure is bleeding in the tail; then take a grated nutmeg, with an egg, and breaking the top of the shell, put out so much of the white as you may have room to slip the nutmeg into the shell; mix them together, and then let shell and all be put down the beast's throat; that done, walk him up and down, and he will soon mend.

Dew-Worm. See LUMBRICUS.

DE WIT (John), the famous pensionary, was born in 1625, at Dort; where he prosecuted his studies so diligently, that, at the age of 23, he published *Elementa Curvarum Linearum*, one of the deepest books in mathematics at that time. After taking his degrees, and travelling, he, in 1650, became pensionary of Dort, and distinguished himself very early in the management of public affairs. He opposed with all his power the war between the English and the Dutch; and when the event justified his predictions, he was unanimously chosen pensionary of Holland. In this capacity he laboured to procure a peace with Cromwell; in which peace a secret article was introduced by one side or other, for the exclusion of the house of Orange. In the war with England after the king's restoration, when it was thought expedient, on Opdam's defeat and death, that some of their own deputies should command the fleet, he was one of the three put in commission; and wrote an accurate relation of all that happened during the expedition he was engaged in, for which, at his return, he received the solemn thanks of the States-General. In 1667, he established the perpetual edict for abolishing the office of Stadtholder, to fix the liberty of the republic, as it was hoped, on a firm basis; which produced seditions and tumults, that restored the office, on pretence that the De Wits were enemies to the house of Orange, and plundered the state. The pensionary begged dismissal from his post; which was granted, with thanks for his faithful services. But the invasion of the French, and the internal divisions among the Hollanders themselves, spread every where terror and confusion; which the Orange party heightened, to ruin the De Wits. Cornelius, the pensionary's brother, was imprisoned and condemned to exile; and a report being raised that he would be rescued, the mob armed, and surrounded the prison where the two bro-

Dew,
De Wit.* See *Revolutions*.

De Wit
||
Diachylon.

thers then were together, dragged them out, barbarously murdered them, hung the bodies on the gallows, and cut them to pieces, which many of them even broiled, and ate with savage fury. Such was the end of one of the greatest geniuses of his age; of whom Sir William Temple, who was well acquainted with him, writes with the greatest esteem and admiration. He observes, that when he was at the head of the government, he differed nothing in his manner of living from an ordinary citizen. His office, for the first ten years, brought him in little more than 300*l.* and in the latter part of his life, not above 700*l.* per ann. He refused a gift of 10,000*l.* from the States-General, because he thought it a bad precedent in the government. With great reason, therefore, Sir William Temple, speaking of his death, observes, "He was a person that deserved another fate, and a better return from his country; after 18 years spent in their ministry, without any care of his entertainments or ease, and little of his fortune. A man of unwearied industry, inflexible constancy, sound, clear, and deep understanding, and untainted integrity; so that whenever he was blinded, it was by the passion he had for that which he esteemed the good and interest of his state. This testimony is justly due to him from all that were well acquainted with him; and is the more willingly paid, since there can be as little opportunity to flatter, as honour to reproach, the dead."

Besides the works already mentioned, he wrote a book containing those maxims of government, upon which he acted; which will be a never-fading monument to his immortal memory. A translation of it from the original Dutch, entitled, *The true interest and political maxims of the republic of Holland*, has been printed in London; to the last edition of which, in 1746, are prefixed historical memoirs of the illustrious brothers Cornelius and John de Witt, by John Campbell, Esq.

DEXTANS, in Roman antiquity, tea ounces, or $\frac{1}{16}$ of their libra. See *LIBRA*.

DEXTER, in heraldry, an appellation given to whatever belongs to the right side of a shield, or coat of arms: thus we say, *bend-dexter, dexter point*, &c.

DEXTROCHERE, or DESTROCHERE, in heraldry, is applied to the right arm painted in a shield, sometimes naked; sometimes clothed, or adorned with a bracelet; and sometimes armed, or holding some moveable or member used in the arms.

DEY, in matters of government, the sovereign prince of Algiers, answering to the *BEY* of Tunis.

DIABETES, in physic, an excessive discharge of urine, which comes away crude, and exceeds the quantity of liquids drank. See (the *Index* subjoined to) *MEDICINE*.

DIABOLUS. See *DEVIL*.

DIABOLUS Marinus. See *RAIA*.

DIABOLUS Metellorum, a title given by chemists to jupiter or tin, because, when incorporated with other metals, it renders them incapable of reduction, or at least very difficult to undergo that operation.

DIACAUSTIC CURVE, a species of the caustic curves formed by refraction.

DIACHYLON, in pharmacy, an emollient digestive plaster, composed of mucilages or viscid juices drawn from certain plants. See *PHARMACY*, n° 967.

DIACODIUM, in pharmacy, a syrup prepared from poppy-heads. It is also called the *syrupus de meconio*. See *PHARMACY*, n° 491.

DIACOUSTICS, called also DIAPHONICS, the consideration of the properties of refracted sound, as it passes through different mediums. See *ACOUSTICS*.

The word is formed from the Greek *δια, per*, "thro'"; which intimates a passage; and *ακου, I hear*, q. d. the consideration of the passage of the sounds we hear. See *SOUND*.

DIADELPHIA, (*δια, twice*, and *αδελφος a brother*.) class the 17th in the sexual system, comprehending those plants which bear hermaphrodite flowers with two sets of united stamina, but this circumstance must not be absolutely depended on. They are the *papilionaceæ* of Tournefort, the *irregulares tetrapetalæ* of Rivinus, and the *leguminosæ* of Ray. See *BOTANY*, p. 1292. and Plate *LIX*.

DIADEM, in antiquity, a head-band, or fillet, worn by kings as a badge of their royalty. It was made of silk, thread, or wool, and tied round the temples and forehead, the ends being tied behind, and let fall on the neck. It was usually white, and quite plain; though sometimes embroidered with gold, and set with pearls and precious stones. In latter times, it came to be twilted round crowns, laurels, &c. and even appears to have been worn on divers parts of the body. See *CROWN*.—The word comes from the Latin *diadema*; of the Greek *διαδμα*, a little band encompassing the head, of the verb *διαδο, cingo*, "I gird."

DIADÉM, in heraldry, is applied to certain circles, or rims, serving to inclose the crowns of sovereign princes, and to bear the globe and cross, or the flower de luces for their crest. The crowns of sovereigns are bound, some with a greater, and some with a less number of diadems.—The bandage about the heads of Moors on shields is also called *diadem*, in blazoning.

DIÆRESIS, in surgery, an operation serving to divide and separate the part when the continuity is a hindrance to the cure.

DIÆRESIS, in medicine, is the consuming of the vessels of an animal body, when from some corroding cause certain passages are made, which naturally ought not to have been; or certain natural passages are dilated beyond their ordinary dimensions, so that the humours which ought to have been contained in the vessels extravasate or run out.

DIÆRESIS, in grammar, the division of one syllable into two, which is usually noted by two points over a letter, as *aulâi* instead of *aule*, *dissolvienda* for *dissolvenda*.

DIÆTETÆ, in Grecian antiquity, a kind of judges, of which there were two sorts, the cleroti and diallacterii. The former were public arbitrators, chosen by lot to determine all causes exceeding ten drachms, within their own tribe, and from their sentence an appeal lay to the superior courts.

The diallacterii, on the contrary, were private arbitrators from whose sentence there lay no appeal, and accordingly they always took an oath to administer justice without partiality.

DIAGLYPHICE, the art of cutting or engraving figures on metals, such as seals, intaglias, matrices of letters, &c. or coins for medals. See *ENGRAVING*.

DIAGNOSIS, (from *διαγνωσκο, to discern or distinguish*;

Diacodium
||
Diagnosis

Diagnostic *gnōsis*; the diagnostics, or the signs of a disease. They are of two kinds, viz. the adjunct, and pathognomonic; the first are common to several diseases, and serve only to point out the difference between diseases of the same species; the latter are those which always attend the disease, and distinguish it from all others.

DIAGNOSTIC, in medicine, a term given to those signs which indicate the present state of a disease, its nature and cause.

DIAGONAL, in geometry, a right line drawn across a quadrilateral figure, from one angle to another, by some called the *diameter*, and by others the *diameter*, of the figure. See **GEOMETRY**.

DIAGORAS, surnamed the *atheist*, lived in the 91st Olympiad. He was not a native of Athens, but he philosophized there. He delighted in making verses, and had composed a poem which a certain poet stole from him. He sued the thief, who swore it was his own, and got glory by it. This tempted Diagoras to deny a Providence. The Athenians summoned him to give an account of his doctrine. He fled, and they set a price upon his head, promising a reward to any who should kill him; but he took shipping, and was cast away.

DIAGRAM, in geometry, a scheme for explaining and demonstrating the properties of any figure, whether triangle, square, circle, &c. *

DIAGRAM, among ancient musicians, the same with the scale of the moderns. See **SCALE**.

DIAHEXAPLA, or **DIAHEXAPTE**, among farriers, a compound medicine, so called from its containing six ingredients, viz. birthwort and gentian roots, juniper-berries, bay-berries, myrrh, and ivory shavings. It is commended for colds, consumptions, purfines, and many other disorders in horses.

DIAL, or **SUN-DIAL**, an instrument serving to measure time, by means of the shadow of the sun. The word is formed from the Latin *dies*, "day," because indicating the *hour of the day*.

The ancients also called it *scithericum*, from its doing it by the shadow.

Definitions. **DIAL** is more accurately defined, a plane, upon which lines are described in such a manner, that the shadow of a wire, or of the upper edge of another plane, erected perpendicularly on the former, may shew the true time of the day.

The edge of the plane by which the time of the day is found, is called the *stile of the dial*, which must be parallel to the earth's axis; and the line on which the said plane is erected, is called the *substile*.

The angle included between the substile and stile, is called the *elevation* or *height of the stile*.

Those dials whose planes are parallel to the plane of the horizon, are called *horizontal dials*; and those dials whose planes are perpendicular to the plane of the horizon, are called *vertical* or *erect dials*.

Those erect dials, whose planes directly front the north or south, are called *direct north* or *south dials*; and all other erect dials are called *decliners*, because their planes are turned away from the north or south.

Those dials whose planes are neither parallel nor perpendicular to the plane of the horizon, are called *inclining* or *reclining dials*, according as their planes

make acute or obtuse angles with the horizon; and if their planes are also turned aside from facing the fourth or north, they are called *declining-inclining* or *declining-reclining dials*.

The intersection of the plane of the dial, with that of the meridian, passing through the stile, is called the *meridian of the dial*, or the *hour-line of XII*.

Those meridians, whose planes pass through the stile, and make angles of 15, 30, 45, 60, 75, and 90 degrees with the meridian of the place (which marks the hour-line of XII.) are called *hour-circles*; and their intersections with the plane of the dial are called *hour-lines*.

In all declining dials, the substile makes an angle with the hour-line of XII; and this angle is called the *distance of the substile from the meridian*.

The declining plane's difference of longitude, is the angle formed at the intersection of the stile and plane of the dial, by two meridians; one of which passes thro' the hour-line of XII, and the other through the substile.

Thus much being premised concerning dials in general, we shall now proceed to explain the different methods of their construction.

If the whole earth *aPp*, were transparent, and hollow, like a sphere of glass, and had its equator divided into 24 equal parts by so many meridian *fig. 1.* The universal principle on which depends.

femicles, *a, b, c, d, e, f, g*, &c. one of which is the geographical meridian of any given place, as London (which is supposed to be at the point *a*); and if the hours of XII were marked at the equator, both upon that meridian and the opposite one, and all the rest of the hours in order on the rest of the meridians, those meridians would be the hour-circles of London: then, if the sphere had an opake axis, as *PEp*, terminating in the poles *P* and *p*, the shadow of the axis would fall upon every particular meridian and hour, when the sun came to the plane of the opposite meridian, and would consequently shew the time at London, and at all other places on the meridian of London.

If this sphere was cut through the middle by a solid plane *ABCD*, in the rational horizon of London, one half of the axis *EP* would be above the plane, and the other half below it; and if straight lines were drawn from the centre of the plane, to those points where its circumference is cut by the hour-circles of the sphere, those lines would be the hour-lines of a horizontal dial for London: for the shadow of the axis would fall upon each particular hour-line of the dial, when it fell upon the like hour-circle of the sphere.

If the plane which cuts the sphere be upright, as *Fig. 2.* *AFCG*, touching the given place (London) at *F*, and directly facing the meridian of London, it will then become the plane of an erect direct south-dial: and if right lines be drawn from its centre *E*, to those points of its circumference where the hour-circles of the sphere cut it, these will be the hour-lines of a vertical or direct south-dial for London, to which the hours are to be set as in the figure (contrary to those on a horizontal dial), and the lower half *Ep* of the axis will cast a shadow on the hour of the day in this dial, at the same time that it would fall upon the like hour-circle of the sphere, if the dial plane was not in the way.

If the plane (still facing the meridian) be made to incline, or recline, any given number of degrees, the

Dial.

Inclining,
reclining,
and declin-
ing, dials.

hour-circles of the sphere will fill cut the edge of the plane in those points to which the hour-lines must be drawn straight from the centre; and the axis of the sphere will cast a shadow on these lines at the respective hours. The like will still hold, if the plane be made to decline by any given number of degrees from the meridian toward the east or west: provided the declination be less than 90 degrees, or the reclination be less than the co-latitude of the place: and the axis of the sphere will be a gnomon, or stile, for the dial. But it cannot be a gnomon, when the declination is quite 90 degrees, nor when the reclination is equal to the co-latitude; because, in these two cases, the axis has no elevation above the plane of the dial.

And thus it appears, that the plane of every dial represents the plane of some great circle upon the earth; and the gnomon of the earth's axis, whether it be a small wire as in the above figures, or the edge of a thin plate, as in the common horizontal dials.

The whole earth, as to its bulk, is but a point, if compared to its distance from the sun: and therefore, if a small sphere of glass be placed upon any part of the earth's surface, so that its axis be parallel to the axis of the earth, and the sphere have such lines upon it, and such planes within it, as above described; it will shew the hours of the day as truly as if it were placed at the earth's centre, and the shell of the earth were as transparent as glass.

But because it is impossible to have a hollow sphere of glass perfectly true, blown round a solid plane; or if it was, we could not get at the plane within the glass to set it in any given position; we make use of a wire-sphere to explain the principles of dialing, by joining 24 semi-circles together at the poles, and putting a thin flat plate of brass within it.

Fig. 1. a.

Dialing by
the com-
mon ter-
restrial globe.

A common globe of 12 inches diameter, has generally 24 meridian femicircles drawn upon it. If such a globe be elevated to the latitude of any given place, and turned about until one of these meridians cut the horizon in the north point, where the hour of XII is supposed to be marked, the rest of the meridians will cut the horizon at the respective distances of all the other hours from XII. Then if these points of distance be marked on the horizon, and the globe be taken out of the horizon, and a flat board or plate be put into its place, even with the surface of the horizon; and if straight lines be drawn from the centre of the board, to those points of distance on the horizon which were cut by the 24 meridian femicircles; these lines will be the hour-lines of a horizontal dial for that latitude, the edge of whose gnomon must be in the very same situation that the axis of the globe was, before it was taken out of the horizon: that is, the gnomon must make an angle with the plain of the dial, equal to the latitude of the place for which the dial is made.

If the pole of the globe be elevated to the co-latitude of the given place, and any meridian be brought to the north point of the horizon, the rest of the meridians will cut the horizon in the respective distances of all the hours from XII, for a direct south dial, whose gnomon must be an angle with the plane of the dial, equal to the co-latitude of the place; and the hours must be set the contrary way on this dial to what they are on the horizontal.

But if your globe have more than 24 meridian femi-

circles upon it, you must take the following method for making *horizontal and south dials*.

Elevate the pole to the latitude of your place, and turn the globe until any particular meridian (suppose the first) comes to the north point of the horizon, and the opposite meridian will cut the horizon in the south. Then, set the hour-index to the uppermost XII on its circle; which done, turn the globe westward until 15 degrees of the equator pass under the brazen meridian, and then the hour-index will be at I (for the sun moves 15 degrees every hour), and the first meridian will cut the horizon in the number of degrees from the north point, that I is distant from XII. Turn on, until other 15 degrees of the equator pass under the brazen meridian, and the hour-index will then be at II, and the first meridian will cut the horizon in the number of degrees that II is distant from XII: and so, by making 15 degrees of the equator pass under the brazen meridian for every hour, the first meridian of the globe will cut the horizon in the distances of all the hours from XII to VI, which is just 90 degrees; and then you need go no farther, for the distances of XI, X, IX, VIII, VII, and VI, in the forenoon, are the same from XII, as the distances of I, II, III, IV, V, and VI, in the afternoon: and these hour-lines continued through the centre, will give the opposite hour lines on the other half of the dial.

Thus, to make a horizontal dial for the latitude of London, which is $51\frac{1}{2}$ degrees north, elevate the north pole of the globe $51\frac{1}{2}$ degrees above the north point of the horizon; and then turn the globe, until the first meridian (which is that of London on the English terrestrial globe) cuts the north point of the horizon, and set the hour-index to XII at noon.

Then turning the globe westward until the index points successively to I, II, III, IV, V, and VI, in the afternoon, or until 15, 30, 45, 60, 75, and 90 degrees of the equator pass under the brazen meridian, you will find that the first meridian of the globe cuts the horizon in the following numbers of degrees from the north towards the east, *viz.* $11\frac{1}{2}$, $24\frac{1}{2}$, $38\frac{1}{2}$, $53\frac{1}{2}$, $71\frac{1}{2}$, and 90; which are the respective distances of the above hours from XII upon the plane of the horizon.

To transfer these, and the rest of the hours, to a Plate horizontal plane, draw the parallel right lines *a c* and *d b*, upon that plane, as far from each other as is equal to the intended thickness of the gnomon or stile of the dial, and the space included between them will be the meridian or twelve o'clock line on the dial. Cross this meridian at right angles with the six o'clock line *g h*, and setting one foot of your compasses in the intersection *a*, as a centre, describe the quadrant *g e* with any convenient radius or opening of the compasses; then, setting one foot in the intersection *b*, as a centre, with the same radius describe the quadrant *f h*, and divide each quadrant into 90 equal parts or degrees, as in the figure.

Because the hour-lines are less distant from each other about noon, than in any other part of the dial, it is best to have the centres of these quadrants at a little distance from the centre of the dial-plane, on the side opposite to XII, in order to enlarge the hour-distances thereabouts, under the same angles on the plane. Thus, the centre of the plane is at *C*, but the centres of the quadrants are at *a* and *b*.

Dial.

To con-
struct a ho-
rizontal
dial.LXXXIX.
fig. 3.

Dial.	D I A	[244I]	D I A	Dial.
Plate LXXXIX.	<p>Lay a ruler over the point <i>b</i> (and keeping it there for the centre of all the afternoon hours in the quadrant <i>f b</i>) draw the hour-line of I through $11\frac{1}{2}$ degrees in the quadrant; the hour-line of II, through $24\frac{1}{2}$ degrees; of III, through $38\frac{1}{2}$ degrees; IIII, through $53\frac{1}{2}$; and V, through $71\frac{1}{2}$; and because the sun rises about four in the morning, on the longest days at London, continue the hour-lines of IV and V in the afternoon through the centre <i>b</i> to the opposite side of the dial.— This done, lay the ruler to the centre <i>a</i> of the quadrant <i>e g</i>; and through the like divisions or degrees of that quadrant, viz. $11\frac{1}{2}$, $24\frac{1}{2}$, $38\frac{1}{2}$, $53\frac{1}{2}$, and $71\frac{1}{2}$, draw the forenoon hour-lines of XI, X, IX, VIII, and VII; and because the sun sets not before eight in the evening on the longest days, continue the hour-lines of VII and VIII in the forenoon, through the centre <i>a</i>, to VII and VIII in the afternoon; and all the hour-lines will be finished on this dial; to which the hours may be set, as in the figure.</p> <p>Lastly, through $51\frac{1}{2}$ degrees of either quadrant, and from its centre, draw the right line <i>a g</i> for the hypotenuse or axis of the gnomon <i>a g i</i>; and from <i>g</i>, let fall the perpendicular <i>g i</i>, upon the meridian line <i>a i</i>, and there will be a triangle made, whose sides are <i>a g</i>, <i>g i</i>, and <i>i a</i>. If a plate similar to this triangle be made as thick as the distance between the lines <i>a c</i> and <i>b d</i>, and set upright between them, touching at <i>a</i> and <i>b</i>, its hypotenuse <i>a g</i> will be parallel to the axis of the world, when the dial is truly set; and will cast a shadow on the hour of the day.</p> <p>N.B. The trouble of dividing the two quadrants may be saved, if you have a scale with a line of chords upon it, such as that on the top of Plate XC.: for if you extend the compasses from 0 to 60 degrees of the line of chords, and with that extent, as a radius, describe the two quadrants upon their respective centres, the above distances may be taken with the compasses upon the line, and set off upon the quadrants.</p> <p>To make an erect direct south dial. Elevate the pole to the co-latitude of your place, and proceed in all respects as above taught for the horizontal dial, from VI in the morning to VI in the afternoon; only the hours must be reversed, as in the figure; and the hypotenuse <i>a g</i> of the gnomon <i>a g f</i>, must make an angle with the dial-plane equal to the co-latitude of the place. As the sun can shine no longer on this dial than from six in the morning until six in the evening, there is no occasion for having any more than 12 hours upon it.</p> <p>To make an erect dial, declining from the south towards the east or west. Elevate the pole to the latitude of your place, and screw the quadrant of altitude to the zenith. Then, if your dial declines towards the east, (which we shall suppose it to do at present), count in the horizon the degrees of declination, from the east point towards the north, and bring the lower end of the quadrant to that degree of declination at which the reckoning ends. This done, bring any particular meridian of your globe (as suppose the first meridian) directly under the graduated edge of the upper part of the brazen meridian, and set the hour to XII at noon. Then, keeping the quadrant of altitude at the degree of declination in the horizon, turn the globe eastward on its axis, and observe the degrees cut by the first meridian in the quadrant of altitude (counted from the zenith) as the hour-index comes to XI, X, IX, &c. in the forenoon, or as 15, 30, 45, &c. degrees of the equator pass under the brazen meridian at these hours respectively; and the degrees then cut in the quadrant by the first meridian, are the respective distances of the forenoon hours from XII on the plane of the dial.— Then, for the afternoon hours, turn the quadrant of altitude round the zenith until it comes to the degree in the horizon opposite to that where it was placed before; namely, as far from the west point of the horizon towards the south, as it was set at first from the east point towards the north; and turn the globe westward on its axis, until the first meridian comes to the brazen meridian again, and the hour-index to XII: then, continue to turn the globe westward, and as the index points to the afternoon hours I, II, III, &c. or as 15, 30, 45, &c. degrees of the equator pass under the brazen meridian, the first meridian will cut the quadrant of altitude in the respective number of degrees from the zenith that each of these hours is from XII on the dial.— And note, that when the first meridian goes off the quadrant at the horizon in the forenoon, the hour-index shews the time when the sun will come upon this dial; and when it goes off the quadrant in the afternoon, the index will point to the time when the sun goes off the dial.</p> <p>Having thus found all the hour-distances from XII, lay them down upon your dial-plane, either by dividing a semicircle into two quadrants of 90 degrees each (beginning at the hour-line of XII), or by the line of chords, as above directed.</p> <p>In all declining dials, the line on which the stile or gnomon stands (commonly called the <i>subfile-line</i>) makes an angle with the twelve o'clock line, and falls among the forenoon hour-lines, if the dial declines towards the east; and among the afternoon hour-lines, when the dial declines towards the west; that is, to the left hand from the twelve o'clock line in the former case, and to the right hand from it in the latter.</p> <p>To find the distance of the subfile from the twelve o'clock line; if your dial declines from the south toward the east, count the degrees of that declination in the horizon from the east point toward the north; and bring the lower end of the quadrant of altitude to that degree of declination where the reckoning ends: then, turn the globe until the first meridian cuts the horizon in the like number of degrees, counted from the south point toward the east; and the quadrant and first meridian will then cross one another at right angles; and the number of degrees of the quadrant, which are intercepted between the first meridian and the zenith, is equal to the distance of the subfile line from the twelve o'clock line; and the number of degrees of the first meridian, which are intercepted between the quadrant and the north pole, is equal to the elevation of the stile above the plane of the dial.</p> <p>If the dial declines westward from the south, count that declination from the east point of the horizon towards the south, and bring the quadrant of altitude to the degree in the horizon at which the reckoning ends; both for finding the forenoon hours, and distance of the subfile from the meridian: and for the afternoon hours, bring the quadrant to the opposite degree in the horizon, namely, as far from the west towards the north, and then proceed in all respects as above.</p>			Plate LXXXIX.
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Fig. 100.				
Plate LXXXIX.				

Thus,

Dial.
Plate
LXXXIX.

Thus, we have finished our declining dial; and in fo doing, we made four dials, *viz.*

1. A north dial, declining eastward by the same number of degrees. 2. A north dial, declining the same number west. 3. A fourth dial, declining east. And, 4. A fourth dial declining west. Only, placing the proper number of hours, and the stile or gnomon respectively, upon each plane. For (as above-mentioned) in the fourth-west plane, the sub-tilar line falls among the afternoon hours; and in the fourth-east, of the same declination, among the forenoon hours, at equal distances from XII. And so all the morning hours on the west decliner will be like the afternoon hours on the east decliner: the fourth-east decliner will produce the north-west decliner; and the fourth-west decliner, the north-east decliner, by only extending the hour-lines, stile and sub-tile, quite through the centre: the axis of the stile (or edge that casts the shadow on the hour of the day) being in all dials whatever parallel to the axis of the world, and consequently pointing towards the north pole of the heaven in north latitudes, and toward the south pole in south latitudes.

An easy
method
for con-
structing of
dials.

But because every one who would like to make a dial, may perhaps not be provided with a globe to assist him, and may probably not understand the method of doing it by logarithmic calculation; we shall shew how to perform it by the plain dialing lines, or scale of latitudes and hours; such as those on the top of Plate XC. and which may be had on scales commonly sold by the mathematical instrument makers.

This is the easiest of all mechanical methods, and by much the best, when the lines are truly divided: and not only the half hours and quarters may be laid down by all of them, but every fifth minute by most, and every single minute by those where the line of hours is a foot in length.

Fig 5.

Having drawn your double meridian line *a b, c d*, on the plane intended for a horizontal dial, and crossed it at right angles by the fix o'clock line *f e* (as in fig. 3.) take the latitude of your place with the compasses, in the scale of latitudes, and set that extent from *c* to *e*, and from *a* to *f*, on the fix o'clock line: then, taking the whole six hours between the points of the compasses in the scale of hours, with that extent set one foot in the point *e*, and let the other foot fall where it will upon the meridian line *c d*, as at *d*. Do the same from *f* to *b*, and draw the right lines *e d* and *f b*, each of which will be equal in length to the whole scale of hours. This done, setting one foot of the compasses in the beginning of the scale at XII, and extending the other to each hour on the scale, lay off these extents from *d* to *e* for the afternoon hours, and from *b* to *f* for those of the forenoon: this will divide the lines *d e* and *b f* in the same manner as the hour-scale is divided at 1, 2, 3, 4, and 6; on which the quarters may also be laid down, if required. Then, laying a ruler on the point *e*, draw the first five hours in the afternoon, from that point, through the dots at the numeral figures 1, 2, 3, 4, 5, on the line *d e*; and continue the lines of IIII and V through the centre *c* to the other side of the dial, for the like hours of the morning: which done, lay the ruler on the point *a*, and draw the last five hours in the forenoon through the dots 5, 4, 3, 2, 1, on the line *f b*; continuing the hour-lines of VII and VIII through the centre *a* to the o-

ther side of the dial, for the like hours of the evening; and set the hours to their respective lines, as in the figure. Lastly, make the gnomon the same way as taught above for the horizontal dial, and the whole will be finished.

To make an erect fourth-dial, take the co-latitude of your place from the scale of latitudes, and then proceed in all respects for the hour-lines, as in the horizontal dial; only reverting the hours, as in fig. 4. and making the angle of the stile's height equal to the co-latitude.

But, lest the young dialist should have neither globe nor wooden scale, we shall now shew him how he may make a dial without any of these helps. Only, if he has not a line of chords, he must divide a quadrant into 90 equal parts or degrees for taking the proper angle of the stile's elevation; which is easily done.

With any opening of the compasses, as *Z L*, describe the two semicircles *L F k* and *L Q k*, upon the centres *Z* and *L*, where the fix o'clock line crosses the double meridian line, and divide each semicircle into 12 equal parts, beginning at *L*, (though, strictly speaking, only the quadrants from *L* to the fix o'clock line need be divided;) then connect the divisions which are equidistant from *L*, by the parallel lines *K M, I N, H O, G P*, and *F Q*. Draw *V Z* for the hypothenuse of the stile, making the angle *V Z E* equal to the latitude of your place; and continue the line *V Z* to *R*. Draw the line *R r* parallel to the fix o'clock line, and set off the distance *a K* from *Z* to *T*, the distance *b I* from *Z* to *X*, *c H* from *Z* to *W*, *d G* from *Z* to *T*, and *e F* from *Z* to *S*. Then draw the lines *S r, T t, W w, X x*, and *Y y*, each parallel to *R r*. Set off the distance *y T* from *a* to 11, and from *f* to 1; the distance *x X* from *b* to 10, and from *g* to 2; *w W* from *c* to 9, and from *h* to 3; *t T* from *d* to 8, and from *i* to 4; *s S* from *e* to 7, and from *n* to 5. Then laying a ruler to the centre *Z*, draw the forenoon hour-lines through the points 11, 10, 9, 8, 7; and laying it to the centre *z*, draw the afternoon lines through the points 1, 2, 3, 4, 5; continuing the forenoon lines of VII and VIII through the centre *Z*, to the opposite side of the dial, for the like afternoon hours; and the afternoon lines IIII and V through the centre *z*, to the opposite side, for the like morning hours. Set the hours to these lines as in the figure, and then erect the stile or gnomon, and the horizontal dial will be finished.

Horizontal
dial.

To construct a fourth dial, draw the line *V Z*, making an angle with the meridian *Z L* equal to the co-latitude of your place; and proceed in all respects as in the above horizontal dial for the same latitude, reverting the hours as in fig. 4. and making the elevation of the gnomon equal to the co-latitude.

Perhaps it may not be unacceptable to explain the method of constructing the dialing lines, and some others; which is as follows.

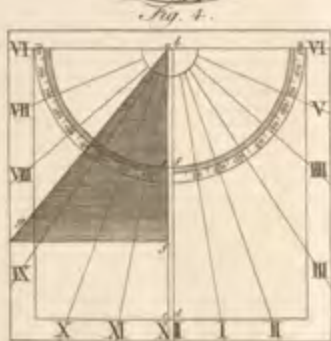
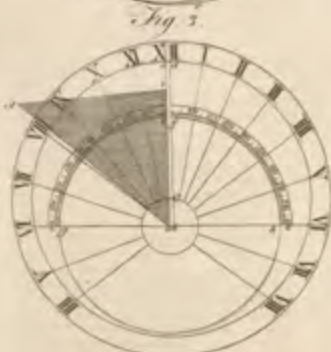
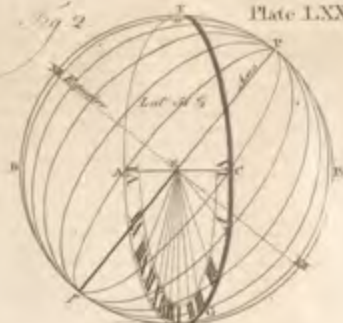
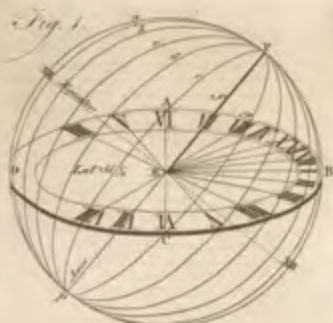
With any opening of the compasses, as *E A*, according to the intended length of the scale, describe the circle *A D C B*, and cross it at right angles by the diameters *C E A* and *D E B*. Divide the quadrant *A B* first into 9 equal parts, and then each part into 10; so shall the quadrant be divided into 90 equal parts or degrees. Draw the right line *A F B* for the chord of this quadrant; and setting one foot of the compasses in the point *A*, extend the other to the several divisions of the quadrant, and transfer these

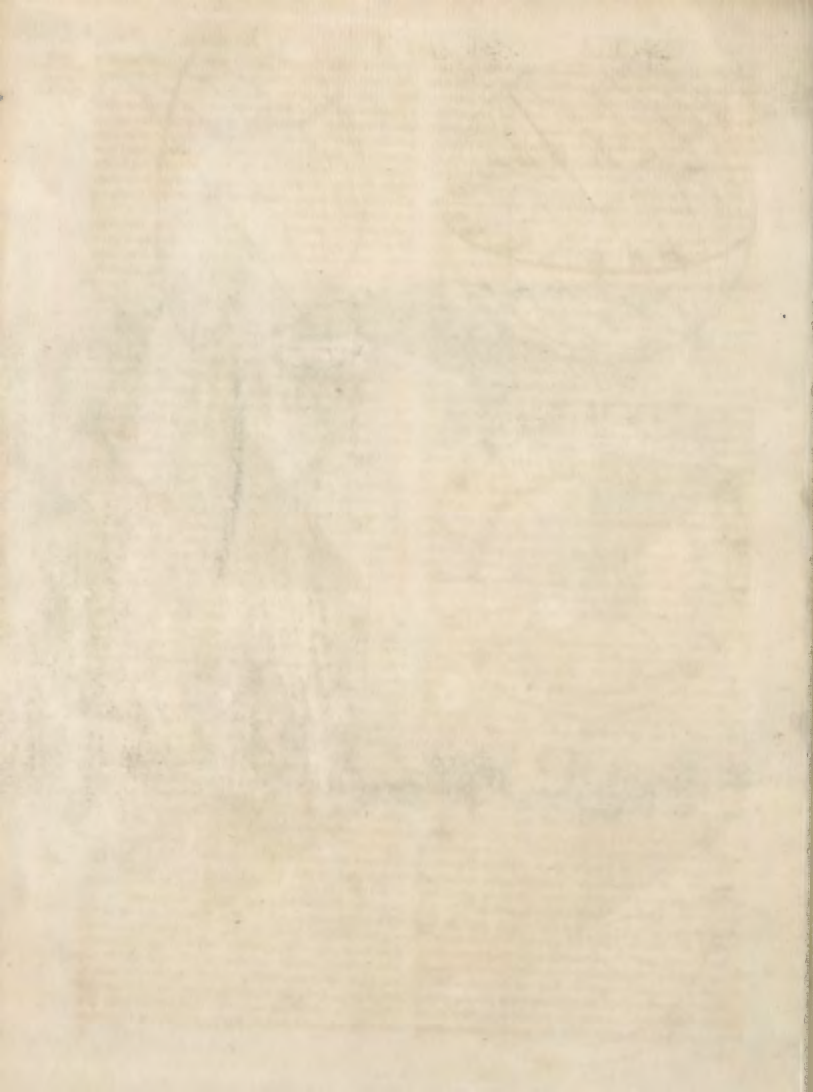
Dial.
Plate
LXXXIX.

Fig. 6.

Dialing
how
constructed.

Plate XC.





Dial.
Plate XC.

these divisions to the line AFB by the arcs 10, 10, 20, 20, &c. and this will be a line of chords, divided into 90 unequal parts; which, if transferred from the line back again to the quadrant, will divide it equally. It is plain by the figure, that the distance from A to 60 in the line of chords, is just equal to AB , the radius of the circle from which that line is made; for if the arc 60, 60 be continued, of which A is the centre, it goes exactly through the centre E of the arc AB .

And therefore, in laying down any number of degrees on a circle, by the line of chords, you must first open the compasses so, as to take in just 60 degrees upon that line, as from A to 60: and then, with that extent, as a radius, describe a circle, which will be exactly of the same size with that from which the line was divided: which done, let one foot of the compasses in the beginning of the chord line, as at A , and extend the other to the number of degrees you want upon the line; which extent, applied to the circle, will include the like number of degrees upon it.

Divide the quadrant CD into 90 equal parts, and from each point of division draw right lines, as $i, k, l, \&c.$ to the line CE ; all perpendicular to that line, and parallel to DE , which will divide EC into a line of lines; and although these are seldom put among the dialing lines on a scale, yet they assist in drawing the line of latitudes. For if a ruler be laid upon the point D , and over each division in the line of lines, it will divide the quadrant CB into 90 unequal parts, as $Ba, Bb, \&c.$ shewn by the right lines $10a, 20b, 30c, \&c.$ drawn along the edge of the ruler. If the right line BC be drawn, subtending this quadrant, and the nearest distances $Ba, Bb, Bc, \&c.$ be taken in the compasses from B , and set upon this line in the same manner as directed for the line of chords, it will make a line of latitudes BG , equal in length to the line of chords AB , and of an equal number of divisions, but very unequal as to their lengths.

Draw the right line DGA , subtending the quadrant DA ; and parallel to it, draw the right line rs , touching the quadrant DA at the numeral figure 3. Divide this quadrant into six equal parts, as 1, 2, 3, &c. and through these points of division draw right lines from the centre E to the line rs , which will divide it at the points where the six hours are to be placed, as in the figure. If every sixth part of the quadrant be subdivided into four equal parts, right lines drawn from the centre through these points of division, and continued to the line rs , will divide each hour upon it into quarters.

In Fig. 2. we have the representation of a portable dial, which may be easily drawn on a card, and carried in a pocket-book. The lines ad, ab , and bc of the gnomon, must be cut quite through the card; and as the ab of the gnomon is raised occasionally above the plane of the dial, it turns upon the uncut line cd as on a hinge. The dotted line AB must be slit quite through the card, and the thread C must be put through the slit, and have a knot tied behind, to keep it from being easily drawn out. On the other end of this thread is a small plummet D , and on the middle of it a small bead for shewing the hour of the day.

To rectify this dial, set the thread in the slit right against the day of the month, and stretch the thread from the day of the month over the angular point where

the curve-lines meet at XII; then shift the bead to that point on the thread, and the dial will be rectified.

To find the hour of the day, raise the gnomon (no matter how much or how little) and hold the edge of the dial next the gnomon towards the sun, so as the uppermost edge of the shadow of the gnomon may just cover the *shadow-line*; and the bead then playing freely on the face of the dial, by the weight of the plummet, will shew the time of the day among the hour-lines, as it is forenoon or afternoon.

To find the time of sun-rising and setting, move the thread among the hour-lines, until it either covers some one of them, or lies parallel betwixt any two; and then it will cut the time of sun-rising among the forenoon hours, and of sun-setting among the afternoon hours, for that day of the year to which the thread is set in the scale of months.

To find the sun's declination, stretch the thread from the day of the month over the angular point at XII, and it will cut the sun's declination, as it is north or south, for that day, in the proper scale.

To find on what days the sun enters the signs: when the bead, as above rectified, moves along any of the curve-lines which have the signs of the zodiac marked upon them, the sun enters those signs on the days pointed out by the thread in the scale of months.

The construction of this dial is very easy, especially if the reader compares it all along with fig. 3. as he reads the following explanation of that figure.

Draw the occult line AB parallel to the top of Fig. 3. the card, and cross it at right angles with the fix o'clock line ECD ; then upon C , as a centre, with the radius CA , describe the semicircle AEL , and divide it into 12 equal parts (beginning at A), as $Ar, As, \&c.$ and from these points of division draw the hour-lines r, s, t, u, v, E, w , and x , all parallel to the fix o'clock line EC . If each part of the semicircle be subdivided into four equal parts, they will give the half-hour lines and quarters, as in fig. 2. Draw the right-line ASD , making the angle SAB equal to the latitude of your place. Upon the centre A describe the arch RST , and set off upon it the arcs SR and ST , each equal to $23\frac{1}{2}$ degrees, for the sun's greatest declination; and divide them into $23\frac{1}{2}$ equal parts, as in fig. 2. Through the intersection D of the lines ECD and ASD , draw the right line FDG at right angles to AD . Lay a ruler to the points A and R , and draw the line ARF through $23\frac{1}{2}$ degrees of south declination in the arc SR ; and then laying the ruler to the points A and T , draw the line ATG through $23\frac{1}{2}$ degrees of north declination in the arc ST : so shall the lines ARF and ATG cut the line FDG in the proper length for the scale of months. Upon the centre D , with the radius DF , describe the semicircle FpG ; which divide into six equal parts, $Fm, mn, no, \&c.$ and from these points of division draw the right lines mb, nt, pk , and ql , each parallel to oD . Then setting one foot of the compasses in the point F , extend the other to A , and describe the arc AZH for the tropic of φ : with the same extent, setting one foot in G , describe the arc AEO for the tropic of \varnothing . Next setting one foot in the point h , and extending the other to A , describe the arc ACI for the beginnings of the signs ♈ and ♊ ; and with the same extent, setting one foot in the point

Dial.
Plate XC.

Dial. *l*, describe the arc *AN* for the beginnings of the signs **II** and **Q**. Set one foot in the point *i*, and having extended the other to *A*, describe the arc *AK* for the beginnings of the signs **X** and **M**; and with the same extent, set one foot in *k*, and describe the arc *AM* for the beginnings of the signs **Y** and **W**. Then setting one foot in the point *D*, and extending the other to *A*, describe the curve *AL* for the beginnings of φ and \ominus ; and the signs will be finished. This done, lay a ruler from the point *A* over the sun's declination in the arch *RST*; and where the ruler cuts the line *PDG*, make marks; and place the days of the months right against these marks, in the manner shewn by fig. 2. Lastly, draw the shadow-line *PQ* parallel to the occult line *AB*; make the gnomon, and set the hours to their respective lines, as in fig. 2. and the dial will be finished.

An universal dial. There are several kinds of dials, which are called *universal*, because they serve for all latitudes. Of these, the best is Mr Pardie's, which consists of three principal parts; the first whereof is called the horizontal plane (*A*), because in practice it must be parallel to the horizon. In this plane is fixed an upright pin, which enters into the edge of the second part *BD*, called the meridional plane; which is made of two pieces, the lowest whereof (*B*) is called the *quadrant*, because it contains a quarter of a circle, divided into 90 degrees; and it is only into this part, near *B*, that the pin enters. The other piece is a semicircle (*D*) adjusted to the quadrant, and turning in it by a groove, for raising or depressing the diameter (*EF*) of the semicircle, which diameter is called the *axis of the instrument*. The third piece is a circle (*G*), divided on both sides into 24 equal parts, which are the hours. This circle is put upon the meridional plane so, that the axis (*EF*) may be perpendicular to the circle, and the point *C* be the common centre of the circle, semicircle, and quadrant. The straight edge of the semicircle is chamfered on both sides to a sharp edge, which passes through the centre of the circle. On one side of the chamfered part, the first six months of the year are laid down, according to the sun's declination for their respective days, and on the other side the last six months. And against the days on which the sun enters the signs, there are straight lines drawn upon the semicircle, with the characters of the signs marked upon them. There is a black line drawn along the middle of the upright edge of the quadrant, over which hangs a thread (*H*), with its plummet (*I*), for levelling the instrument. *N. B.* From the twenty-third of September to the twentieth of March, the upper surface of the circle must touch both the centre *C* of the semicircle, and the line of φ and \ominus ; and from the twentieth of March to the twenty-third of September, the lower surface of the circle must touch that centre and line.

To find the time of the day by this dial. Having set it on a level place in sun-shine, and adjusted it by the levelling screws *k* and *l*, until the plumb-line hangs over the black line upon the edge of the quadrant, and parallel to the said edge; move the semicircle in the quadrant, until the line of φ and \ominus (where the circle touches) comes to the latitude of your place in the quadrant: then turn the whole meridional plane *BD*, with its circle *G*, upon the horizontal plane *A*, until

the edge of the shadow of the circle falls precisely on the day of the month in the semicircle; and then the meridional plane will be due north and south, the axis *EF* will be parallel to the axis of the world, and will cast a shadow upon the true time of the day, among the hours on the circle.

N. B. As, when the instrument is thus rectified, the quadrant and semicircle are in the plane of the meridian, so the circle is then in the plane of the equinoctial. Therefore, as the sun is above the equinoctial in summer (in northern latitudes), and below it in winter; the axis of the semicircle will cast a shadow on the hour of the day, on the upper surface of the circle, from the 20th of March to the 23d of September: and from the 23d of September to the 20th of March the hour of the day will be determined by the shadow of the semicircle, upon the lower surface of the circle. In the former case, the shadow of the circle falls upon the day of the month, on the lower part of the diameter of the semicircle; and in the latter case, on the upper part.

The method of laying down the months and signs Fig. 5. upon the semicircle is as follows. Draw the right-line *ACB*, equal to the diameter of the semicircle *ADB*, and cross it in the middle at right angles with the line *ECD*, equal in length to *ADB*; then *EC* will be the radius of the circle *FCG*, which is the same as that of the semicircle. Upon *E*, as a centre, describe the circle *FCG*, on which set off the arcs *Ch* and *Gi*, each equal to 23½ degrees, and divide them accordingly into that number, for the sun's declination. Then laying the edge of a ruler over the centre *E*, and also over the sun's declination for every fifth day of each month (as in the card-dial) mark the points on the diameter *AB* of the semicircle from *a* to *g*, which are cut by the ruler; and there place the days of the months accordingly, answering to the sun's declination. This done, setting one foot of the compasses in *C*, and extending the other to *a* or *g*, describe the semicircle *abcdegf*; which divide into six equal parts, and through the points of division draw right lines, parallel to *CD*, for the beginning of the lines (of which one half are on one side of the semicircle, and the other half on the other), and set the characters of the signs to their proper lines, as in the figure.

Having shewn how to make sun dials by the assistance of a good globe, or of a dialing scale, we shall now proceed to the method of constructing dials arithmetically; which will be more agreeable to those who have learned the elements of trigonometry, because globes and scales can never be so accurate as the logarithms in finding the angular distances of the hours. Yet, as a globe may be found exact enough for some other requisites in dialing, we shall take it in occasionally.

The construction of sun-dials on all planes whatever, may be included in one general rule: intelligible, if that of a horizontal dial for any given latitude be well understood. For there is no plane, however obliquely situated with respect to any given place, but what is parallel to the horizon of some other place; and therefore, if we can find that other place by a problem on the terrestrial globe, or by a trigonometrical calculation, and construct a horizontal dial for it; that dial applied to the plane where it is to serve, will be a true dial for that place.—Thus, an erect direct south dial in

$51\frac{1}{2}$ degrees north-latitude, would be a horizontal dial on the same meridian, 90 degrees fouthward of $51\frac{1}{2}$ degrees north-latitude : which falls in with $38\frac{1}{2}$ degrees of south latitude. But if the upright plane declines from facing the south at the given place, it would still be a horizontal plane 90 degrees from that place, but for a different longitude, which would alter the reckoning of the hours accordingly.

C A S E I.

1. Let us suppose, that an upright plane at London declines 36 degrees westward from facing the south; and that it is required to find a place on the globe, to whose horizon the said plane is parallel; and also the difference of longitude between London and that place.

Rectify the globe to the latitude of London, and bring London to the zenith under the brafs meridian; then that point of the globe which lies in the horizon at the given degree of declination (counted westward from the fourth point of the horizon) is the place at which the abovementioned plane would be horizontal.

—Now, to find the latitude and longitude of that place, keep your eye upon the place, and turn the globe eastward, until it comes under the graduated edge of the brafs meridian : then, the degree of the brafs meridian that stands directly over the place, is its latitude; and the number of degrees in the equator, which are intercepted between the meridian of London and the brafs meridian, is the place's difference of longitude.

Thus, as the latitude of London is $51\frac{1}{2}$ degrees north, and the declination of the place is 36 degrees west; elevate the north pole $51\frac{1}{2}$ degrees above the horizon, and turn the globe until London comes to the zenith, or under the graduated edge of the meridian; then count 36 degrees on the horizon westward from the fourth point, and make a mark on that place of the globe over which the reckoning ends, and bringing the mark under the graduated edge of the brafs meridian, it will be found to be under $30\frac{1}{2}$ degrees in south latitude : keeping it there, count in the equator the number of degrees between the meridian of London and the brafs meridian (which now becomes the meridian of the required place) and you will find it to be $42\frac{1}{2}$. Therefore an upright plane at London, declining 36 degrees westward from the south, would be a horizontal plane at that place, whose latitude is $30\frac{1}{2}$ degrees south of the equator, and longitude $42\frac{1}{2}$ degrees west of the meridian of London.

Which difference of longitude being converted into time, is 2 hours 51 minutes.

The vertical dial declining westward 36 degrees at London, is therefore to be drawn in all respects as a horizontal dial for south latitude $30\frac{1}{2}$ degrees; save only, that the reckoning of the hours is to anticipate the reckoning on the horizontal dial, by 2 hours 51 minutes : for so much sooner will the sun come to the meridian of London, than to the meridian of any place whose longitude is $42\frac{1}{2}$ degrees west from London.

2. But to be more exact than the globe will shew us, we shall use a little trigonometry.

Let $NESW$ be the horizon of London, whose zenith is Z , and P the north pole of the sphere; and let Zh be the position of a vertical plane at

Z , declining westward from S (the south) by an angle of 36 degrees; on which plane an erect dial for London at Z is to be described. Make the semi-diameter ZD perpendicular to Zh ; and it will cut the horizon in D , 36 degrees west of the south S . Then a plane, in the tangent HD , touching the sphere in D , will be parallel to the plane Zh ; and the axis of the sphere will be equally inclined to both these planes.

Let WQE be the equinoctial, whose elevation above the horizon of Z (London) is $38\frac{1}{2}$ degrees; and PRD be the meridian of the place D , cutting the equinoctial in R . Then it is evident, that the arc RD is the latitude of the place D (where the plane Zh would be horizontal) and the arc RQ is the difference of longitude of the planes Zh and HD .

In the spherical triangle WDR , the arc WD is given, for it is the complement of the plane's declination from S to south; which complement is 54° (viz. $90^\circ - 36^\circ$) : the angle at R , in which the meridian of the place D cuts the equator, is a right angle; and the angle RWD measures the elevation of the equinoctial above the horizon of Z , namely, $38\frac{1}{2}$ degrees. Say therefore, As radius is to the co-sine of the plane's declination from the south, so is the co-sine of the latitude of Z to the sine of RD the latitude of D : which is of a different denomination from the latitude of Z , because Z and D are on different sides of the equator.

As radius - - - - - 10.00000

To co-sine 36° $0'$ = RQ 9.90796

So co-sine $51^\circ 30'$ = QZ 9.79415

To sine $30^\circ 14' = DR$ (9.70211) = the lat. of D , whose horizon is parallel to the vertical plane Zh at Z .

$N. B.$ When radius is made the first term, it may be omitted; and then by subtracting it mentally from the sum of the other two, the operation will be shortened. Thus, in the present case,

To the logarithmic sine of $WDR = 54^\circ 0'$ 9.90796.

Add the logarithmic sine of $RD = 38^\circ 30'$ 9.79415.

Their sum—radius - - - - - 9.70211 gives the same solution as above. And we shall keep to this method in the following part of this article.

To find the difference of longitude of the places D and Z , say, As radius is to the co-sine of $38\frac{1}{2}$ degrees, the height of the equinoctial at Z , so is the co-tangent of 36 degrees, the plane's declination, to the co-tangent of the difference of longitudes. Thus,

To the logarithmic sine of $51^\circ 30'$ 9.89354

Add the logarithmic tang. of $\dagger 54^\circ 0'$ 10.13874

Their sum—radius - - - - - 10.03228 is the nearest tangent of $47^\circ 8' = WR$; which is the co-tangent of $42^\circ 52' = RQ$, the difference of longitude sought. Which difference, being reduced to time, is two hours 51 minutes.

3. And thus having found the exact latitude and longitude of the place D , to whose horizon the vertical plane at Z is parallel, we shall proceed to the construction of a horizontal dial for the place D , whose latitude is $30^\circ 14'$ south; but anticipating the time at D by two hours 51 minutes (neglecting the $\frac{1}{2}$ min. in practice because

14 G

because

* The co-sine of 36.0 . or of RQ . \dagger The co-sine of 51.30 . or of QZ . * The co-sine of 38.30 . or of WDR .

\dagger The co-tangent of 36.0 . or of DR .

Fig. 7. Assume any right line CSL , for the subfile of the dial, and make the angle KCP equal to the latitude of the place (viz. $30^\circ 14'$.) to whose horizon the plane of the dial is parallel; then CRP will be the axis of the stile, or edge that casts the shadow on the hours of the day, in the dial. This done, draw the contingent line EQ , cutting the subfilar line at right angles in K ; and from K make KR perpendicular to the axis CRP . Then $KG (=KR)$ being made radius, that is, equal to the chord of 60° or tangent of 45° on a good sector, take $42^\circ 52'$ (the difference of longitude of the places Z and D) from the tangents, and having set it from K to M , draw CM for the hour-line of XII. Take KN , equal to the tangent of an angle less by 15 degrees than KM ; that is, the tangent of $27^\circ 52'$; and through the point N draw CN for the hour-line of I. The tangent of $12^\circ 52'$ (which is 15° less than $27^\circ 52'$), set off the same way, will give a point between K and N , through which the hour-line of II is to be drawn. The tangent of $2^\circ 8'$ (the difference between 45° and $42^\circ 52'$) placed on the other side of CL , will determine the point through which the hour-line of III is to be drawn: to which $2^\circ 8'$, if the tangent of 15° be added, it will make $17^\circ 8'$; and this set off from K towards Q on the line EQ , will give the point for the hour-line of IV: and so of the rest.—The forenoon hour-lines are drawn the same way, by the continual addition of the tangents 15° , 30° , 45° , &c. to $42^\circ 52'$ (=the tangent of KM) for the hours of XI, X, IX, &c. as far as necessary; that is, until there be five hours on each side of the subfile. The sixth hour, accounted from that hour or part of the hour on which the subfile falls, will be always in a line perpendicular to the subfile, and drawn through the centre C .

4. In all erect dials, CM , the hour-line of XII, is perpendicular to the horizon of the place for which the dial is to serve; for that line is the intersection of a vertical plane with the plane of the meridian of the place, both which are perpendicular to the plane of the horizon: and any line HO , or h_o , perpendicular to CM , will be a horizontal line on the plane of the dial, along which line the hours may be numbered; and CM being set perpendicular to the horizon, the dial will have its true position.

5. If the plane of the dial had declined by an equal angle toward the east, its description would have differed only in this, that the hour-line of XII would have fallen on the other side of the subfile CL , and the line HO would have a subcontrary position to what it has in this figure.

6. And these two dials, with the upper points of their files turned toward the north pole, will serve for other two planes parallel to them; the one declining from the north toward the east, and the other from the north toward the west, by the same quantity of angle. The like holds true of all dials in general, whatever be

their declination and obliquity of their planes to the horizon.

CASE II.

7. If the plane of the dial not only declines, but also reclines, or inclines. Suppose its declination from fronting the south S be equal to the arc SD on the horizon; Fig. 1. and its reclination be equal to the arc Dd of the vertical circle DZ : then it is plain, that if the quadrant of altitude ZdD on the globe cuts the point D in the horizon, and the reclination is counted upon the quadrant from D to d ; the intersection of the hour circle PRd , with the equinoctial WQE , will determine Rd , the latitude of the place d , whose horizon is parallel to the given plane Zh at Z ; and RQ will be the difference in longitude of the places at Z and Z .

Trigonometrically thus: let a great circle pass thro' the three points W, d, E ; and in the triangle WdD , right-angled at D , the sides WD and Dd are given; and thence the angle DWD is found, and so is the hypothenuse Wd . Again, the difference, or the sum, of DWD and DWR , the elevation of the equinoctial above the horizon of Z , gives the angle dWR ; and the hypothenuse of the triangle WRd was just now found; whence the sides Rd and WR are found, the former being the latitude of the place d , and the latter the complement of RQ , the difference of longitude sought.

Thus, if the latitude of the place Z be $52^\circ 10'$ north; the declination SD of the plane Zh (which would be horizontal at d) be 36° ; and the reclination be 15° , or equal to the arc Dd ; the south latitude of the place d , that is, the arc Rd , will be $15^\circ 9'$; and RQ , the difference of the longitude, $36^\circ 2'$. From these data, therefore, let the dial (fig. 2.) be described, as in the former example.

8. There are several other things requisite in the practice of dialing; the chief of which shall be given in the form of arithmetical rules, simple and easy to those who have learned the elements of trigonometry. For in practical arts of this kind, arithmetic should be used as far as it can go; and scales never trilled to, except in the final construction, where they are absolutely necessary in laying down the calculated hour-distances on the plane of the dial.

RULE I. To find the angles which the hour-lines on any dial make with the subfile.

To the logarithmic sine of the given latitude, or of the file's elevation above the plane of the dial, add the logarithmic tangent of the hour * distance from the meridian, or from the † subfile; and the sum minus radius will be the logarithmic tangent of the angle sought.

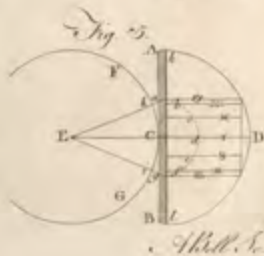
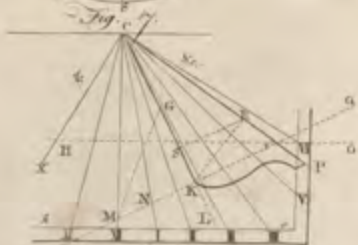
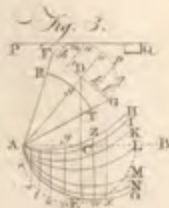
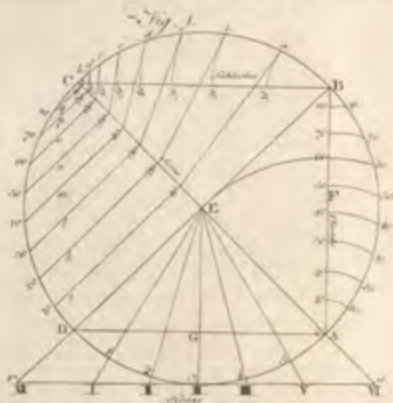
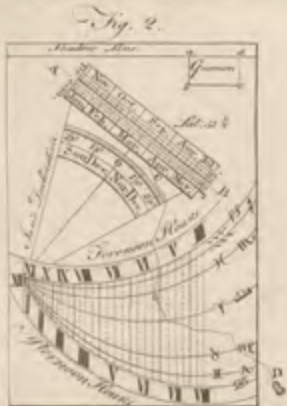
For KC is to KM in the ratio compounded of the ratio of KC to $KG (=KR)$ and of KG to KM ; which making CK the radius 10,000,000, or 10,000,000, or 10, or 1, are the ratio of 10,000,000, or of 10,000,000, or of 10, or of 1, to $KG \times KM$.

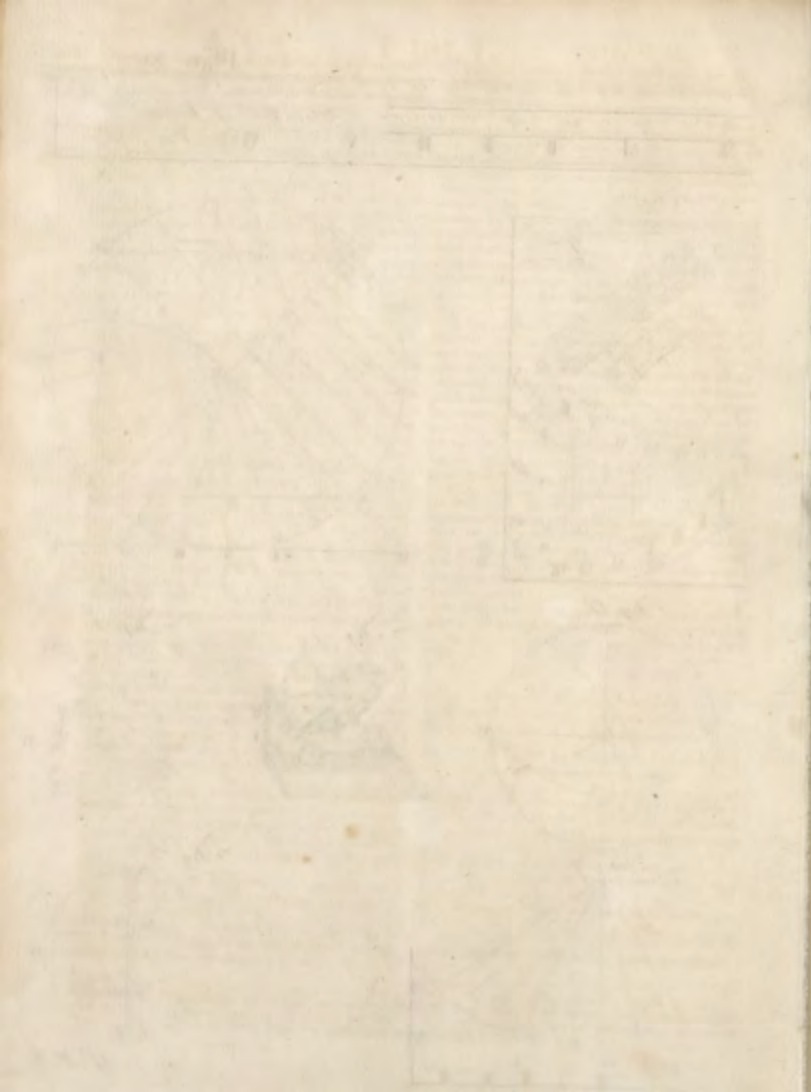
Thus, in a horizontal dial, for latitude $51^\circ 30'$, to find the angular distance of XI in the forenoon, or I the afternoon, from XII:

To

* That is, of 15, 30, 45, 60, 75°, for the hours of I, II, III, IIII, V, in the afternoon; and XI, X, IX, VIII, VII, in the forenoon.

† In all horizontal dials, and erect north or south dials, the subfile and meridian are the same: but in all declining dials, the subfile line makes an angle with the meridian.





Dial.

To the logarithmic fine of $51^{\circ} 30'$ 9.89354 $\frac{1}{2}$
 Add the logarithmic tang. of $15^{\circ} 0'$ 9.42805

Plate XC.
fig. 7.

The sum—radius is - - - 9.32159—the logarithmic tangent of $11^{\circ} 50'$, or of the angle which the hour-line of XI or I makes with the hour of XII.

And by computing in this manner, with the fine of the latitude, and the tangents of $30, 45, 60$, and 75° , for the hours of II, III, IIII, and V in the afternoon; or of X, IX, VIII, and VII in the forenoon; you will find their angular distances from XII to be $24^{\circ} 18', 38^{\circ} 4', 53^{\circ} 35'$, and $71^{\circ} 6'$; which are all that there is occasion to compute for.—And these distances may be set off from XII by a line of chords; or rather, by taking 1000 from a scale of equal parts, and setting that extent as a radius from C to XII; and then, taking 209 of the same parts (which, are the natural tangent of $11^{\circ} 50'$), and setting them from XII to XI and to I, on the line *h₀*, which is perpendicular to CXII: and so for the rest of the hour-lines, which, in the table of natural tangents, against the above distances, are 451, 782, 1355, and 2020, of such equal parts from XII, as the radius CXII contains 1000. And, lastly, set off 1257 (the natural tangent of $51^{\circ} 30'$) for the angle of the stile's height, which is equal to the latitude of the place.

RULE II. *The latitude of the place, the sun's declination, and his hour-distance from the meridian, being given, to find (1.) his altitude; (2.) his azimuth.*

Plate XCI.
fig. 1.

1. Let *d* be the sun's place, *R* his declination; and, in the triangle *PZd*, *Pd* the sum, or the difference, of *dR*, and the quadrant *PR*, being given by the supposition, as also the complement of the latitude *PZ*, and the angle *dPZ*, which measures the horary distance of *d* from the meridian; we shall (by Case 4. of Keill's oblique spheric Trigonometry) find the base *Zd*, which is the sun's distance from the zenith, or the complement of his altitude.

And (2.) As fine *Zd*: fine *Pd*: : fine *dPZ*: *dZP*, or of its supplement *DZS*, the azimuthal distance from the south.

Or the practical rule may be as follows.

Write *A* for the sign of the sun's altitude, *L* and *l* for the sine and co-sine of the latitude, *D* and *d* for the sine and co-sine of the sun's declination, and *H* for the sine of the horary distance from VI.

Then the relation of *H* to *A* will have three varieties.

1. When the declination is toward the elevated pole, and the hour of the day is between XII and VI; it is $A=LD+Hld$, and $H=\frac{A-LD}{ld}$.

2. When the hour is after VI, it is $A=LD-Hld$, and $H=\frac{LD-A}{ld}$.

3. When the declination is toward the depressed pole, we have $A=Hld-LD$, and $H=\frac{A+LD}{ld}$.

Which theorems will be found useful, and expedient.

tious enough for solving those problems in geography and dialing, which depend on the relation of the sun's altitude to the hour of the day.

Dial.

Plate XCI.
fig. 1.

EXAMPLE I.

Suppose the latitude of the place to be $51\frac{1}{2}$ degrees north: the time five hours distant from XII, that is, an hour after VI in the morning, or before VI in the evening; and the sun's declination 20° north. *Required the sun's altitude?*

Then to log. *L* = log. fin. $51^{\circ} 30'$ 1.89354*
 add log. *D* = log. fin. $20^{\circ} 0'$ 1.53405

Their sum 1.42759 gives

LD = logarithm of 0.267664, in the natural fines.

And, to log. *H* = log. fin. $+15^{\circ} 0'$ 1.41300

add $\left\{ \begin{array}{l} \log. l = \log. \sin. 38^{\circ} 0' \\ \log. d = \log. \sin. 70^{\circ} 0' \end{array} \right.$ 1.79414

1.97300

Their sum 1.18015 gives

Hld = logarithm of 0.151408, in the natural fines.

And these two numbers (0.267664 and 0.151408) make 0.419072 = *A*; which, in the table, is the nearest natural sine of $24^{\circ} 47'$, the sun's altitude sought.

The same hour-distance being assumed on the other side of VI, then *LD* — *Hld* is 0.116256, the sine of $6^{\circ} 40\frac{1}{2}'$; which is the sun's altitude at V in the morning, or VII in the evening, when his north declination is 20° .

But when the declination is 20° south (or towards the depressed pole) the difference *Hld* — *LD* becomes negative; and thereby shews, that, an hour before VI in the morning, or past VI in the evening, the sun's centre is $6^{\circ} 40\frac{1}{2}'$ below the horizon.

EXAMPLE II.

From the same data, to find the sun's azimuth.

If *H*, *L*, and *D* are given, then (by par. 2. of Rule II.) from *H* having found the altitude and its complement *Zd*; and the arc *Pd* (the distance from the pole) being given; say, As the co-sine of the altitude is to the sine of the distance from the pole, so is the sine of the hour-distance from the meridian to the sine of the azimuth distance from the meridian.

Let the latitude be $51^{\circ} 30'$ north, the declination $15^{\circ} 9'$ south, and the time II h. 24 m. in the afternoon, when the sun begins to illuminate a vertical wall, and it is required to find the position of the wall.

Then, by the foregoing theorems, the complement of the altitude will be $81^{\circ} 32\frac{1}{2}'$, and *Pd* the distance from the pole being $109^{\circ} 5'$, and the horary distance from the meridian, or the angle *dPZ*, 36° .

To log. fin. $74^{\circ} 51'$ 1.98464

Add. log. fin. $36^{\circ} 0'$ 1.76922

And from the sum 1.75386

Take the log. fin. $81^{\circ} 32\frac{1}{2}'$ 1.99525

Remains 1.75861 = log. fin.

35° , the azimuth distance sought.

14 G 2

When

† In which case, the radius *GK* is supposed to be divided into 100000 equal parts.

§ Here we consider the radius as unity, and not 10.0000, by which, instead of the index 9, we have —1, as above; which is of no farther use than making the work a little easier.

† The distance of one hour from VI.

§ The co-latitude of the place.

|| The co-declination of the sun.

Dial.

hour. When the altitude is given, find from thence the hour, and proceed as above.

Plate XCI.

This praxis is of singular use on many occasions; in finding the declination of vertical planes more exactly than in the common way, especially if the transits of the sun's centre are observed by applying a ruler with sights, either plain or telescopic, to the wall or plane whose declination is required.—In drawing a meridian line, and finding the magnetic variation.—In finding the bearings of places in terrestrial surveys; the transits of the sun over any place, or his horizontal distance from it, being observed, together with the altitude and hour.—And thence determining small differences of longitude.—In observing the variations at sea, &c.

Of the double Horizontal Dial; and the Babylonian and Italian Dials.

To the *gnomonic* projection, there is sometimes added a *stereographic* projection of the hour-circles, and the parallels of the sun's declination, on the same horizontal plane; the upright side of the gnomon being sloped into an edge, standing perpendicularly over the centre of the projection: so that the dial, being in its due position, the shadow of that perpendicular edge is a vertical circle passing thro' the sun, in the stereographic projection.

The months being duly marked on this dial, the sun's declination, and the length of the day at any time, are had by inspection (as also his altitude, by means of a scale of tangents.) But its chief property is, that it may be placed true, whenever the sun shines, without the help of any other instrument.

Fig. 1.

Let d be the sun's place in the stereographic projection, $x d y z$ the parallel of the sun's declination, $Z d$ a vertical circle through the sun's centre, $P d$ the hour-circle; and it is evident, that the diameter NS of this projection being placed duly north and south, these three circles will pass through the point d . And therefore, to give the dial its due position, we have only to turn its gnomon toward the sun, on a horizontal plane, until the hour on the common gnomonic projection coincides with that marked by the hour-circle $P d$, which passes through the intersection of the shadow $Z d$ with the circle of the sun's present declination.

The Babylonian and Italian dials reckon the hours, not from the meridian, as with us, but from the sun's rising and setting. Thus, in Italy, an hour before sun-set is reckoned the 23d hour; two hours before sun-set the 22d hour; and so of the rest. And the shadow that marks them on the hour-lines, is that of the point of a stile. This occasions a perpetual variation between their dials and clocks, which they must correct from time to time, before it arises to any sensible quantity, by setting their clocks so much faster or slower. And in Italy, they begin their day, and regulate their clocks, not from sun-set, but from about mid-twilight, when the *Ave-Maria* is said; which corrects the difference that would otherwise be between the clock and the dial.

The improvements which have been made in all sorts of instruments and machines for measuring time, have rendered such dials of little account. Yet, as the theory of them is ingenious, and they are really, in some

Dial.

respects, the best contrived of any for vulgar use, a general idea of their description may not be unacceptable.

Plate XCI.

Let fig. 3. represent an erect direct south wall, on which a Babylonian dial is to be drawn, shewing the hours from sun-rising; the latitude of the place, whose horizon is parallel to the wall, being equal to the angle KCR . Make, as for a common dial, $KG=KR$ (which is perpendicular to CR) the radius of the equinoctial EQ , and draw RS perpendicular to CK for the stile of the dial; the shadow of whose point R is to mark the hours, when SR is set upright on the plane of the dial.

Then it is evident, that, in the contingent line EQ , the spaces $K 1$, $K 2$, $K 3$, &c. being taken equal to the tangents of the hour-distances from the meridian, to the radius KG , one, two, three, &c. hours after sun-rising, on the equinoctial day; the shadow of the point R will be found, at these times, respectively in the points 1, 2, 3, &c.

Draw, for the like hours after sun-rising, when the sun is in the tropic of Capricorn $\propto V$, the like common lines CD , CE , CF , &c. and at these hours the shadow of the point R will be found in those lines respectively. Find the sun's altitudes above the plane of the dial at these hours; and with their co-tangents Sd , Se , Sf , &c. to radius SR , describe arcs intersecting the hour-lines in the points d , e , f , &c. so shall the right lines 1 d , 2 e , 3 f , &c. be the lines of I, II, III, &c. hours after sun-rising.

The construction is the same in every other case; due regard being had to the difference of longitude of the place at which the dial would be horizontal, and the place for which it is to serve; and likewise, taking care to draw no lines but what are necessary; which may be done partly by the rules already given for determining the time that the sun shines on any plane; and partly from this, that on the tropical days, the hyperbola described by the shadow of the point R limits the extent of all the hour-lines.

Of the right placing of dials, and having a true meridian line for the regulating of clocks and watches.

The plane on which the dial is to rest being duly prepared, and every thing necessary for fixing it, you may find the hour tolerably exact by a large equinoctial ring-dial, and set your watch to it. And then the dial may be fixed by the watch at your leisure.

If you would be more exact, take the sun's altitude by a good quadrant, noting the precise time of observation by a clock or watch. Then compute the time for the altitude observed; and set the watch to agree with that time, according to the sun. A Hadley's quadrant is very convenient for this purpose: for by it you may take the angle between the sun and his image reflected from a basin of water; the half of which angle, subtracting the refraction, is the altitude required. This is best done in summer; and the nearer the sun is to the prime vertical (the east or west azimuth) when the observation is made, so much the better.

Or, in summer, take two equal altitudes of the sun in the same day; one any time between 7 and 10 in the morning, the other between 2 and 5 in the afternoon; noting the moments of these two observations by

Fig. 1.

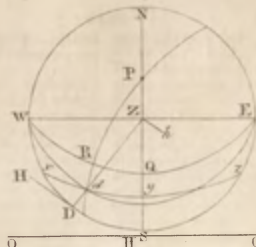


Fig. 2.

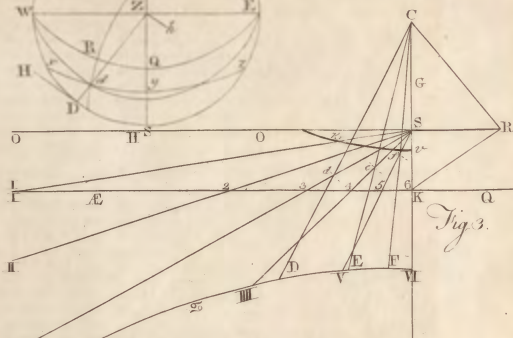
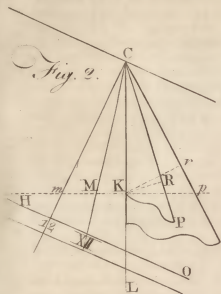
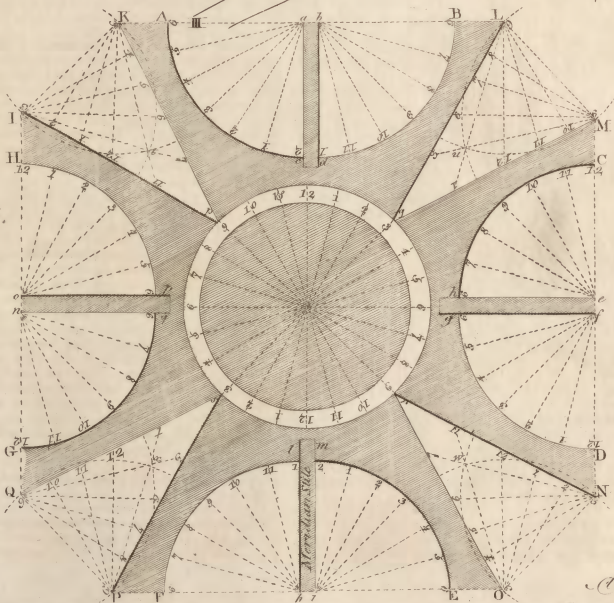
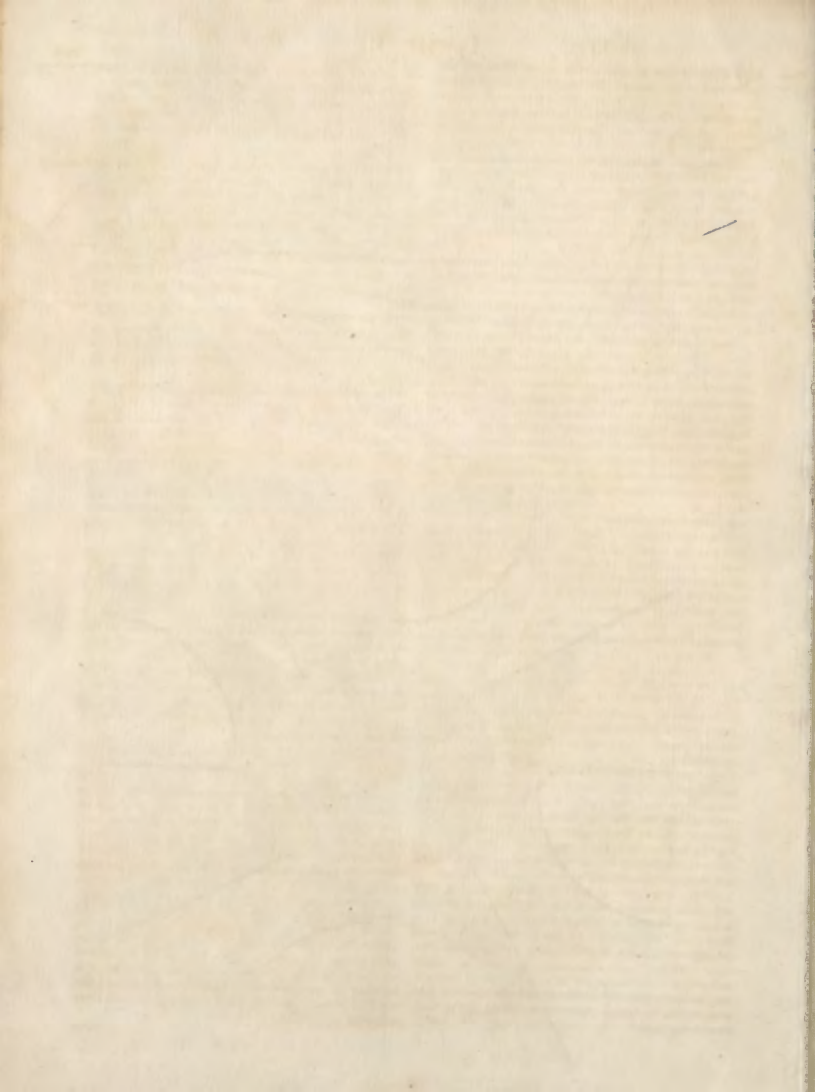


Fig. 3.

Fig. 4.





Dial.

by a clock or watch: and if the watch shews the observations to be at equal distances from noon, it agrees exactly with the sun: if not, the watch must be corrected by half the difference of the forenoon and afternoon intervals; and then the dial may be set true by the watch.

Thus, for example, suppose you had taken the sun's altitude when it was 20 minutes past VIII in the morning by the watch; and found, by observing in the afternoon, that the sun had the same altitude 10 minutes before IIII; then it is plain, that the watch was 5 minutes too fast for the sun: for 5 minutes after XII is the middle time between VIII h. 20 m. in the morning, and III. h. 50 m. in the afternoon; and therefore, to make the watch agree with the sun, it must be set back five minutes.

A good *meridian line*, for regulating clocks or watches, may be had by the following method.

Make a round hole, almost a quarter of an inch diameter, in a thin plate of metal; and fix the plate in the top of a south window, in such a manner, that it may recline from the zenith at an angle equal to the co-latitude of your place, as nearly as you can guess: for then the plate will face the sun directly at noon on the equinoctial days. Let the sun shine freely thro' the hole into the room; and hang a plumb line to the ceiling of the room, at least five or six feet from the window, in such a place as that the sun's rays, transmitted through the hole, may fall upon the line when it is noon by the clock; and having marked the said place on the ceiling, take away the line.

Having adjusted a sliding bar to a dove-tail groove, in a piece of wood about 18 inches long, and fixed a hook into the middle of the bar, nail the wood to the above-mentioned place on the ceiling, parallel to the side of the room in which the window is; the groove and bar being towards the floor. Then, hang the plumb-line upon the hook in the bar, the weight or plummet reaching almost to the floor; and the whole will be prepared for farther and proper adjustment.

This done, find the true solar time by either of the two last methods, and thereby regulate your clock. Then, at the moment of next noon by the clock, when the sun shines, move the sliding-bar in the groove, until the shadow of the plumb-line bisects the image of the sun (made by his rays transmitted thro' the hole) on the floor, wall, or on a white screen placed on the north-side of the line; the plummet or weight at the end of the line hanging freely in a pail of water placed below it on the floor.—But because this may not be quite correct for the first time, on account that the plummet will not settle immediately, even in water; it may be farther corrected on the following days, by the above method, with the sun and clock; and so brought to a very great exactness.

N. B. The rays transmitted through the hole, will cast but a faint image of the sun, even on a white screen, unless the room be so darkened that no sun-shine may be allowed to enter but what comes through the small hole in the plate. And always, for some time before the observation is made, the plummet ought to be immersed in a jar of water, where it may hang freely; by which means the line will soon become steady, which otherwise would be apt to continue swinging.

Dial.

An Universal Dial, shewing the hours of the day by a terrestrial globe, and by the shadows of several gnomons, at the same time: together with all the places of the earth which are then enlightened by the sun; and those to which the sun is then rising, or on the meridian, or setting.

This dial is made of a thick square piece of wood^{or Plate} hollow metal. The sides are cut into semicircular hollows, in which the hours are placed; the stile of each hollow coming out from the bottom thereof, as far as the ends of the hollows project. The corners are cut out into angles, in the insides of which the hours are also marked; and the edge of the end of each side of the angle serves as a stile for casting a shadow on the hours marked on the other side.

In the middle of the uppermost side, or plane, there is an equinoctial dial; in the centre whereof an upright wire is fixed, for casting a shadow on the hours of that dial, and supporting a small terrestrial globe on its top.

The whole dial stands on a pillar, in the middle of a round horizontal board, in which there is a compass and magnetic needle, for placing the *meridian stile* toward the south. The pillar has a joint with a quadrant upon it, divided into 90 degrees (supposed to be hid from sight under the dial in the figure) for setting it to the latitude of any given place.

The equator of the globe is divided into 24 equal parts, and the hours are laid down upon it at these parts. The time of the day may be known by these hours, when the sun shines upon the globe.

To rectify and use this dial, set it on a level table, or sole of a window, where the sun shines, placing the meridian stile due south, by means of the needle; which will be, when the needle points as far from the north fleur-de-lis toward the west, as it declines westward, at your place. Then bend the pillar in the joint, till the black line on the pillar comes to the latitude of your place in the quadrant.

The machine being thus rectified, the plane of its dial part will be parallel to the equator, the wire or axis that supports the globe will be parallel to the earth's axis, and the north pole of the globe will point toward the north pole of the heavens.

The same hour will then be shewn in several of the hollows, by the ends of the shadows of their respective stiles: the axis of the globe will cast a shadow on the same hour of the day, in the equinoctial dial, in the centre of which it is placed, from the 20th of March to the 23d of September; and, if the meridian of your place on the globe be set even with the meridian stile, all the parts of the globe that the sun shines upon, will answer to those places of the real earth which are then enlightened by the sun. The places where the shade is just coming upon the globe, answer to all those places of the earth to which the sun is then setting; as the places where it is going off, and the light coming on, answer to all the places of the earth where the sun is then rising. And lastly, if the hour of VI be marked on the equator in the meridian of your place (as it is marked on the meridian of London in the figure) the division of the light and shade on the globe will shew the time of the day.

The

Dial.

Dial.

The northern file of the dial (opposite to the southern or meridian one) is hid from sight in the figure, by the axis of the globe. The hours in the hollow to which that file belongs, are also supposed to be hid by the oblique view of the figure: but they are the same as the hours in the front-hollow. Those also in the right and left hand semicircular hollows are mostly hid from sight; and so also are all those on the sides next the eye of the four acute angles.

The construction of this dial is as follows:

Plate XCI.
fig. 4.

On a thick square piece of wood, or metal, draw the lines ac and bd , as far from each other as you intend for the thickness of the file $abcd$; and in the same manner, draw the like thickness of the other three files, $efgh$, $iklm$, and $nopq$, all standing out-right as from the centre.

With any convenient opening of the compasses, as aa , (so as to leave proper strength of stuff when KI is equal to ad), set one foot in a , as a centre, and with the other foot describe the quadrantal arc Ac . Then, without altering the compasses, set one foot in b as a centre, and with the other foot describe the quadrantal arc bB . All the other quadrants in the figure must be described in the same manner, and with the same opening of the compasses, on their centres ef , ik , and no ; and each quadrant divided into six equal parts, for as many hours, as in the figure; each of which parts must be subdivided into 4, for the half-hours and quarters.

At equal distances from each corner, draw the right lines Ip and Kp , Lq and Mq , Nr and Or , P_s and Q_s ; to form the four angular hollows IpK , LqM , NrO , and P_sQ_s ; making the distances between the tips of these hollows, as IK , LM , NO , and P_sQ_s , each equal to the radius of the quadrants; and leaving sufficient room within the angular points pqr and s , for the equinoctial in the middle.

To divide the insides of these angles properly for the hour-spaces thereon, take the following method.

Set one foot of the compasses in the point I , as a centre, and open the other to K ; and with that opening describe the arc Kt : then, without altering the compasses, set one foot in K , and with the other foot describe the arc It . Divide each of these arcs, from I and K to their intersection at t , into four equal parts; and from their centres I and K , through the points of division, draw the right lines $I3$, $I4$, $I5$, $I6$, $I7$; and $K2$, $K1$, $K12$, $K11$; and they will meet the sides Kp and Ip of the angle IpK where the hours thereon must be placed. And these hour-spaces in the arcs must be subdivided into four equal parts, for the half hours and quarters.—Do the like for the other three angles, and draw the dotted lines, and set the hours in the insides where those lines meet them, as in the figure: and the like hour-lines will be parallel to each other in all the quadrants and in all the angles.

Mark points for all these hours on the upper side; and cut out all the angular hollows, and the quadrantal ones quite through the places where their four gnomons must stand; and lay down the hours on their insides, (as in Plate XCII.), and set in their gnomons, which must be as broad as the dial is thick; and this breadth and thickness must be large enough to keep the shadows of the gnomons from ever falling quite

out at the sides of the hollows, even when the sun's declination is at the greatest.

Lastly, draw the equinoctial dial in the middle, all the hours of which are equidistant from each other: and the dial will be finished.

As the sun goes round, the broad end of the shadow of the file $abcd$ will shew the hours in the quadrant Ac , from sun-rise till VI in the morning; the shadow from the end M will shew the hours on the side Lq from V to IX in the morning; the shadow of the file $efgh$ in the quadrant Dg (in the long days) will shew the hours from sun-rise till VI in the morning; and the shadow of the end N will shew the morning-hours, on the side Or , from III to VII.

Just as the shadow of the northern file $abcd$ goes off the quadrant Ac , the shadow of the southern file $iklm$ begins to fall within the quadrant Fh , at VI in the morning; and shews the time, in that quadrant, from VI till XII at noon; and from noon till VI in the evening in the quadrant me . And the shadow of the end O , shews the time from XI in the forenoon till III in the afternoon, on the side rN ; as the shadow of the end P shews the time from IX in the morning till I o'clock in the afternoon, on the side Q_s .

At noon, when the shadow of the eastern file $efgh$ goes off the quadrant bC (in which it shewed the time from VI in the morning till noon, as it did in the quadrant gD from sun-rise till VI in the morning) the shadow of the western file $nopq$ begins to enter the quadrant Hp ; and shews the hours thereon from XII at noon till VI in the evening; and after that till sunset, in the quadrant gG ; and the end Q_s casts a shadow on the side P_s from V in the evening till IX at night, if the sun be not set before that time.

The shadow of the end I shews the time on the side Kp from III till VII in the afternoon; and the shadow of the file $abcd$ shews the time from VI in the evening till the sun sets.

The shadow of the upright central wire, that supports the globe at top, shews the time of the day, in the middle or equinoctial dial, all the summer half-year, when the sun is on the north side of the equator.

DIALECT, an appellation given to the language of a province, in so far as it differs from that of the whole kingdom. The term, however, is more particularly used in speaking of the ancient Greek, whereof there were four dialects, the Attic, Ionic, Æolic, and Doric, each of which was a perfect language in its kind, that took place in certain countries, and had peculiar beauties.

In Great Britain, besides the grand diversity of English and Scotch, almost every county has a dialect of its own, all differing considerably in pronunciation, accent, and tone, although one and the same language.

DIALECTICS, in the literary history of the ancients, that branch of logics which taught the rules and modes of reasoning. See LOGIC, Part III.

DIALIA, in antiquity, sacrifices performed by the flames dialis. See FLAMEN.

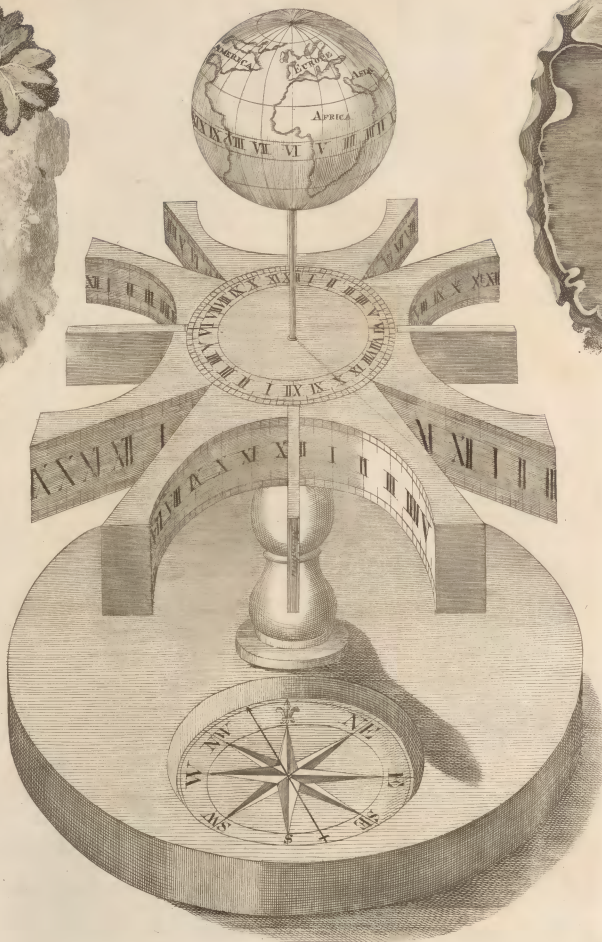
DIALING, the art of drawing dials, on any given plane, or on the surface of any given body. See DIAL.

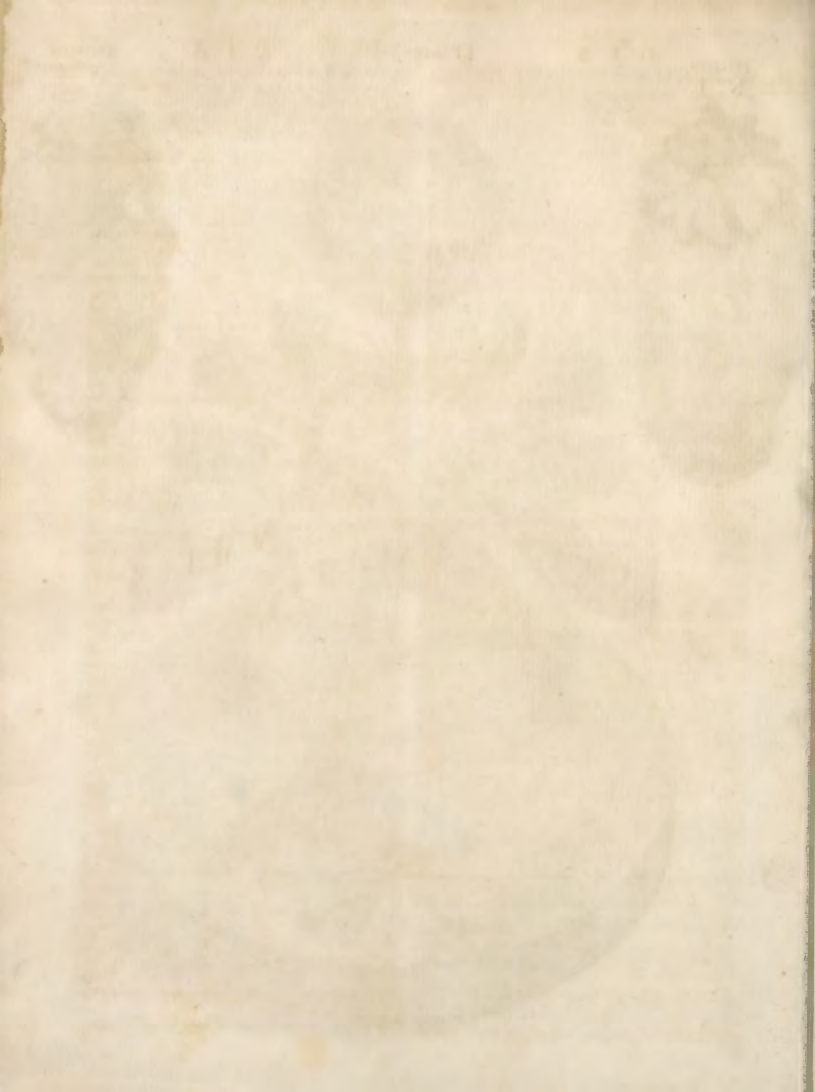
The Greeks and Latins called this art *gnomonica* and *sciatherica*, by reason it distinguishes the hours by the shadow of a gnomon. Some call it *photo-sciatherica*, by

DORIS.
N^o 1.

Plate XCII.

DORIS.
N^o 2.





Dialing.

by reason the hours are sometimes shewn by the light of the sun. Lastly, others call it *horologigraphy*.

The antiquity of dials is beyond doubt. Some attribute their invention to Anaximenes Milesius; and others to Thales. Vitruvius mentions one made by the ancient Chaldee historian Berosus, on a reclining plane, almost parallel to the equinoctial. Aristarchus Samius invented the hemispherical dial. And there were some spherical ones, with a needle for a gnomon. The discus of Aristarchus was an horizontal dial, with its limb raised up all around, to prevent the shadows stretching too far.

But it was late ere the Romans became acquainted with dials. The first sun-dial at Rome was set up by Papirius Cursor, about the year of the city 460; before which time, says Pliny, there is no mention of any account of time but by the sun's rising and setting: it was set up at or near the temple of Quirinus, but went ill. About 30 years after, M. Valerius Messala being consul, brought out of Sicily another dial, which he set up on a pillar near the rostrum; but for want of its being made for that latitude, it could not go true. They made use of it 99 years; till Martius Philippus set up another more exact.

But there seem to have been dials among the Jews much earlier than any of these. Witness the dial of Ahaz; who began to reign 400 years before Alexander, and within 12 years of the building of Rome; mentioned by Isaiah, chap. xxxviii. verse 8.

The first professed writer on dialing is Clavius; who demonstrates all, both the theory and the operations, after the rigid manner of the ancient mathematicians; but so intricately, that few, we dare say, ever read them all. Dechales and Ozanam give much easier demonstrations in their *Courses*, and Wolhus in his *Elements*. M. Picard has given a new method of making large dials, by calculating the hour-lines; and Mr de la Hire, in his *Dialing*, printed in 1683, a geometrical method of drawing hour-lines from certain points determined by observation. Eberhardus Welperus, in 1625, published his *Dialing*, wherein he lays down a method of drawing the primary dials on a very easy foundation. The same foundation is described at length by Sebastian Munster, in his *Rudimenta Mathematica*, published in 1551. Sturmius, in 1672, published a new edition of Welperus's *Dialing*, with the addition of a whole second part, about inclining and declining dials, &c. In 1708, the same work, with Sturmius's additions, was republished with the addition of a fourth part, containing Picard's and de la Hire's methods of drawing large dials. Paterson, Michael, and Muller, have each wrote on dialing, in the German tongue; Coetfius in his *Horologigraphia Plana*, printed in 1689; Gauppenius, in his *Gnomonica Mechanica*; Bion, in his *Use of Mathematical Instruments*; and the late ingenious Mr Ferguson, in his *Select Lectures*. See the article DIAL.

DIALING-Lines, or Scales, are graduated lines, placed on rules, or the edges of quadrants, and other instruments, to expedite the construction of dials. See DIAL, p. 2442, col. 2. and Plate XC.

DIALING-Sphere, is an instrument made of brass, with several femicircles sliding over one another, on a moving horizon, to demonstrate the nature of the doctrine of spherical triangles, and to give a true idea of

the drawing of dials on all manner of planes.

DIALING, in a mine, called also *Plumming*, is the using of a compass (which they call *dial*), and a long line, to know which way the load, or vein of ore inclines, or where to shift an air-shaft, or bring an adit to a desired place.

DIALIS, in antiquity, a Latin term signifying something that belongs to Jupiter.—The word is formed from *Δις*, the genitive of *Ζεύς*, Jupiter.

Flamen DIALIS. See **FLAMEN**.

DIALITHA, in the writings of the ancients, a word used to express the elegant ornaments of the Greeks and Romans, composed of gold and gems. They also called these, *lithocolla*, “cemented stones or gems;” the gold being in this case as a cement to hold the stones together. They wore bracelets and other ornamental things about their habits thus made; and their cups and table-furniture, for magnificent treats, were of this kind. The green stones were found to succeed best of all in these things; and the emerald, and greenish topaz, or, as we call it, chrysolite, were most in esteem for this purpose. This use of the stones explains what Pliny very often says of them in his description: *Nihil jucundius aurum decet*, “Nothing becomes gold better;” this he says of the green topaz or chrysolite; and this and many other like passages have greatly perplexed the critics, who did not hit upon this explanation.

DIALOGISM, in rhetoric, is used for the soliloquy of persons deliberating with themselves. See **SOLILOQUY**.

DIALOGUE, in matters of literature, a conversation between two or more persons, either by writing or by word of mouth.

Composition and Style of Written Dialogue. As the end of speech is conversation, no kind of writing can be more natural than dialogue, which represents this. And accordingly we find it was introduced very early, for there are several instances of it in the Mosaic history. The ancient Greek writers also fell very much into it, especially the philosophers, as the most convenient and agreeable method of communicating their sentiments and instructions to mankind. And indeed it seems to be attended with very considerable advantages, if well and judiciously managed. For it is capable to make the driest subjects entertaining and pleasant, by its variety, and the different characters of the speakers. Besides, things may be canvassed more minutely, and many lesser matters, which serve to clear up a subject, may be introduced with a better grace, by questions and answers, objections and replies, than can be conveniently done in a continued discourse. There is likewise a further advantage in this way of writing, that the author is at liberty to choose his speakers: And therefore, as Cicero has well observed, when we imagine, that we hear persons of an established reputation for wisdom and knowledge talking together, it necessarily adds a weight and authority to the discourse, and more closely engages the attention. The subject-matter of it is very extensive. For whatever is a proper argument of discourse, public or private, serious or jocular; whatever is fit for wise and ingenious men to talk upon, either for improvement or diversion; is suitable for a dialogue.

From this general account of the nature of dialogue,

Dialogue.

Dialogue.

it is easy to perceive what kind of style best suits it. Its affinity with *EPISTLES*, shews there ought to be no great difference between them in this respect. Indeed, some have been of opinion, that it ought rather to sink below that of an epistle, because dialogues should in all respects represent the freedom of conversation; whereas, epistles ought sometimes to be composed with care and accuracy, especially when written to superiors. But there seems to be little weight in this argument, since the design of an epistle is to say the same things, and in the same manner, as the writer judges would be most fit and proper for him to speak, if present. And the very same thing is designed in a dialogue, with respect to the several persons concerned in it. Upon the whole, therefore, the like plain, easy, and simple style, suited to the nature of the subject, and the particular characters of the persons concerned, seems to agree to both.

But as greater skill is required in writing dialogues, than letters; we shall give a more particular account of the principal things necessary to be regarded in their composition, and illustrate them chiefly from Cicero's excellent *Dialogues concerning an orator*.—A dialogue, then, consists of two parts; an introduction, and the body of the discourse.

1. The introduction acquaints us with the place, time, persons, and occasion, of the conversation. Thus Cicero places the scene of his dialogues at Crassus's country seat; a very proper recess, both for such a debate, and the parties engaged in it. And as they were persons of the first rank, and employed in the greatest affairs of state, and the discourse held them for two days; he represents it to have happened at the time of a festival, when there was no business done at Rome, which gave them an opportunity to be absent.

And because the greatest regard is to be had in the choice of the persons, who ought to be such as are well acquainted with the subject upon which they discourse; in these dialogues of Cicero, the two principal disputants are Crassus and Antony, the greatest orators of that age, and therefore the most proper persons to dispute upon the qualifications necessary for their art. One would think it scarce necessary to observe, that the conference should be held by persons who lived at the same time, and so were capable to converse together. But yet, some good writers have run into the impropriety of feigning dialogues between persons who lived at distant times. Plato took this method, in which he has been followed by Macrobius. But others, who have been willing to bring persons to discourse together, who lived in different ages, without such inconsistency, have wrote dialogues of the dead. Lucian has made himself most remarkable in this way. As to the number of persons in a dialogue, they may be more or less; so many, as can conveniently carry on a conversation without disorder or confusion, may be admitted. Some of Cicero's dialogues have only two, others three or more, and those concerning an orator seven. And it is convenient they should all, in some respects, be persons of different characters and abilities; which contributes both to the variety and beauty of the discourse, like the different attitude of figures in a picture. Thus in Cicero's dialogues last mentioned, Crassus excelled in art, Antony principally for the force of his genius, Catullus for the purity of his style, Sce-

vola for his skill in the law, Cæsar for wit and humour; and though Sulpitius and Cotta, who were young men, were both excellent orators, yet they differed in their manner. But there should be always one chief person, who is to have the main part of the conversation; like the hero in an epic poem or a tragedy, who excels the rest in action; or the principal figure in a picture, which is most conspicuous. In Plato's dialogues, this is Socrates; and Crassus, in those of Cicero above mentioned.

It is usual, likewise, in the introduction, to acquaint us with the occasion of the discourse. Indeed this is not always mentioned; as in Cicero's dialogue of the parts of oratory, where the son begins immediately with desiring his father to instruct him in the art. But it is generally taken notice of, and most commonly represented, as accidental. The reason of which may be, that such discourses appear most natural; and may likewise afford some kind of apology for the writer in managing his different characters, since the greatest men may be supposed not always to speak with the utmost exactness in an accidental conversation. Thus Cicero, in his dialogues concerning an orator, makes Crassus occasionally fall upon the subject of oratory, to divert the company from the melancholy thoughts of what they had been discoursing of before, with relation to the public disorders, and the dangers which threatened their country. But the introduction ought not to be too long and tedious. Mr Addison complains of this fault in some authors of this kind. "For though, as he says, some of the finest treatises of the most polite Latin and Greek writers are in dialogue, as many very valuable pieces of French, Italian, and English, appear in the same dress; yet in some of them there is so much time taken up in ceremony, that, before they enter on their subject, the dialogue is half over."

2. We come now to the *body* of the discourse, in which some things relating to the persons, and others to the subject, are proper to be remarked.

And as to the *persons*, the principal thing to be attended to, is to keep up a justness of character thro' the whole. And the distinct characters ought to be so perfectly observed, that from the very words themselves it may be always known who is the speaker. This makes dialogue more difficult than single description, by reason of the number and variety of characters which are to be drawn at the same time, and each of them managed with the greatest propriety. The principal speaker should appear to be a person of great sense and wisdom, and best acquainted with the subject. No question ought to be asked him, or objection started to what he says, but what he should fairly answer. And what is said by the rest should principally tend to promote his discourse, and carry it through in the most artful and agreeable manner. Where the argument is attended with difficulties, one other person or more may be introduced, of equal reputation, or near it, but of different sentiments, to oppose him and maintain the contrary side of the question. This gives opportunity for a thorough examination of the point on both sides, and answering all objections. But if the combatants are not pretty equally matched, and masters of the subject, they will treat it but superficially. And through the whole debate, there ought not to be

the least wrangling, peevishness, or obliquity; nothing but the appearance of good-humour and good breeding, the gentleman and the friend, with a readiness to submit to conviction and the force of truth, as the evidence shall appear on one side or the other. In Cicero, these two characters are Crassus and Antony. And from them Mr Addison seems to have taken his Philander and Cynthio, in his *Dialogues upon the usefulness of ancient medals*, which are formed pretty much on Cicero's plan. Where younger persons are present, or such who are not equally acquainted with the subject, they should be rather upon the inquiry than dispute: And the questions they ask should be neither too long, nor too frequent; that they may not too much interrupt the debate, or appear over talkative before wiser and more experienced persons. Sulpitius and Cotta sustain this character in Cicero, and Eugenius in Mr Addison. And it is very convenient there should be one person of a witty and jocular humour, to enliven the discourse at proper seasons, and make it the more entertaining, especially when the dialogue is drawn out to any considerable length. Cæsar has this part in Cicero. And in Mr Addison, Cynthio is a person of this turn, and opposes Philander in a merry way. Mr Addison's subject admitted of this; but the seriousness and gravity of Cicero's argument required a different speaker for the jocular part. Many persons ought not to speak immediately one after another. Horace's rule for plays is:

To crowd the stage is odious and absurd,
Let no fourth actor strive to speak a word.

Though Scaliger and others think a fourth person may sometimes be permitted to speak in the same scene without confusion. However, if this is not commonly to be allowed upon the stage, where the actors are present, and may be distinguished by their voice and habit; much less in a dialogue, where you have only their names to distinguish them.

With regard to the *subject*, all the arguments should appear probable at least, and nothing be advanced which may seem weak or trivial. There ought also to be an union in dialogue, that the discourse may not ramble, but keep up to the main design. Indeed, short and pleasant progressions are sometimes allowable for the ease and entertainment of the reader. But every thing should be so managed, that he may still be able to carry on the thread of the discourse in his mind, and keep the main argument in view, till the whole is finished. The writers of dialogue have not confined their discourses to any certain space of time; but either concluded them with the day; or broke off when their speakers have been tired, and reassumed them again the next day. Thus Cicero allows two days for his three dialogues concerning an orator; but Mr Addison extends his to three days, allowing a day for each. Nor has the same method always been observed in composing dialogues. For sometimes the writer, by way of narrative, relates a discourse which passed between other persons. Such are the dialogues of Cicero and Mr Addison last mentioned, and many others both of the ancients and moderns. But, at other times, the speakers are introduced in person, as talking to each other. This, as Cicero observes, prevents the frequent repetition of those words, *he said, and he replied*; and by placing the hearer, as it were, in the conversation, gives him a more lively representation of

the discourse, which makes it the more affecting. And therefore Cicero, who wrote his *dialogue of old age* in this manner, in which Cato, who was then in years, largely recounts the satisfactions of life which may be enjoyed in old age, tells his friend Atticus, he was himself so affected with that discourse, that when he reviewed it sometimes, he fancied they were not his own words, but Cato's. There are some other dialogues of Cicero, written in the same way; as that *Of friendship*, and *Of the parts of oratory*. And both Plato and Lucian generally chose this method.

DIALOGUES, in dramatic composition. See POETRY, chap. ii. 22, 23.

DIALTHÆA, in pharmacy, an unguent much used as a resolvent; so called from ALTHÆA, or marshmallows, which is the principal ingredient in it.

DIALYSIS, in grammar, a mark or character, consisting of two points, “, placed over two vowels of a word, in order to separate them, because otherwise they would make a diphthong, as *Mosais*, &c.

DIAMASTIGOSIS, in Grecian antiquity, a solemnity at Sparta in honour of Diana Orthia, wherein the children of the most distinguished families were wont to slash and tear each others bodies with rods before the altar of the goddess: the parents of the children being always present, used to animate and excite them not to give the least sign of pain or concern; and indeed so great was the bravery and resolution of the boys, that seldom or never any cry or groan was heard to proceed from them, tho' they frequently whipped one another to death. The design of this custom was to fortify the children betimes, and harden them against wounds, bruises, &c.

DIAMETER, in geometry, a right line passing thro' the centre of a circle, and terminated at each side by the circumference thereof. See GEOMETRY.

DIAMOND, in natural history, a genus of precious stones, of a fine pellicul substance, of great hardness, seldom souled by any admixture of earthy or other coarse matter, susceptible of elegant tinges from metal-line particles, giving fire with steel, not fermenting with acid menstruums, and of one simple and permanent appearance in all lights.

DIAMONDS are the hardest and most brilliant of all stones. They are either hexagonal prisms, terminated by eight-sided points or pyramids; or they are flat, or cubical, or rounded. Whether this difference of form be original, or adventitious, has not been determined. The first kind are the best and hardest; and may therefore have preserved their original form against accidents better than the others, especially than those which are rounded, which are said to be least hard, and consequently most liable to have their forms altered by attrition. Diamonds are said to consist of laminæ or plates, and probably they have some uniform texture; because lapidaries find that they may be polished much more easily in one than in any other direction. This stone becomes luminous in the dark, by exposure during a certain time to the rays of the sun; by heating it in a crucible; by plunging it in boiling water; or by rubbing it with a piece of glass. By friction it acquires an electrical property, by which it attracts the substance used for soils, called *black mastic*, and other light matters. The author of the Chemical Dictionary says, that diamonds are refractory in the fire,

Diamond. and even apyrrous. Nevertheless, experiments have been made, which prove that diamonds are capable of being dissipated, not only by the collected heat of the sun, but also by the heat of a furnace. Mr Boyle says, that he perceived certain acrid and penetrating exhalations from diamonds exposed to fire. A diamond by exposure to a concave speculum, the diameter of which was 40 inches, was reduced to an eighth part of its weight *. In the *Giornale de Letterati d' Italia*, tom. viii. art. 9. we may read a relation of experiments made on precious stones, by order of the grand duke of Tuscany, with a burning lens, the diameter of which was two thirds of a Florentine ell, near the focus of which was placed another smaller lens. By these experiments we find, that diamonds were more altered by solar heat than most of the other precious stones, although not the least appearance of a commencing fusion was observable. A diamond weighing 30 grains, thus exposed during 30 seconds, lost its colour, lustre, and transparency, and became of an opaque white. In five minutes, bubbles appeared on its surface; soon afterwards it burst into pieces, which were dissipated; and the small fragment which remained was capable of being crushed into fine powder by the pressure of the blade of a knife. Neither the addition of glass, flints, sulphur, metals, or salt of tartar, prevented this dissipation of diamonds, or occasioned any degree of fusion. By this heat rubies were softened, and lost some of their colour, but preserved their form and weight. By addition of a third lens, a further degree of fusion was given to rubies. Even then rubies could not be made to unite with glass. By having been exposed to this heat, the surface of the rubies which had suffered fusion, lost much of their original hardness, and were nearly as soft as crystal. But their internal parts, which had not been fused, retained their hardness. Emeralds by this heat were rendered white, or of various colours, and soon afterwards were fused. They were found to have lost part of their weight, and to be rendered less hard and brittle.

Experiments were also made by order of the emperor Francis I. on precious stones; from which we find, that diamonds were entirely dissipated by having been exposed in crucibles to a violent fire of a furnace during 24 hours; while rubies by the same heat were not altered in weight, colour, or polish. By exposing diamonds during two hours only at a time, the following alterations produced on them by fire were observed. First, they lost their polish; then they were split into thin plates; and, lastly, totally dissipated. By the same fire, emeralds were fused. See *Magasin de Hambourg*, tom. xviii.

The action of fire on diamonds has, notwithstanding the above mentioned experiments, been lately doubted in France; and the question has been agitated by several eminent chemists with much interest, and numerous experiments have been made which throw some light on the subject. M. D'Arcet found, not only that diamonds included in porcelain crucibles close, or covered with perforated lids, and exposed to the long and intense heat of a porcelain furnace, were perfectly dissipated; but also, that these stones could in a few hours be totally volatilised with a much inferior degree of heat, by exposing them in a coppel, under the muffle of an essay-furnace. In this latter experiment, he observed that the dissipation was gradual, and that it was

effected by a kind of exfoliation. The dissipation of diamonds exposed in coppels was confirmed by M. Macquer; who further observed, that the diamonds were, before the dissipation began, rendered, by the fire, brilliant and shining, as it were, with a phosphoric light. In order to determine whether the dissipation of diamonds was actually effected by their reduction into vapour, or by a combustion or other effect of air upon them, Messrs Lavoisier, Macquer, and Cadet, exposed diamonds to intense heat in an earthen retort, during several hours, but without any other effect than that their polish was destroyed, and about $\frac{1}{4}$ th of their weight diminished. M. Mitouard put diamonds in a tobacco-pipe filled with pounded charcoal and accurately closed with lute. He further secured the diamonds from access of air or flame, by placing the tobacco-pipe in a crucible, to which another crucible was inverted and carefully luted. The diamonds, thus secluded from external air, having been exposed to the most intense heat which could be excited in a well constructed furnace, were not thereby altered or diminished. M. Mitouard was induced to believe, that the charcoal conducted to the preservation of diamonds not merely by excluding the air, but by some peculiar property, which he supposes may be the same as that by which this substance defends metals from destruction by fire. He was confirmed in his opinion, by observing that diamonds were not preserved from the action of fire by surrounding them with powder of chalk and of calcined hartshorn, and including them in close vessels, so well as when the charcoal had been employed. Some chemists even thought that the perfect exclusion of air alone was sufficient to preserve diamonds, and doubted whether the balls and crucibles of porcelain employed by M. D'Arcet had excluded the air with sufficient accuracy. Indeed, in one of M. D'Arcet's own experiments, a diamond included in a ball of porcelain had resisted the action of fire. In order to ascertain this question, M. Cadet exposed diamonds in covered and luted crucibles to the violent heat of a forge during two hours; by which operation the diamonds lost only $\frac{1}{4}$ th part of their weight. He infers, that the destruction of diamonds by fire in open vessels is not a true volatilization; but merely an exfoliation, caused by the fire expanding the air contained between the thin plates of which these stones consist and that by this exfoliation or decapitation these plates are reduced to so fine a powder as to escape observation. M. D'Arcet objected against the experiments of his adversaries, that they were not of sufficient duration to decide against his, which had lasted several days. He renewed and multiplied his experiments, which confirmed him in his opinion of the volatilisation of diamonds in vessels perfectly closed; and that this effect of fire on diamonds is not a mere exfoliation or mechanical separation of the plates of which these stones consist, he infers from the parts of the diamonds pervading the most solid porcelain crucibles without being perceptible, and from the luminous appearance first noticed by M. Macquer, and which was afterwards observed by M. Roux to be an actual flame.

Diamonds are found only in the East Indies, and in Brasil in South America; but the Oriental diamonds are preferable to the Brazilian ones. The diamond mines are found only in the kingdoms of Golconda, Vifapour,

Vilapour, Bengal, and the Island of Borneo. There are four mines, or rather two mines and two rivers, whence diamonds are drawn. The mines are, 1. That of Raolconda, in the province of Carnatica, five days journey from Golconda, and eight from Vilapour. It has been discovered about 200 years. 2. That of Gani, or Coulour, seven days journey from Golconda eastwardly. It was discovered 140 years ago by a peasant, who digging in the ground found a natural fragment of 25 carats. 3. That of Soumelpour, a large town in the kingdom of Bengal, near the Diamond-mine. This is the most ancient of them all: it should rather be called that of *Gouah*, which is the name of the river, in the fand whereof these stones are found. Lastly, the fourth mine, or rather the second river, is that of Succudan, in the island of Borneo.

DIAMOND-Mine of Raolconda.—In the neighbourhood of this mine the earth is sandy, and full of rocks and cople. In these rocks are found several little veins of half and sometimes a whole inch broad, out of which the miners, with a kind of hooked irons, draw the sand, or earth, wherein the diamonds are; breaking the rocks when the vein terminates, that the track may be found again, and continued. When a sufficient quantity of earth or sand is drawn forth, they wash it two or three times, to separate the stones therefrom. The miners work quite naked, except for a thin linen cloth before them; and besides this precaution, have likewise inspectors, to prevent their concealing of stones: which, however, maugre all this care, they frequently find means to do, by watching opportunities when they are not observed, and swallowing them down.

DIAMOND-Mine of Gani or Coulour.—In this mine are found a great number of stones from 10 to 40 carats, and even more; and it was here that famous diamond of Aureng-Zeb the Great Mogul, which before it was cut weighed 793 carats, was found. The stones of this mine are not very clear; their water is usually tinged with the quality of the soil; being black where that is marshy, red where it partakes of red, sometimes green and yellow, if the ground happen to be of those colours. Another defect of some consequence is a kind of greasiness appearing on the diamond, when cut, which takes off part of its lustre. —There are usually no less than 60,000 persons, men, women, and children, at work in this mine.

When the miners have found a place where they intend to dig, they level another somewhat bigger in the neighbourhood thereof, and inclose it with walls about two foot high, only leaving apertures from space to space, to give passage to the water. After a few superstitious ceremonies, and a kind of feast which the master of the mine makes for the workmen, to encourage them, every one goes to his business, the men digging the earth in the place first discovered, and the women and children carrying it off into the other walled round. They dig 12 or 14 foot deep, and till such time as they find water. Then they cease digging; and the water thus found serves to wash the earth two or three times, after which it is let out at an aperture reserved for that end. This earth being well washed, and well dried, they sift it in a kind of open sieve, or riddle, much as we do corn in Europe; then thrash it, and sift it afresh; and lastly, search it well with the

hands to find the diamonds. They work naked as in the mine of Raolconda, and are watched after the like manner by inspectors.

DIAMOND-Mine of Soumelpour, or river Gouah.—Soumelpour is a large town built all of earth, and covered with branches of cacao-trees: the river Gouah runs by the foot thereof, in its passing from the high mountains towards the south to the Ganges, where it loses its name. It is from this river that all our fine diamond points, or sparks, called *natural sparks*, are brought. They never begin to seek for diamonds in this river till after the great rains are over, that is, after the month of December; and they usually even wait till the water is grown clear, which is not before January. The season at hand, eight or ten thousand persons, of all ages and sexes, come out of Soumelpour and the neighbouring villages. The most experienced among them search and examine the sand of the river, going up it from Soumelpour to the very mountain whence it springs. A great sign that there are diamonds in it, is the finding of those stones which the Europeans call *thunder-stones*. When all the sand of the river, which at that time is very low, has been well examined, they proceed to take up that wherein they judge diamonds likely to be found; which is done after the following manner: They dam the place round with stones, earth, and fscines, and lading out the water, dig about two foot deep: the sand thus got is carried into a place walled round on the bank of the river. The rest is performed after the same manner as at Coulour, and the workmen are watched with equal strictness.

DIAMOND-Mine in the island of Borneo, or river of Succudan.—We are but little acquainted with this mine; the queen who reigns in that part of the island not allowing strangers to have any commerce in these stones: though there are very fine ones to be bought at Batavia, brought thither by stealth. They were anciently imagined to be softer than those of the other mines; but experience shews, they are in no respect inferior to them.

Beside these four diamond-mines, there have been two others discovered; one of them between Coulour and Raolconda, and the other in the province of Carnatica; but they were both closed up almost as soon as discovered: that of Carnatica, because the water of the diamonds was always either black, or yellow; and the other, on account of their cracking, and flying in pieces when cut and ground.

The diamond, we have already observed, is the hardest of all precious stones. It can only be cut and ground by itself and its own substance. To bring it to that perfection which augments its price so considerably, they begin by rubbing several against each other, while rough; after having first glued them to the ends of two wooden blocks, thick enough to be held in the hand. It is this powder thus rubbed off the stones, and received in a little box for the purpose, that serves to grind and polish the stones.

Diamonds are cut and polished by means of a mill, which turns a wheel of soft iron sprinkled over with diamond-dust mixed with oil of olives. The same dust, well ground, and diluted with water and vinegar, is used in the sawing of diamonds; which is performed with an iron or brass wire, as fine as a hair. Sometimes, in lieu of sawing the diamonds, they

Diamond. cleave them, especially if there be any large shivers therein. But the Europeans are not usually daring or expert enough to run the risque of cleaving, for fear of breaking.

The finest diamonds are those of a complexion like that of a drop of pure water. It is likewise a valuable property if they are of a regular form and truly made; as also, that they be free from stains, spots, specks, flaws, and cross veins. If diamonds are tintured yellow, blue, green, or red, in a high degree, they are next in esteem; but if they are tintured with these colours only in a low degree, the value of them is greatly diminished. There are also diamonds of other complexions; such as brown, and those of a dark hue: the first resembling the brownest figar-candy, and the latter dusky iron. In the *Philosophical Commerce of Arts*, Dr Lewis tells us of a black diamond that he himself had seen. At a distance, it looked uniformly black; but, on closer examination, appeared in some parts transparent, and in others charged with foulness, on which the black hue depended.

The *first water* in diamonds means the greatest purity and perfection of their complexion, which ought to be that of the purest water. When diamonds fall short of this perfection, they are said to be of the *second* or *third water*, &c. till the stone may be properly called a *coloured one*: for it would be an impropriety to speak of an imperfectly coloured diamond, or one that has other defects, as a stone of a bad water only.

Mr Boyle has observed, from a person much conversant in diamonds, that some of these gems, in their rough state, were much heavier than others of the same bigness, especially if they were cloudy or foul; and Mr Boyle mentions one that weighed 8½ grains, which, being carefully weighed in water, proved to an equal bulk of that liquor as $2\frac{2}{3}$ to 1. So that, as far as could be judged by that experiment, a diamond weighs not thrice as much as water: and yet, in his table of specific gravities, that of a diamond is said to be to water as 3400 to 1000; that is, as $3\frac{4}{5}$ to 1; and therefore, according to these two accounts, there should be some diamonds whose specific gravity differs nearly $\frac{1}{5}$ from that of others. But this is a much greater difference than can be expected in two bodies of the same species; and indeed, on an accurate trial, does not prove to be the case with diamonds. The Brasil diamonds differ a little in weight one from another, and greatly vary from the standard set by Mr Boyle for the specific gravity of this gem in general; two large diamonds from that part of the world being carefully weighed, one was found as 3518, the other as 3521, the specific gravity of water being reckoned 1000. After this, ten East India diamonds were chosen out of a large parcel, each as different from the other in shape, colour, &c. as could be found. These being weighed in the same scales and water with the former, the lightest proved as 3512, the heaviest as 3525, still supposing the water to be 1000.—Mr Elliot, who made these experiments, has drawn out a table of their several differences, which is done with great care and accuracy; and, taking in all the common varieties in diamonds, may serve as a general rule for their mean gravity and differences.

	Water	In air.	In water	Specific gravity.	Diamond
		Grains.	Grains.	1000	
Nº 1.	A Brazil diamond, fine water, and rough coat	92,425	66,16	3518	
2.	Ditto, fine water, rough coat	88,21	63,16	3521	
3.	Ditto, fine bright coat	10,025	7,170	3511	
4.	Ditto, fine bright coat	95,60	68,30	3501	
5.	An East India diamond, pale blue	26,485	18,945	3512	
6.	Ditto, bright yellow	23,33	16,710	3524	
7.	Ditto, very fine water, bright coat	20,66	14,800	3525	
8.	Ditto, very bad water, honeycomb coat	20,38	14,590	3519	
9.	Ditto, very hard bluish cast	22,5	16,1	3515	
10.	Ditto, very soft, good water	22,615	16,2	3525	
11.	Ditto, a very large red foulness in it	25,480	18,230	3514	
12.	Ditto, soft, bad water	29,525	21,140	3521	
13.	Ditto, soft, brown coat	26,535	18,990	3516	
14.	Ditto, very deep green coat	25,250	18,080	3521	

The mean specific gravity of the Brasil diamonds appears to be	-	-	-	3513
Of the East India diamonds	-	-	-	3519
The mean of both	-	-	-	3517

Therefore if any thing is to be concluded as to the specific gravity of the diamond, it is, that it is to water as 3517 to 1000.

For the valuation of diamonds of all weights, Mr Jefferies lays down the following rule. He first supposes the value of a rough diamond to be settled at 21. per carat, at a medium; then to find the value of diamonds of greater weights, multiply the square of their weight by 2, and the product is the value required: *E. G.* to find the value of a rough diamond of two carats; $2 \times 2 = 4$, the square of the weight; which, multiplied by two, gives 8. the true value of a rough diamond of two carats. For finding the value of manufactured diamonds, he supposes half their weight to be lost in manufacturing them; and therefore, to find their value, we must multiply the square of double their weight by 2, which will give their true value in pounds. Thus, to find the value of a wrought diamond weighing two carats; we first find the square of double the weight, *viz.* $4 \times 4 = 16$; then $16 \times 2 = 32$. So that the true value of a wrought diamond of two carats is 32 l.—On these principles Mr Jefferies has constructed tables of the price of diamonds from 1 to 100 carats.

Diamonds are commonly found but of very small sizes. The largest ever seen was brought from Brasil, and is in the possession of the king of Portugal. It weighs $12\frac{1}{2}$ ounces, and has been valued at upwards of 50 millions sterling. By some skilful lapidaries, however, this stone is only reckoned to be a topaz; in which case, its value must be prodigiously diminished. The largest oriental diamond in the world belongs to the great Mogul. It weighs 279 carats. According to the computation of M. Tavernier, this diamond is worth 779,244 l. Ster. but by the tables of Mr Jefferies above-mentioned,

Diamond. mentioned, its value is only 624,962 l.

Brilliant DIAMOND, is that cut in faces both at top and bottom; and whose table, or principal face at top, is flat. To make a complete square brilliant, if the rough diamond be not found of a square figure, it must be made so; and if the work is perfectly executed, the length of the axis will be equal to the side of the square base of the pyramid.—Jewellers then form the table and collet by dividing the block, or length of the axis, into 18 parts. They take $\frac{1}{2}$ from the upper part, and $\frac{1}{8}$ from the lower. This gives a plane at $\frac{1}{4}$ distance from the girdle for the table; and a smaller plane at $\frac{1}{8}$ distance for the collet; the breadth of which will be $\frac{1}{2}$ of the breadth of the table. In this state the stone is said to be a *complete square table diamond*.—The brilliant is an improvement on the table-diamond, and was introduced within the last century, according to Mr Jefferies.—To render a brilliant perfect, each corner of the above described table-diamond must be shortened by $\frac{1}{10}$ of its original. The corner ribs of the upper sides must be flattened, or run towards the centre of the table $\frac{1}{2}$ less than the sides; the lower part, which terminates in the girdle, must be $\frac{1}{2}$ of one side of the girdle; and each corner rib of the under sides must be flattened at the top, to answer the above flattening at the girdle, and at bottom must be $\frac{1}{2}$ of each side of the collet.

The parts of the small work which completes the brilliant, or the star and skill facets, are of a triangular figure. Both of these partake equally of the depth of the upper sides from the table to the girdle; and meet in the middle of each side of the table and girdle, as also at the corners. Thus they produce regular lozenges on the four upper sides and corners of the stone. The triangular facets, on the under sides, joining to the girdle, must be half as deep again as the above facets, to answer to the collet part.—The stone here described is said to be a *full-substantive brilliant*.—If the stone is thicker than in the proportion here mentioned, it is said to be an *over-weighted brilliant*.—If the thickness is less than in this proportion, it is called a *spread-brilliant*.—The beauty of brilliants is diminished from their being either over-weighted or spread. The true proportion of the axis, or depth of the stone to its side, is as 2 to 3.—Brilliants are distinguished into square, round, oval, and drops, from the figure of their respective girdles.

Cornish DIAMOND, a name given by many people to the crystals found in digging the mines of tin in Cornwall. These crystals are of the nature of the Kerry-stone of Ireland, but somewhat inferior to it: they are usually bright and clear, except towards the root, where they are coarse and foul, or whitish. They are usually found in the common form of an hexangular column terminated at each end by a hexangular pyramid.

Rose-DIAMOND is one that is quite flat underneath, with its upper part cut in divers little faces, usually triangles, the uppermost of which terminate in a point.—In rose-diamonds, the depth of the stone from the base to the point must be half the breadth of the diameter of the base of the stone. The diameter of the crown must be $\frac{2}{3}$ of the diameter of the base. The perpendicular, from the base to the crown, must be $\frac{1}{2}$ of the diameter of the stone. The lozenges which appear in

all circular rose-diamonds, will be equally divided by the ribs that form the crown; and the upper angles or facets will terminate in the extreme point of the stone, and the lower in the base or girdle.

Rough DIAMOND, is the stone as nature produces it in the mines.

A rough diamond must be chosen uniform, of a good shape, transparent, not quite white, and free of flaws and shivers. Black, rugged, dirty, flawed, veiny stones, and all such as are not fit for cutting, they use to pound in a steel mortar made for that purpose; and when pulverized, they serve to saw, cut, and polish the rest. Shivers are occasioned in diamonds by this, That the miners, to get them more easily out of the vein, which winds between two rocks, break the rocks with huge iron levers, which shakes, and fills the stone with cracks and shivers. The ancients had two mistaken notions with regard to the diamond: the first, that it became soft, by steeping it in hot goat's blood; and the second, that it is malleable, and bears the hammer. Experience shews us the contrary; there being nothing capable of mollifying the hardness of this stone; though its hardness be not such, that it will endure being struck at pleasure with the hammer.

Table-DIAMOND. See *Brilliant DIAMOND*.

DIAMOND, in the glass-trade, an instrument used for squaring the large plates or pieces; and, among glaziers, for cutting their glass.

These sort of diamonds are differently fitted up. That used for large pieces, as looking-glasses, &c. is set in an iron ferril, about two inches long, and a quarter of an inch in diameter; the cavity of the ferril being filled up with lead, to keep the diamond firm: there is also a handle of box, or ebony, fitted to the ferril, for holding it by.

DIAMOND, in heraldry, a term used for expressing the black colour in the achievements of peerage.

Guillim does not approve of blazoning the coats of peers by precious stones instead of metals and colours; but the English practice allows it. Morgan says the diamond is an emblem of fortitude.

DIANA, the goddess of hunting, in heathen mythology, was the daughter of Jupiter and Latona. She is called Hecate in hell, Diana on earth, and Phoebe in heaven. She was famous for her chastity. Her temple at Epheusus was one of the seven wonders of the world. It was burnt the same day that Alexander the Great was born, by Erostratus, from no other motive but to perpetuate his name.

DIANÆ ARBOR, or **ARBOR LUNÆ**, in chemistry, the beautiful crystallizations of silver, dissolved in aqua fortis, to which some quicksilver is added: and so called from their resembling the trunk, branches, leaves, &c. of a tree. See *CHEMISTRY*, n° 198.

DIANDRIA, (from *δύο*, twice, and *άνδρ*, a man) the name of the second class in Linnaeus's sexual system, consisting of hermaphrodite plants; which, as the name imports, have flowers with two stamens or male organs.

The orders in this class are three, derived from the number of styles or female parts. Most plants with two stamens have one style; as jessamy, lilac, privet, veronica, and bastard alaternus: vernal grafs has two styles; pepper, three.

DIANTHERA, in botany, a genus of the monogynia,

Diamond
Dianthera.

Dianthus.

gynia order, belonging to the diandria class of plants, for which there is no English name.—There is only one species, a native of Virginia and other parts of North America. It is a low herbaceous plant, with a perennial root, sending out upright stalks a foot high, garnished with long narrow leaves of an aromatic odour, standing close to the stalks; from the side of the stalks the footstalks of the flowers are produced, sustaining small spikes of flowers.—This plant is very difficult to be preserved in Britain; for though it is hardy enough to live in the open air, it is very subject to rot in winter. It may be propagated by seeds sown on a gentle hot-bed; and in the winter the plants must be kept in a dry stove.

DIANTHUS, CLOVE-GILLIFLOWER, CARNATION, PINK, SWEET-WILLIAM, &c. a genus of the digynia order, belonging to the decandria class of plants.—There are a great number of species; but not more than four that have any considerable beauty as garden-flowers, each of which furnishes some beautiful varieties. 1. The caryophyllus, or clove-gilliflower, including all the varieties of carnation. It rises with many short trailing shoots from the root, garnished with long, very narrow, evergreen leaves; and amidst them upright slender flower-stalks, from one to three feet high, emitting many side-shoots; all of which, as well as the main stalk, are terminated by large solitary flowers, having short oval scales to the calix, and crenated petals. The varieties of this are very numerous, and unlimited in the diversity of flowers. 2. The deltoides, or common pink, rises with numerous short leafy shoots crowning the root, in a tufted head close to the ground, closely garnished with small narrow leaves; and from the ends of the shoots, many erect flower-stalks from about 6 to 15 inches high, terminated by solitary flowers of different colours, single and double, and sometimes finely variegated. This species is perennial, as all the varieties of it, commonly cultivated, also are. 3. The Chinensis, Chinese, or Indian pink, is an annual plant with upright firm flower-stalks, branching erect on every side, a foot or 15 inches high, having all the branches terminated by solitary flowers of different colours and variegations, appearing from July to November. 4. The barbatous, or bearded dianthus, commonly called *sweet-william*. This rises with many thick leafy shoots, crowning the root in a cluster close to the ground; garnished with spear-shaped evergreen leaves, from half an inch to two inches broad. The stems are upright and firm, branching erect two or three feet high, having all the branches and main stem crowned by numerous flowers in aggregate clusters of different colours and variegations.

Culture. Though the carnations grow freely in almost any garden earth, and in it produce beautiful flowers, yet they are generally superior in that of a light loamy nature: and of this kind of soil the florists generally prepare a kind of compost in the following manner, especially for those fine varieties which they keep in pots. A quantity of loamy earth must be provided, of a light sandy temperature, from an upland or dry pasture-field or common, taking the top spit turf and all, which must be laid in a heap for a year, and turned over frequently. It must then be mixed with about one third of rotten dung of old hot-beds, or rotten neats dung, and a little sea-sand, form-

ing the whole into a heap again, to lie three, four, or six months, at which time it will be excellent for use; and if one parcel or heap was mixed with one of these kinds of dungs, and another parcel with the other, it will make a change, and may be found very beneficial in promoting the size of the flowers. This compost, or any other made use of for the purpose, should not be sifted, but only well broken with the spade and hands.—When great quantities of carnations are required, either to furnish large grounds, or for market, or when it is intended to raise new varieties, it is easily effected by sowing some seed annually in spring, in common earth, from which the plants will rise abundantly. Several good varieties may also be expected from the plants of each sowing; and possibly not one exactly like those from which the seed was sowed. The single flowers are always more numerous than the double ones; but it is from the latter only that we are to select our varieties. The season for sowing the seed, is any time from the 20th of March to the 15th of April.—The plants generally come up in a month after sowing: they must be occasionally weeded and watered till July, when they will be fit for transplanting into the nursery beds. These beds must be made about three feet wide, in an open situation; and taking advantage of moist weather, prick the plants therein four inches asunder, and finish with a gentle watering, which repeat occasionally till the plants have taken good root. Here they must remain till September, when they will be so well advanced in growth as to require more room; and should then have their final transplantation into other three feet wide beds of good earth, in rows 9 inches asunder, where they are to be placed in the order of quincunx. Here they are to remain all winter, until they flower, and have obtained an increase of the approved varieties of doubles by layers; and until this period, all the culture they require is, that if the winter should prove very severe, an occasional shelter of mats will be of advantage. In spring, the ground must be loosened with a hoe; they must be kept clear from weeds; and when the flower-stalks advance, they are to be tied up to sticks, especially all those that promise by their large flower-pods to be doubles.

The only certain method of propagating the double varieties is by layers. The proper parts for layers are those leafy shoots arising near the crown of the root, which, when about five, six, or eight inches long, are of a proper degree of growth for layers. The general season for this work is June, July, and the beginning of August, as then the shoots will be arrived at a proper growth for that operation; and the sooner it is done after the shoots are ready, the better, that they may have sufficient time to acquire strength before winter: those laid in June and July will be fit to take off in August and September, so will form fine plants in the month of October. The method of performing the work is as follows.—First provide a quantity of small hooked sticks for pegs. They must be three or four inches long, and their use is to peg the layers down to the ground. Get ready also in a barrow a quantity of light, rich mould, to raise the earth, if necessary, round each plant, and provide also a sharp penknife. The work is begun by stripping off all the leaves from the body of the shoots, and shortening those at top an inch or two evenly. Then choosing a strong

Dianthus

strong joint on the middle of the shoot or thereabouts, and on the back or under side thereof, cut with the penknife the joint half-way through, directing your knife upward so as to slit the joint up the middle, almost to the next joint above, by which you form a kind of tongue on the back of the shoot; observing that the swelling fleshy part of the joint remaining at the bottom of the tongue must be trimmed off, that nothing may obstruct the issuing of the fibres; for the layers always form their roots at that part. This done, loosen the earth about the plant; and, if necessary, add some fresh mould, to raise it for the more ready reception of the layers; then with your finger make a hollow or drill in the earth to receive the layer; which, bend horizontally into the opening, raising the top upright, so as to keep the gash or slit part of the layer open; and, with one of the hooked ticks, peg down the body of the layer, to secure it in its proper place and position, still preserving the top erect, and the slit open, and draw the earth over it an inch or two, bringing it close about the erect part of the shoot; and when all the shoots of each plant are thus laid, give directly some water to settle the earth close, and the work is finished. In dry weather the waterings must be often repeated, and in five or six weeks the layers will have formed good roots. They must then be separated with a knife from the old plant, gently raised out of the earth with the point of a knife or trowel in order to preserve the fibrous roots of the layers as entire as possible; and when thus taken up, cut off the naked sticky part at bottom close to the root, and trim the tops of the leaves a little. They are then ready for planting either into beds or pots. In November the fine varieties in pots should be moved to a sunny, sheltered, situation for the winter; and if placed in a frame, to have occasional protection from hard frost, it will be of much advantage. In the latter end of February, or some time in March, the layers in the small pots, or such as are in beds, should be transplanted with balls into the large pots, where they are to remain for flower. To have as large flowers as possible, curious florists clear off all side-shoots from the flower-stem, suffering only the main or top buds to remain for flowering. When the flowers begin to open, attendance should be given to assist the fine varieties, to promote their regular expansion, particularly the largest kinds called *butchers*, whose flowers are sometimes three or four inches diameter. Unless these are assisted by art, they are apt to burst open on one side, in which case the flower will become very irregular: therefore, attending every day at that period, observe, as soon as the calix begins to break, to cut it a little open, at two other places in the indenting at top with narrow-pointed scissors, and hereby the more regular expansion of the petals will be promoted; observing, if one side of any flower comes out faster than another, to turn the pot about, that the other side of the flower may be next the sun, which will also greatly promote its regular expansion. When any fine flower is to be blown as large and spreading as possible, florists place spreading paper collars round the bottom of the flowers, on which they may spread their petals to the utmost expansion. These collars are made of stiff, white paper, cut circular, about three or four inches over, having a hole in the middle to receive the bottom of the flower,

and one side cut open to admit it. This is to be placed round the bottom of the petals in the inside of the calix, the leaves of which are made to spread flat for its support: the petals must then be drawn out and spread upon the collar to their full width and extent; the longest ones undermost, and the next longest upon these; and so on; observing that the collar must no where appear wider than the flower; and thus a carnation may be rendered very large and handsome.

These directions will answer equally well for the propagation of the pinks and sweet-williams, tho' neither of these require such nicety in their culture as the carnations.

DIAPASON, in music, a musical interval, by which most authors who have wrote on the theory of music, use to express the OCTAVE of the Greeks.

DIAPASON, among the musical instrument-makers, a kind of rule or scale whereby they adjust the pipes of their organs, and cut the holes in their hautboys, flutes, &c. in due proportion for performing the tones, semitones, and concords, just.

DIAPASON-Diaex, in music, a kind of compound concord, whereof there are two sorts; the greater, which is in the proportion of 10-3; and the lesser, in that of 16-5.

DIAPASON Diapente, in music, a compound consonance in a triple ratio, as 3-9. This interval, says Martianus Capella, consists of 9 tones and a semitone; 19 semitones, and 38 dieses. It is a symphony made when the voice proceeds from the first to the twelfth sound.

DIAPASON Diatessaron, in music, a compound concord founded on the proportion of 8 to 3. To this interval Martianus Capella allows 8 tones and a semitone; 17 semitones, and 34 dieses. This is when the voice proceeds from its first to its eleventh sound. The moderns would rather call it the *clavichord*.

DIAPASON Ditone, in music, a compound concord, whose terms are as 10-4, or as 5-2.

DIAPASON Semiditone, in music, a compound concord, whose terms are in the proportion of 12-5.

DIAPADESIS, in medicine, a transudation of the fluids through the sides of the vessels that contain them, occasioned by the blood's becoming too much attenuated, or the pores becoming too patent.

DIAPENTE, in the ancient music, an interval marking the second of the concords, and with the diatessaron an octave. This is what in the modern music is called a *fifth*.

DIAPHANOUS, an appellation given to all transparent bodies, or such as transmit the rays of light *. * See *Optics*.

DIAPHORESIS, in medicine, an elimination of the humours in any part of the body thro' the pores of the skin. See *PERSPIRATION*.

DIAPHORETICS, among physicians, all medicines which promote perspiration.

DIAPHRAGM. See *ANATOMY*, n° 370.

DIAPORESIS, a figure in oratory, expressing the uncertainty of the speaker how he shall proceed in his discourse.

DIARBECK, or **DIARBÈKER**, the modern name of the province of MESOPOTAMIA in Turkey in Asia.

DIARRHOEA, or **LOOSENESS**, in medicine, is a frequent and copious evacuation of liquid excrement by stool. See (the *Index* subjoined to) *MEDICINE*.

DIAR-

Diarthrosis

DIARTHROSIS. See ANATOMY, n° 2. c.

DIARY, among traders, denotes a day-book, containing the proceedings of one day.

DIACHISM, among musicians, denotes the difference between the comma and enharmonic diesis, commonly called the *lessor comma*.DIASCORDIUM, in pharmacy, a celebrated composition, so called from *seordum*, one of its ingredients. See PHARMACY, n° 888.DIASTOLE, among physicians, signifies the dilatation of the heart, auricles, and arteries; and stands opposed to the *SYSTOLE*, or contraction of the same parts. See ANATOMY, n° 388.DIASTOLE, in grammar, a figure in prosody whereby a syllable naturally short is made long. Such is the first syllable of *Priamides* in the following verse of Virgil: *Atque hic Priamides! nihil o tibi, amice, relictum.*

DIASYRMUS, in rhetoric, a kind of hyperbole, being an exaggeration of some low, ridiculous thing.

DIATESSARON, among ancient musicians, a concord, or harmonical interval, composed of a greater tone, a less tone, and one greater semitone: its proportion in numbers is as 4 : 3.

DIATONICK, in music, (compounded of two Greek words, *viz.* the preposition *dia*, signifying a transition from one thing to another, and the substantive *tonos*, importing a given degree of tension or musical note), is indifferently applied to a scale or gammut, to intervals of a certain kind, or to a species of music, whether in melody or harmony, composed of these intervals. Thus we say the *diatonick series*, a *diatonick interval*, *diatonick melody* or harmony. As the *diatonick scale* forms the system of *diatonick music*, and consists of *diatonick intervals*, it will be necessary, for understanding the former, that we should explain the latter. See INTERVAL.

DIATRAGACANTH, in pharmacy, a name applied to certain powders, of which gum tragacanth is the chief ingredient. See PHARMACY, n° 825. b.

DIAUGOPHRAGMIA, in natural history, a genus of fossils of the order of septariae, whose partitions, or septa, consist of spar with an admixture of crystal. Of this genus there are three species. 1. A red kind, with brownish yellow partitions. 2. A brownish yellow kind, with whitish partitions. 3. A bluish-white kind, with straw-coloured partitions.

DIBBLE, or DIBBER, a simple but useful implement in gardening, used for planting out all sorts of young plants, &c.

DIBBLING WHEAT. See WHEAT.

DICE, among gamblers, certain cubical pieces of bone or ivory, marked with dots on each of their faces, from one to six, according to the number of faces.

Sharps have several ways of falsifying dice. 1. By sticking a hog's bristle in them, so as to make them run high or low, as they please. 2. By drilling, and loading them with quicksilver: which cheat is found out by holding them gently by two diagonal corners; for if false, the heavy sides will turn always down. 3. By filing and rounding them. But all these ways fall far short of the art of the dice-makers; some of whom are so dexterous this way, that your sharpening gamblers will give any money for them.

Dice formerly paid 5 s. every pair imported, with an additional duty of 4 s. 5 $\frac{1}{2}$ d. for every 20 s. value up-

on oath; but are now prohibited to be imported.

Dicæarchus

DICÆARCHUS, a scholar of Aristotle, composed a great number of books which were much esteemed. Cicero and his friend Pomponius Atticus valued him highly. He wrote a book to prove, that men suffer more mischief from one another, than from all evils beside. And the work he composed concerning the republic of Lacedæmon was extremely honoured, and read every year before the youth in the assembly of the ephori. Geography was one of his principal studies, on which science there is a fragment of a treatise of his still extant, and preserved among the *Veteris geographiæ scriptores minores*.

DICHOTOMY, a term used by astronomers for that phasis or appearance of the moon, wherein she is bisected, or shews just half her disk. In this situation the moon is said to be in a quadrat aspect, or to be in her quadrature.

DICHOTOMY, in botany. See BOTANY, p. 1298.

DICKER, in old writers, denotes the quantity of ten hides of skins, whereof 20 made a last: also 10 pair of gloves, ten bars of iron, and the like, are sometimes expressed by the term *dicker*.DICKINSON (Edmund), a celebrated English physician and chemist, born in 1624. He studied and took his degrees at Merton-college, Oxford; and in 1655 published there his *Delphi Phœnicizantes*, &c. a most learned piece, in which he attempted to prove that the Greeks borrowed the story of the Pythian Apollo, and all that rendered the oracle at Delphos famous, from the Holy Scriptures, and the book of Joshua in particular: a work that procured him great reputation both at home and abroad. He practised physic first at Oxford; but removing to London in 1684, his good fortune in recovering the earl of Arlington from a dangerous sickness, procured his promotion to be physician in ordinary to Charles II. and to his household. As that prince understood and loved chemistry, Dr Dickinson grew into great favour at court; and was continued in his appointments under James II. After the abdication of his unfortunate master, being then in years, and afflicted with the stone, he retired from practice, and died in 1707. He published many other things, particularly *Physica vetus & vera*, &c. containing a system of philosophy chiefly framed on principles collected from the Mosiac history.DICTAMNUS, WHITE DITTANY, or *Fraxinella*: a genus of the monogynia order, belonging to the dicandria class of plants. There is only one species. It hath thick, penetrating, perennial roots, collected into a head at top, sending up erect stalks annually, two or three feet high, garnished with pinnated alternate leaves, of three or four pair of oblong stiff lobes, terminated by an odd one; and the stalks crowned by long, pyramidal, loose spikes of flowers, of white, red, and purple colours. They are very ornamental plants, and succeed in any of the common borders. The dittany which grows in Crete, Dalmatia, and the Morea, forms an article in the materia medica. The leaves, which are the only parts used, are imported from Italy. The best sort are well covered over with a thick white down, and now and then intermixed with purplish flowers. In smell and taste they somewhat resemble lemon-thyme, but have more of an aromatic

Dictator
Dictionary

matic flower, as well as a greater degree of pungency; when fresh they yield a considerable quantity of an excellent essential oil.

DICTATOR, in the policy of the ancient Romans, a magistrate invested with sovereign and even arbitrary power.

He had power of life and death; also to raise and disband troops, make war or peace, and that without the consent either of the senate or people, or being accountable for his proceedings. He was elected by one of the consuls in the night-time, on the frontiers of the commonwealth, and nowhere else; and the ordinary duration of his office was only for six months, during which time all other magistracies ceased, the tribuneship excepted. Whenever he appeared in public, he was attended by 24 lictors, or double the number allowed a consul. However, notwithstanding all this power, he could not go out of Italy, or even ride on horseback during a march, without leave from the people.

This office was accounted the safeguard of the commonwealth for 400 years together; till Sylla and Cæsar, by assuming the title of *perpetual dictators*, converted it into tyranny, and rendered the very name odious.

DICTION, the phrase, elocution, or style of a writer or speaker. See **ORATORY**, n° 99—121.

DICTIONARY, in its original acceptation, is the arranging all the words of a language according to the order of the alphabet, and annexing a definition or explanation to each word. When arts and sciences began to be improved and extended, the multiplicity of technical terms rendered it necessary to compile dictionaries either of science in general, or of particular sciences, according to the views of the compiler.

DICTIONARY of the English Language. The only attempt which has hitherto been made towards forming a regular dictionary of the English language, is that of the learned Dr Samuel Johnson. But altho' it is executed in a masterly manner, yet as it cannot be expected that an undertaking of this nature could be brought to perfection by one man, we shall venture to suggest a few circumstances which, if duly attended to, may perhaps be of some utility.

The design of every dictionary of language, is to explain, in the most accurate manner, the meaning of every word; and to shew the various ways in which it can be combined with others, in as far as this tends to alter its meaning. The dictionary which does this in the most accurate manner, is the most complete. Therefore the principal study of a lexicographer ought to be, to discover a method which will be best adapted for that purpose. Dr Johnson, with great labour, has collected the various meanings of every word, and quoted the authorities; but, would it not have been an improvement if he had given an accurate definition of the precise meaning of every word; pointed out the way in which it ought to be employed with the greatest propriety; showed the various deviations from that original meaning, which custom had so far established as to render allowable; and fixed the precise limits beyond which it could not be employed without becoming a vicious expression? With this view, it would have been necessary to exhibit the nice distinctions that take place between words which are

nearly synonymous. Without this, many words can only be defined in such a manner, as that they must be considered as exactly synonymous. We omit giving any quotations from Johnson, to point out these defects; and shall content ourselves with giving a few examples, to show how, according to our idea, a dictionary of the English language ought to be compiled.

IMMEDIATELY. *adv. of time.*

1. Instantly, without delay. Always employed to denote future time, and never past. Thus, we may say, *I will come immediately*; but not, *I am immediately come from such a place*. See **PRESENTLY**.
2. Without the intervention of any cause or event; as opposed to *mediately*.

PRESENTLY. *adv. of time.*

1. Instantly, without delay. Exactly synonymous with *immediately*; being never with propriety employed to denote any thing but future time.
2. Formerly it was employed to express present time. Thus, *The house presently possessed by such a one*, was often used: but this is now become a vicious expression; and we ought to say, *The house possessed at present*. It differs from *immediately* in this, that even in the most corrupt phrases it never can denote past time.

FORM. *subst.* The external appearance of any object, when considered only with respect to shape or figure. This term therefore, in the literal sense, can only be applied to the objects of the sight and touch; and is nearly synonymous with *figure*: but they differ in some respects. *Form* may be employed to denote more rude and unfinished shapes; *figure*, those which are more perfect and regular. *Form* can never be employed without denoting matter; whereas *figure* may be employed in the abstract: thus, we say a square or a triangular *figure*; but not a square or triangular *form*. And in the same manner we say, the *figure* of a house: but we must denote the substance which forms that figure, if we use the word *form*; as, *a shroud of the form of a house*, &c. See **FIGURE**.

2. In contrast to irregularity, or confusion. As beauty cannot exist without order, it is by a figure of speech employed to denote beauty, order, &c.
3. As *form* respects only the external appearance of bodies, without regard to their internal qualities, it is, by a figure of speech, employed in contrast to these qualities, to denote empty show, without essential qualities. In this sense it is often taken when applied to religious ceremonies, &c.
4. As *form* is employed to denote the external appearance of bodies; so, in a figurative sense, it is applied to reasoning, denoting the particular mode or manner in which this is conducted; as, *the form of a syllogism*, &c.
5. In the same manner it is employed to denote the particular mode of procedure established in courts of law; as, *the forms of law, religion*, &c.
6. *Form* is sometimes, although improperly, used to denote the different circumstances of the same body; as, *water in a fluid or a solid form*. But

as this phrase regards the internal qualities rather than the external figure, it is improper; and ought to be, *water in a fluid or a solid state*.

7. But when bodies of different kinds are compared with one another, this term may be employed to denote other circumstances than shape or figure: for we may say, *a juice exuding from a tree in the form of wax or resin*; although, in this case, the consistence, colour, &c. and not the external arrangement of parts, constitutes the resemblance.
8. From the regular appearance of a number of persons arranged in one long seat, such persons so arranged are sometimes called a *form*; as, *a form of students*, &c. And,
9. By an easy transition, the seat itself has also acquired that name.

GREAT. *adj.* A relative word, denoting largeness of quantity, number, &c. serving to augment the value of those terms with which it is combined, and opposed to *small* or *little*. The principal circumstances in which this word can be employed, are the following:

1. When merely inanimate objects are considered with regard to quantity, *great* is with propriety employed, to denote that the quantity is considerable; as, *a great mountain, a great house*, &c. and it is here contrasted with *small*. When *great* is thus employed, we have no other word that is exactly synonymous.
2. When inanimate objects are considered with regard to their extent, this term is sometimes employed, although with less propriety; as, *a great plain, a great field*, &c. And in this sense it is nearly synonymous with *large*; and they are often used indiscriminately, but with some difference of meaning: for, as *large* is a term chiefly employed to denote extent of superficies, and as *great* more particularly regards the quantity of matter; therefore, when *large* is applied to any object which is not merely superficial, it denotes that it is the extent of surface that is there meant to be considered, without regard to the other dimensions; whereas when the term *great* is employed, it has a reference to the whole contents. If, therefore, we say, *a large house, or a large river*, we express that the house, the river, have a surface of great extent, without having any necessary connection with the size in other respects. But if we say, *a great house, or a great river*, it at once denotes that they have not only a large surface, but are also of great size in every respect.
3. *Great*, when applied to the human species, never denotes the size or largeness of body, but is applied solely to the qualities of the mind. Thus, when we say, that *Socrates was a great man*, we do not mean that he was a man of great size, but that he was a man who excelled in the endowments of the mind. The terms which denote largeness of size in the human body are, *big, bulky, huge*, &c.
4. *Great* is sometimes applied to the human species, as denoting high rank. In this case it is oftener used in the plural number than otherwise. Thus

we say simply, *the great*, meaning the whole body of men in high station, as opposed to *mean*. It should seldom be employed in this sense, as it tends to confound dignity of rank with elevation of mind.

5. As this is a general term of augmentation, it may be joined with all nouns which denote *quantity, quality, number, excellence, or defects*; or such as imply *praise, blame, anger, contempt*, or any other affection of the mind.
6. It is employed to denote every step of ascending or descending consanguinity; as, *great-grandfather, great-grandson*, &c.

HIGH. *adj.* Exalted in a perpendicular direction at a distance from the surface of the earth. Opposed to *low*.

1. *High* is a term altogether indefinite, and is employed to express the degree of elevation of any inanimate body. Thus, we say, *a high mountain, a high house, steeple, tower, pillar*, &c. Nor is there any other word that can here be considered as synonymous; *lofty* being employed only to denote a very eminent degree of elevation.
2. To express the perpendicular elevation of vegetables, either *high* or *tall* may be employed, as being in this case nearly synonymous. We may therefore say, *a high or tall tree, a high or tall mast*, &c.: but with this difference between these two expressions, that *tall* can be more properly applied to those that are much elevated and of small dimensions; and *high*, to such as are more bulky, and of greater size.
3. The perpendicular height of man can never be expressed by the word *high*: *tall* being here the proper expression. And altho' *high* is sometimes used to express the height of other animals, yet it seems to be an improper expression. See **TALL**.
4. *High*, when applied to the human species, always refers to the mind; and denotes *haughtiness, stateliness, pride*, &c.; and, when combined with the expressions of any energy of the mind, it denotes that in a higher degree. In this sense, it is opposed to *meanness, abjectness, and humility*.
5. As this is an indefinite term, tending to denote any thing that is elevated above us, it may be combined with almost every noun which admits of this elevation. And as objects high above us are always out of our reach, it is in a metaphorical sense used to denote any thing that seems to be above the ordinary condition of mankind; or those qualities or endowments of mind that are not easily acquired: as, *dignity or elevation of sentiment; dignity of rank; acuteness in reasoning; difficult subjects; pride, haughtiness*, or any other quality which seems beyond the ordinary level of mankind; *dearths of price*, &c.
6. In the same manner we apply this term to time; which having a metaphorical resemblance to a river flowing on with an unceasing current thro' all successive ages, any thing of remote antiquity is denoted by the term *high*.
7. Likewise those degrees of latitudes far removed from the line, where the pole becomes more elevated.
8. And to some particular crimes, as being attended

tended with peculiar degrees of guilt; as, *high treason*.

TALL. *adj.* Something elevated to a considerable degree in a perpendicular direction. Opposed to *low*.

1. This term is chiefly employed to express the height of man, and other animals; and is applied to denote the height of the body only, without having any reference to the mind. When applied to man, no other word can be substituted in its stead; when applied to other animals, *high* is sometimes considered as nearly synonymous. See **HIGH**.

2. It is likewise employed to denote the perpendicular height of vegetables; and in this case, it is nearly synonymous with *high*. See **HIGH**.

3. It can in no case be employed to express the height of merely inanimate objects; as we can never say a *tall steeple, tower, or pillar*, but a *high steeple, &c.* For the distinctions in these cases, see **HIGH**.

LONG. *adj.* A relative term, denoting the distance between the extremes of any body, which is extended more in one of its geometrical dimensions than another. Opposed to *short*.

1. This term may be applied to all inanimate objects, of whatever kind, whose dimensions in one way exceeds the other, and when not in an erect posture, whatever be the other circumstances attending them; whether it relates to superficies alone, or to solid bodies; whether these be bounded or open, straight or crooked, flexible or rigid, or in any other circumstances whatever: thus we say, a *long or short line, a long or short ridge, street, ditch, rope, chain, staff, &c.* But it is to be observed, that although *long* is in the strict sense only opposed to *short*; yet as it expresses the extension of matter in one of its geometrical proportions, it is often contrasted by those words which express the other proportions when we mean only to describe the several proportions; as, a *table long and broad*. And as these several dimensions are expressed by different words, according to the various forms, modifications, and circumstances, in which bodies are found, therefore it is in this sense contrasted by a great diversity of terms: as, a *long and broad or wide, narrow or strait, street or lane, a long and thick, or small, rope, chain, staff, &c.* For the distinctions in these cases, see **BROAD**, **WIDE**, &c.

2. Objects necessarily fixed in an erect position can never have this term applied to them; and therefore we cannot say a *long, but a high, tower or steeple*. And for the same reason, while trees are growing and fixed in an erect position, we cannot apply this term to them; but when they are felled and laid upon the ground, it is quite proper and necessary. Thus, we do not say a *long, but a tall or high tree*, while it is growing; but we say a *long, not a tall, log of wood*: and in the same manner we say a *tall mast*, when it is fixed in the ship; but a *long mast*, while it lies upon the beach. See **TALL** and **HIGH**.

3. Those vegetables which are of a tender pliant nature, or so weak as not to be able to retain a fixt

position, being considered as of a middle nature between erect and prostrate bodies, admit of either of the terms *long, tall, or high*; as, a *long or tall rush or willow wand, or a long, tall, or high stalk of corn*. See **HIGH** and **TALL**.

4. The parts of vegetables, when considered as distinct from the whole, even when growing and erect, assume the term *long*: for we do not say a *tall, but a long, shoot of a tree; and a tree with a long stem*, in preference to a *tree with a high stem*.

5. For the same reason, a *staff, and pole*, even when fixed in a perpendicular direction, assume the word *long*, in preference to *tall or high*.

6. With regard to animals, the general rule is applied, without any exceptions: *tall*, and not *long*, being employed to denote the height of the human body, when in an erect posture; and *long*, and not *tall*, to denote its length when in an incumbent situation. *Long*, applied to all other animals which do not walk erect, always denotes their greatest length in a horizontal position from head to tail.

7. In a figurative sense, it denotes, with regard to time, any thing at a great distance from us.

8. As also, any thing that takes up much time before it is finished; as, a *long discourse, a protracted note in music, &c.*

BROAD. *adj.* The distance between the two nearest sides of any body, whose geometrical dimensions are larger in one direction than in another; and has a reference to superficies only, and never to the solid contents. Opposed to *narrow*.

1. *Broad*, in the strictest acceptation, is applied to denote those bodies only whose sides are altogether open and unconfined; as, a *broad table, a broad wheel, &c.*: and in these cases it is invariably contrasted by the word *narrow*; nor is there any other word which in these cases can be considered as synonymous with it, or used in its stead.

2. When any object is in some sort bounded on the sides, although not quite closed up, as a road, street, ditch, &c. either *broad or wide* may be employed, but with some difference of signification; *broad* being most properly used for those that are more open, and *wide* for those which are more confined: nor can this term be ever applied to such objects as are close bounded all around, as a house, a church, &c. *Wide* being here employed. For the more accurate distinctions in these cases, see the article **WIDE**.

WIDE. *adj.* A term employed to denote relative extent in certain circumstances. Opposed to *narrow and strait*.

1. This term is in its proper sense applied only to denote the space contained within any body closed all round on every side; as a house, gate, &c.: and differs from *broad* in this, that it never relates to the superficies of solid objects, but is employed to express the capaciousness of any body which containeth vacant space; nor can capaciousness in this sense be expressed by any other word but *wide*.

2. As many bodies may be considered either with respect to their capaciousness, or superficial extent; in all these cases, either the term *broad or wide* may be used; as, a *broad or wide street or ditch*,

ditch, &c. but with a greater or less degree of propriety, according to the circumstances of the object, or the idea we wish to convey. In a street where the houses are low and the boundaries open, or in a ditch of small depth and large superficies, as this largeness of superficies bears the principal proportion, *broad* would be more proper: but if the houses are of great height, or the ditch of great depth, and capaciousness is the principal property that affects the mind, we would naturally say a *wide street* or *ditch*; and the fame may be said of all similar cases. But there are some cases in which both these terms are applied, with a greater difference of meaning; thus we say, a *broad* or a *wide gate*: But as the gate is employed to denote either the aperture in the wall, or the matter which closes that aperture, these terms are each of them used to denote that particular quality to which they are generally applied: and as the opening itself can never be considered as a superficies, the term *wide*, in this case, denotes the distance between the sides of the aperture; while, on the contrary, *broad* denotes the extent of matter fitted to close that aperture; nor can these two terms in any case be substituted for one another.

3. As a figurative expression, it is used as a cant phrase for a mistake: as, *you are wide of the mark*; that is, not near the truth.

NARROW. *adj.* A relative term, denoting a proportional smallness of distance between the sides of the superficies of plain bodies. Opposed to *broad*.

1. As this is only applied to superficies, it is exactly contrasted by *broad*, and is applied in all cases where the term *broad* can be used, (see **BROAD**); and in no other case but as a contrast to it, except the following.
2. It sometimes is employed to describe the smallness of space circumscribed between certain boundaries, as opposed to *wide*, and nearly synonymous with *strait*; as we say a *wide* or a *narrow house*, *church*, &c. For the necessary distinctions here, see the article **STRAIT**.
3. In a figurative sense it denotes *parsimony*, *poverty*, *confined sentiments*, &c.

STRAIT. *adj.* A relative term, denoting the extent of space in certain circumstances. Opposed to *wide*; see **WIDE**.

4. This term is employed, in its proper sense, to denote only space, as contained between surrounding bodies in such circumstances as to denote some degree of confinement; and is exactly opposed to *wide*: as, a *wide* or a *strait gate*, &c. See **WIDE**.
2. So necessary is it that the idea of confinement should be connected with this word, that in all those cases where the space contained is large, as in a church or house, we cannot express a smaller proportional width by this term. And as we have no other word to express space in these circumstances, we have been obliged to force the word *narrow* from its natural signification, and make it express this. See **NARROW**.
3. In some particular cases, *narrow* or *strait* may be employed to the same object; as, a *narrow* or a *strait lane*: but here *strait* is never employed but

where an idea of confinement is suggested, and where it is exactly contrasted to *wide*; nor can *narrow* be employed but in such circumstances where *broad* would be a perfect contrast to it. Therefore these two terms may be always employed in the same circumstances as those which contrast them may be. For an account of which, see **WIDE**.

3. The term *strait* is likewise in a peculiar manner used to denote the smallness of the internal diameter of those small bodies which are fitted to receive or contain others, as any kind of bag, tube, body-cloaths, mortoise, and others of the same kind; and in all these cases this term may be employed to denote the smallness of their lesser diameter, and never the term *narrow*. But in certain circumstances the word *tight* may be substituted for it. See **TIGHT**.
4. *Strait*, in a figurative sense, denotes any sort of confinement of sentiment or disposition.

TIGHT. *adj.* A term employed in certain circumstances to denote the internal capacity of particular bodies. Nearly synonymous with *strait*.

This term is confined entirely to denote the smallness of the internal dimensions of such objects as are formed to cover or to receive or contain other solid bodies, and can be employed in no other case. And although it agrees with *strait*, in always denoting confinement, and by being applicable to the same species of objects, yet it differs in the following respects: 1. If there be any difference of the diameter of the objects to which the term *strait* can be applied, it always has reference to the smaller; yet *tight* may be applied to any sort of confinement, whether it regards the length or breadth. 2. *Strait* can be applied to all bodies of capacity when of small diameter, without any sort of reference to the nature of the substance which it may be capable of containing. For we can say a *strait bag*, a *strait sleeve*, a *strait mortoise*, a *strait gate*, &c. whereas *tight* can only be applied to any body when it is considered as having reference to another body which is intended to be contained in it, and is pinched for want of room. Thus, we say, the *sleeve of a coat is too tight for the arm*, the *mortoise is too tight for the tenon*, &c.; but we cannot say, the *bag*, or the *gate*, is too tight, because these are fitted to receive any sort of objects. And hence it happens, that, in many cases, the dimensions of the same body may be expressed by *tight* or *strait* when considered in different circumstances. Thus, we may say, *this sleeve is too strait*, when we look at a coat when lying on the table, and consider its proportions; but it is not till we have tried it upon the arm that it is intended to cover, that we call it *tight*. And we may say, a *gate is too strait*, or *too tight*: but in the first case we consider it as being too confined for admitting objects to pass through it; and in the last, as being too confined with respect to the leaves that are to shut the aperture, not allowing them space to move with freedom.

These examples may serve to give some idea of the plan of an English Dictionary composed upon philosophical

Dictionary. phical principles: But, besides the circumstances above enumerated, there are many others which would require particular attention in the execution of a work of this kind. In the English language, a great variety of terms occur, which denote matter under certain general forms or circumstances, without regarding the minute diversities that may take place; as the word *cloth*, which denotes matter as manufactured into a particular form, including under it all the variety of stuffs manufactured in that particular way, of whatever materials, colours, texture, or fineness, they may be. The same may be said of *wood*, *iron*, *yarn*, and a great variety of terms of the same nature, some of which cannot assume any plural; while others admit of it in all cases, and others admit or refuse it according to the different circumstances in which they are considered. In a dictionary, therefore, all this variety of cases ought to be clearly and distinctly pointed out under each particular article: this is the more necessary, as some of these words have others formed from them, which might be readily mistaken for their plurals, altho' they have a very different signification; as *cloaths*, which does not denote any number of pieces or different kinds of *cloth*, but *wearing apparel*. The following example will illustrate this head.

WOOD. *fab.* A solid substance, of which the trunks and branches of trees consist.

1. This term is employed to denote the solid parts of vegetables of all kinds, in whatever form or circumstances they are found. Nor does this term admit of plural with propriety, unless in the circumstances after-mentioned: for we say, *many different kinds of woods*, in preference to *many kinds of woods*; or, we say, *oak*, *ash*, or *elm wood*, not *woods*.

2. But where we want to contrast *wood* of one quality or country with that of another, it admits of a plural: for we say, *white woods are in general softer than red*; or *West-Indian woods are in general of greater specific gravity than the European woods*: But unless where the colour, or some quality which distinguishes it from growing wood, is mentioned, this plural ought as much as possible to be avoided, as it always suggests an idea of growing wood.

3. *Wood* likewise denotes a number of trees growing near one another; being nearly synonymous with *forest*: See FOREST. In this sense it always admits of a plural; as, *The woods and wilds whose solitary gloom, &c.*

A Dictionary cannot be reckoned complete without explaining obsolete words; and if the terms of the several provincial dialects were likewise given, it would be of great utility: nor would this take much time; because a number of these words need no other explanation than to mark along with them the words which had come in their place, when there happened to be one perfectly synonymous: and in those cases where the same idea could not be expressed in modern language without a periphrasis, it would be of use to explain them distinctly; so that, when a writer found himself at a loss for a term, and obliged to search for one beyond the bounds of our own language, he might take one of these, when he found that it was expressive and energetic, in preference to another drawn from a

foreign language. This would at least have one good effect; it would make our language more fixed and stable; not to say more accurate and precise, than by borrowing from foreign languages. The following examples may serve to give some idea of the manner of treating this part of the work.

MOE, or MO. *adj.* An obsolete term, still employed in the Scotch dialect, and by them pronounced *mae*; denoting a greater number, and nearly synonymous with *more*: but it differs in this respect, that, in the Scotch dialect, *mae* and *mair* (English, *more*) are each employed in their distinct sphere, without encroaching upon one another; *mae* being employed to denote number, but never quantity or quality; and *mair*, to denote quantity and quality, but never number: thus they say *mae*, not *mair*, *apples*, *men*, &c. and they say *mair*, not *mae*, *cloth*, *earth*, *courage*, &c. See MAIR. Both of these terms are supplied by the word *more*; which, in the English language, is applied indiscriminately to denote quantity, quality, and number. See MORE.

THIR. *pron.* Obsolete; still employed in the Scotch dialect: the plural of *this*; and contrasted to *these*, in the same manner as *that* is to *this*.

As there is no word in the English language equivalent to this, we thus shew the manner in which it is employed. In the English language we say, *that stone or house*, pointing at one at a distance, *is larger or more commodious than this stone or this house*, which is supposed to be at hand. In the same manner, in the Scotch dialect, they say, *these* (or, as it is pronounced, *thae*) *stones are rubbier than thir stones*; denoting, that the former are at a distance, and the latter at hand. And, in the same manner, it is invariably applied to denote any present object in the plural number, as opposed to *these*: as *these or thir apples*, as at hand or at a distance; *these or thir trees*, &c.; but never in the singular number, as it is always *this* or *that tree, house*, &c.

As the English language is so exceedingly irregular in the pronunciation, the same letter in the same situation often assuming sounds totally different in different words, it is impossible to establish any general rules on this subject, which do not admit of many exceptions: therefore, a dictionary is the best means of ascertaining and pointing out the proper pronunciation of words. For, if the writer first pointed out all the different sounds that the same letter could ever be made to express, and assigned to every particular sound which each letter could be made to assume, a particular mark, which was appropriated to denote that particular sound of the letter whenever it occurred; by placing these particular marks above the letters in the dictionary, the sound of each letter would be pointed out in all cases with the utmost certainty. It would be impossible for us to illustrate this by examples, without first ascertaining all the sounds of each letter; which would lead us into a discussion too long for this place; and this is at present the more unnecessary, as the public have been long in expectation of a dictionary, by a very able hand, in which this particular will be attended to.

We shall only further observe, that, besides having the

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the accented syllable of every word *properly* distinguished in a dictionary to assist in the pronunciation, the English language requires another essential improvement, *viz.* the use of accents to distinguish the meaning of words and phrases; which, although it is not so properly confined to a lexicographer, yet it is not quite without his sphere. Thus the word *as* admits of two very different sounds, as well as different significations; as in this example, "Cicero was nearly as eloquent as Demosthenes;" in which the first *as* is pronounced *af*, and the last is pronounced *az*. Now, it often happens, that, in reading, the particular way in which it ought to be understood is not pointed out by the context, till after the word itself is pronounced, which has an equal chance at least of being pronounced wrong; whereas, if it were always accented when employed in the one sense, and not in the other, it would free the reader from this perplexity. There are other cases in which the use of proper accents in writing would be of great consequence; as at the beginning of a sentence, when it was put as a question, or used ironically, &c. the want of which every one must have observed. But as this does not so properly belong to the lexicographer as the grammarian, we shall here take no further notice of it.

The above examples, we hope, will be sufficient to give the reader some idea of the plan that we would propose; and enable him to determine, whether or not a dictionary, executed upon this plan, would convey to his mind a more perfect knowledge of the English language, than those dictionaries that have been hitherto published. These examples were given rather with a view to show the manner in which a work of this kind might be conducted, than as perfect and unexceptionable explanations of the several articles there enumerated; and therefore we did not think it necessary to produce any authorities, although we are sensible that they would be requisite in a work of this kind.

DICTYS (Cretensis), a very ancient historian, who serving under Idomeneus king of Crete in the Trojan war, wrote the history of that expedition in nine books; and Tzetzes tells us, that Homer formed his Iliad upon the plan of that history. It is however maintained, that the Latin history of Dictys which we have at present is spurious.

DIDACTIC, in the schools, signifies the manner of speaking, or writing, adapted to teach or explain the nature of things.

DIDACTIC Poetry. See **POETRY**, n° 69, &c.

DIDAPPER, in ornithology. See **COLYMBUS**.

DIDELPHIS, or **OPPOSSUM**, in zoology; a genus of quadrupeds belonging to the order of ferae, the characters of which are these: they have ten fore-teeth in the upper jaw, and eight in the under one. The dog-teeth are long; the tongue is somewhat ciliated; and they have a pocket formed by a duplicature of the skin of the belly, in which the dugs are included.

There are six species. 1. The marsupialis, with a long sharp-pointed nose; large, round, naked, and very thin ears; small, black, lively, eyes; long stiff hairs on each side the nose, and behind the eyes: the hind part of the neck and back covered with hair two inches long; the bottoms of a yellowish white, middle part black, ends whitish: the sides covered with hair

of a dirty and dusky colour; the belly with soft, woolly, dirty white hair: the tail, for near three inches, clothed with long hairs like those on the back; the rest of the tail covered with small scales. The tail of this animal has a disagreeable appearance, looking like the body of a snake, and has the same prehensile quality with that of some monkeys; the body is round and pretty thick, the legs short: on the lower part of the belly of the female is a large pouch, in which the teats are lodged, and where the young shelter as soon as they are born. The length of the body is 16 or 17 inches; that of the tail 14.—This creature inhabits many parts of America and the East Indies. It is very destructive to poultry, and sucks the blood without eating the flesh; it feeds also on roots and wild fruits, and is very active in climbing trees. It hunts eagerly after birds and their nests; and will hang suspended from the branches of a tree by its tail; then, by swinging its body, it will fling itself among the trees that grow in the neighbourhood. It walks very slow; and when pursued and overtaken, will feign itself dead. It is not easily killed, being as tenacious of life as a cat. When the female is about to bring forth, she makes a thick nest of dry grass in some close bush at the foot of a tree; and brings four, five, or six, young at a time. As soon as the young are brought forth, they take shelter in the pouch or false belly; and fasten so closely to the teats, that they cannot be separated without difficulty. They are blind, naked, and very small, when new-born, and resemble fetuses: it is therefore necessary that they should continue in that false belly, till they attain proper strength and sight; and are prepared to undergo what may be called a *second birth*. After this they run into the pouch as into an asylum in time of danger; and the parent carries them about with her. During the time of this second gestation, the female shews an excessive attachment to her young, and will suffer any torture rather than allow this receptacle to be opened; for she has the power of opening or closing it by the assistance of some very strong muscles. The flesh of the old animal is very good, like that of a sucking pig: the hair is dyed by the Indian women, and wove into garters and girdles: the skin is very fetid.

2. The murina, hath the face and upper parts of the body of a tawny colour; the belly yellowish white; the tail slender, and covered with minute scales to the very rump: the length from the nose to the tail, about six inches and a half; the tail of the same length: the female wants the false belly of the former; but on the lower part the skin forms on each side a fold, between which the teats are lodged. It inhabits the hot parts of South America; agrees with the others in its food manners, and the prehensile power of its tail. It brings from 10 to 14 young ones at a time: they assist themselves to the teats as soon as they are born, and remain attached like inanimate things, till they attain growth and vigour to shift a little for themselves.

3. The Mexican oppossum, is of an ash-colour on the head and upper parts of the body: the belly and legs whitish: the tail long and pretty thick, varied with brown and yellow; it is hairy near an inch from its origin, the rest naked: the length from the nose to the tail, about seven inches and a half; of the tail, more than 11.—It inhabits the mountains of Mexico,

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fig. 7.

and lives in trees, where it brings forth its young: when in any fright, they embrace the parent closely; the tail is prehensile, and serves instead of a hand.

4. The short-tailed opossum, hath the back of a dull red, and the belly of a paler colour; the tail scarce half the length of the body, thick at the base, and gradually lessening towards the end: no false belly. It inhabits South America: the young adhere to the teats as soon as born. Seba says, it lives in woods, and brings from 9 to 12 young ones at a time.

5. The opossum of Surinam, hath the upper part of the body reddish, mixed with a light ash-colour and yellow: the under-parts are of a dirty yellowish white; the bottom of the tail is covered with hair, for near two inches and a half; the rest naked: the length from the nose to the tail near nine inches; the tail ten. It inhabits Surinam, and perhaps may be the species called by the colonists the *cane-rat*; which is so destructive to the sugar-canes.

6. The dorifera, or merian opossum, hath the head and upper part of the body, of a yellowish brown colour; the belly white, and tinged with yellow; the tail very long and slender, and, except at the base, quite naked.—It is a native of Surinam, and burrows under ground: it brings five or six young at a time, which follow their parent: On any apprehension of danger, they all jump on her back; and, twining their tails round her's, she immediately runs with them into her hole.

DIDO, the daughter of Belus king of Tyre, and the wife of Sichæus. To avoid the tyranny of her brother Pygmalion, who had put her husband to death, she fled into Africa, where she built Carthage, 882 B. C. At length Hiarbas, king of the Gethuli, having demanded her in marriage, and threatening, in case of refusal, to make war on the Carthaginians, Dido caused a pile to be erected, and after having sacrificed victims, as if to appease the manes of her husband, ascended the pile, and stabbed herself with a poinard in sight of the people. From this action she obtained the name of *Dido*, or the *Resolute Woman*, the being before called *Elissa*.—Virgil makes her cotemporary with Æneas, and his chronology is justified by Sir Isaac Newton; while other learned men maintain that Æneas was never either in Carthage or Italy, and that he lived above 300 years before Dido.

DIDUS, or popo, in ornithology, a genus belonging to the order of gallinæ. The bill is contracted in the middle by two transverse rugæ; each mandible is inflexed at the point; and the face is bare behind the eyes. The body is blackish and cloudy; the tail is very short, and the upper part of the bill red. It is a native of India; and is incapable of flying, because the wings are not furnished with feathers sufficient for that purpose.

DIDYMUS of Alexandria, an ecclesiastical writer of the fourth century; who, though he is said to have lost his eyes at five years of age, when he had scarcely learned to read, yet applied so earnestly to study, that he attained all the philosophic arts in a high degree, and was thought worthy to fill the chair in the famous divinity-school at Alexandria. He was the author of a great number of works: but all we have now remaining, are a Latin translation of his book upon the *Holy Spirit*, in the works of St Jerome who was the trans-

lator; short strictures on the Canonical epistles; and a book against the Manichees.

DIDYNAMIA, (from *dis* twice, and *dynamis* power), the name of the 14th class in Linnæus's sexual method; consisting of plants with hermaphrodite flowers, which have four stamina or male organs, two of which are long and two short. See BOTANY, p. 1292, and Plate LIX. fig. 14.

DIEMERBROEK (Ibbrand), a learned professor of physic and anatomy at Utrecht, was born at Montfort, in Holland, in 1609, where he acquired great reputation by his lectures and his practice; and died at Utrecht, in 1674. He wrote a treatise on the plague, which is esteemed; and several learned works in anatomy and medicine; which were printed at Utrecht in 1685, in folio.

DIEPPE, a handsome sea-port town of France, in Upper Normandy, in the territory of Caux; with a good harbour, an old castle, and two handsome moles. The parish-church of St James is an elegant structure; and there is a tower from which, in fine weather, the coast of England may be seen. The principal trade consists in herrings, whittings, mackerel, ivory, toys, and laces. It was bombarded by the English in 1694, and it is not now so considerable as it was formerly. It is seated at the mouth of the river Argues, in E. Long. 1. 9. N. Lat. 49. 55.

DIES MARCHIÆ was the day of congress, or meeting of the English and Scots, annually appointed to be held on the marches or borders, in order to adjust all differences between them.

DIESIS, in music, is the division of a tone less than a semitone; or an interval consisting of a less or imperfect semitone.

Diclis is the smallest and softest change or inflexion of the voice imaginable: it is called a *faint*, expressed thus X, by a St Andrew's cross, or saltier.

DIET, in medicine, according to some, comprehends the whole regimen, or rule of life, with regard to the six non-naturals; air, meats, and drinks, sleep, and watching, motion and rest, passions of the mind, retentions and excretions. Others restrain the term of *diet*, to what regards eating and drinking, or solid aliments and drinks. See FOOD.

The natural constitution of the body of man is such, that it can easily bear some changes and irregularities, without much injury: had it been otherwise, we should be almost constantly put out of order by every slight cause. This advantage arises from those wonderful communications of the inward parts, whereby, when one part is affected, another comes immediately to its relief.

Thus, when the body is too full, nature causes evacuations through some of the outlets: and for this reason it is, that diseases from inanition are generally more dangerous than from repletion; because we can more expeditiously diminish than increase the juices of the body. Upon the same account also, though temperance be beneficial to all men, the ancient physicians advised persons in good health and their own masters, to indulge a little now and then, by eating and drinking more plentifully than usual. But, of the two, intemperance in drinking is safer than in eating; and if a person has committed excess in the latter, cold water drank upon a full stomach will help digestion; to which

Didymia
Diet.

it will be of service to add lemon juice, or elixir of vitriol. If he has eaten high seasoned things, rich sauces, &c. then let him sit up for some little time, and afterwards sleep. But if a man happen to be obliged to fast, he ought to avoid all laborious work. From satiety it is not proper to pass directly to sharp hunger, nor from hunger to satiety; neither will it be safe to indulge absolute rest immediately after excessive labour, nor suddenly fall to hard work after long idleness. In a word, therefore, all changes in the way of living should be made by degrees.

The softer and milder kinds of aliment are proper for children, and for youth the stronger. Old people ought to lessen the quantity of their food, and increase that of their drink: but yet some allowance is to be made for custom, especially in the colder climates like ours; for as in these the appetite is keener, so is the digestion better performed. *Mead's Monita & Præcepta.*

DIET-Drinks, a form in physic, including all the medicated wines, ales, and wheys, used in chronic cases. They require a course or continuation to answer any intention of moment.

DIET of Appearance, in Scots law, the day to which a defender is cited to appear in court; and every other day to which the court shall afterwards adjourn the consideration of the question.

DIET, or DYET, in matters of policy, is used for the general assembly of the states or circles of the empire of Germany, and of Poland, to deliberate and concert measures proper to be taken for the good of the public.

The general diet of the empire is usually held at Ratisbon: it consists of the emperor, the nine electors, and the ecclesiastical princes; viz. the archbishops, bishops, abbots, and abbesses; the secular princes, who are dukes, marquises, counts, viscounts, or barons; and the representatives of the imperial cities. It meets on the emperor's summons, and any of the princes may send their deputies thither in their stead. The diet makes laws, raises taxes, determines differences between the several princes and states, and can relieve the subjects from the oppressions of their sovereigns.

The diet of Poland, or the assembly of the states, consisted of the senate and deputies, or representative of every palatinate or county and city; and usually met every two years, and oftener upon extraordinary occasions, if summoned by the king, or, in his absence, by the archbishop of Gnesna. The general diet of Poland sat but six weeks, and often broke up in a tumultuous manner: for one dissenting voice prevented their passing any laws, or coming to any resolutions on what was proposed to them from the throne. Switzerland has also a general diet, which is usually held every year at Baden, and represents the whole Helvetic body: it seldom lasts longer than a month. Besides this general diet, there are diets of the protestant cantons, and diets of the catholic ones: the first assemble at Araw, and are convoked by the canton of Zurich; the second at Lucern, convoked by the canton of that name.

DIETETIC, denotes something belonging to diet, but particularly that part of physic which treats of this subject. See **DIET**, **FOOD**, and **DRINK**.

DIETS, a town in the circle of the Upper Rhine in Germany, situated on the river Lohr, twenty miles north of Mentz, and subject to the house of Nassau-Orange. E. Long. 7. 40. N. Lat. 50. 28.

DIEU ET MON DROIT, i. e. *God and my right*, the motto of the royal arms of England, first assumed by king Richard I. to intimate that he did not hold his empire in vassalage of any mortal.

It was afterwards taken up by Edward III. and was continued without interruption to the time of the late king William, who used the motto *Je maintiendrai*, though the former was still retained upon the great seal. After him queen Anne used the motto *Semper eadem*, which had been before used by queen Elizabeth; but ever since queen Anne, *Dieu et mon droit* continues to be the royal motto.

DIFFERENCE, in mathematics, is the remainder, when one number or quantity is subtracted from another.

DIFFERENCE, in logic. See **LOGIC**, n° 20—24.

DIFFERENCE, in heraldry, a term given to a certain figure added to coats of arms, serving to distinguish one family from another; and to shew how distant younger branches are from the elder or principal branch.

DIFFERENTIAL, **DIFFERENTIALE**, in the higher geometry, an infinitely small quantity, or a particle of quantity so small as to be less than any assignable one. It is called a *differential*, or *differential quantity*, because frequently considered as the difference of two quantities; and, as such, is the foundation of the *differential calculus*: Sir Isaac Newton, and the English, call it a *moment*, as being considered as the momentary increase of quantity. See **FLUXIONS**.

DIEXAHEDRIA, in natural history, a genus of pellucid and crystalliform spars, composed of two pyramids, joined base to base, without any intermediate column: the diexahedria are dodecahedral, or composed of two hexangular pyramids.

DIFFUZE, an epithet applied to such writings as are wrote in a prolix manner. Among historians, Salust is reckoned sententious, and Livy diffuse. Thus also among the orators, Demosthenes is close and concise; Cicero, on the other hand, is diffuse.

DIFFUSION, the dispersion of the subtle effluvia of bodies into a kind of atmosphere all round them. Thus the light diffused by the rays of the sun, issues all round from that amazing body of fire.

DIGASTRICUS, in anatomy, a muscle of the lower jaw, called also **BIVENTER**.

DIGBY (Sir Kenelm), became very illustrious in the 17th century for his virtue and learning. He was descended of an ancient family in England. His great-grandfather, accompanied by six of his brothers, fought valiantly at Bosworth-field on the side of Henry VII. against the usurper Richard III. His father, Everard, suffered himself to be engaged in the gun-powder plot against king James I. and for that crime was beheaded. His son wiped off that stain, and was restored to his estate. King Charles I. made him gentleman of the bed-chamber, commissioner of the navy, and governor of the Trinity-house. He granted him letters of reprisal against the Venetians, by virtue whereof he took several prizes with a small fleet which he commanded. He fought the Venetians near the port of

Scan-

Digby Scanderoun, and bravely made his way through them with his booty. He was a great lover of learning, and translated several authors into English; and his "Treatise of the Nature of Bodies and the Immortality of the Soul," discovers great penetration and extensive knowledge. He applied to chemistry; and found out several useful medicines, which he gave freely away to people of all sorts, especially to the poor. He distinguished himself particularly by his sympathetic powder for the cure of wounds at a distance; his discourse concerning which made a great noise for a while. He had conferences with Des Cartes about the nature of the soul.

In the beginning of the civil wars, he exerted himself very vigorously in the king's cause; but he was afterwards imprisoned, by the parliament's order, in Winchester house, and had leave to depart thence in 1643. He afterwards compounded for his estate, but was ordered to leave the nation; when he went to France, and was sent on two embassies to pope Innocent X. from the queen, widow to Charles I. whose chancellor he then was. On the restoration of Charles II. he returned to London; where he died in 1665, aged 60.

This eminent person was, for the early pregnancy of his parts, and his great proficiency in learning, compared to the celebrated Picus de Mirandola, who was one of the wonders of human nature. His knowledge, though various and extensive, appeared to be greater than it really was; as he had all the powers of elocution and address to recommend it. He knew how to shine in a circle of ladies, or philosophers; and was as much attended to when he spoke on the most trivial subjects, as when he spoke on the most important. It is said that one of the princes of Italy, who had no child, was desirous that his princeps should bring him a son by Sir Kenelm, whom he esteemed a just model of perfection.

DIGEST, in matters of literature, a collection of the decisions of the Roman lawyers properly digested, or arranged under distinct heads, by order of the emperor Justinian. It constitutes the first part or volume of the civil law.

DIGESTION, in medicine, is the dissolution of the aliments into such minute parts as are fit to enter the lacteal vessels, and circulate with the mass of blood. See **ANATOMY**, n^o 366—369.

DIGESTION, in chemistry, is an operation which consists in exposing bodies to a gentle heat, in proper vessels, and during a certain time. This operation is very useful to favour the action of certain substances upon each other; as, for example, of well calcined, dry, fixed alkali upon rectified spirit of wine. When these two substances are digested together in a matrafs, with a gentle sand-bath heat, the spirit of wine acquires a yellow-reddish colour, and an alkaline quality. The spirit would not so well acquire these qualities by a stronger and shorter heat.

Want of DIGESTION, a disease attended with pain and a sense of weight, with eructations and copious flatulencies from corrupt humours in the stomach.

DIGESTIVE, in medicine, such remedies as strengthen and increase the tone of the stomach, and assist in the digestion of foods. To this class belong all stomachics and strengtheners or corroborants.

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DIGGING, among miners, is appropriated to the operation of freeing any kind of ore from the bed or stratum in which it lies, where every stroke of their tools turns to account: in contradistinction to the openings made in search of such ore, which are called *hatches*, or *essay-hatches*; and the operation itself, *tracing of mines*, or *hatchbing*.

When a bed of ore is discovered, the bee-men, so called from the instrument they use, which is a kind of pick-ax, free the ore from the fossils around it; and the shovel-men throw it up from one shamble to another, till it reaches the mouth of the hatch.

In some mines, to save the expence as well as fatigue of the shovel-men, they raise the ore by means of a winder and two buckets, one of which goes up as the other comes down.

DIGIT, in astronomy, the twelfth part of the diameter of the sun or moon, used to express the quantity of an eclipse. Thus an eclipse is said to be of six digits, when fix of these parts are hid.

DIGITS, or *Monades*, in arithmetic, signify any integer under 10; as 1, 2, 3, 4, 5, 6, 7, 8, 9.

DIGIT is also a measure taken from the breadth of the finger. It is properly $\frac{1}{4}$ of an inch, and contains the measure of four barley-corns laid breadth-wise.

DIGITALIS, *fox-glove*; a genus of the angiospermia order, belonging to the didynamia class of plants.—There are six species; five of which are hardy, herbaceous, biennial and perennial plants, and the sixth a tender shrubby exotic. The herbaceous species rise two or three feet high, crowned with spikes of yellow iron-coloured or purple flowers. The shrubby sort rises five or six feet high, having spear-shaped rough leaves, four or five inches long, and half as broad; the branches being all terminated with flowers growing in loose spikes.—All the species are easily raised by seeds.—An ointment made of the flowers of purple fox-glove and May-butter, is much commended by some physicians for scrophulous ulcers which run much and are full of matter. Taken internally, this plant is a violent purgative and emetic; and is therefore only to be administered to robust constitutions. The country people in England frequently use a decoction of it with poly-pody of the oak in epileptic fits. In Italy, fox-glove is esteemed an excellent vulnerary.

DIGITATED, among botanists. See **BOTANY**, p. 1297.

DIGLYPH, in architecture, a kind of imperfect triglyph, console, or the like; with two channels or engravings, either circular or angular.

DIGNE, an episcopal town of Provence in France, famous for the baths that are near it. It is seated on a river called Marderic; in E. Long. 5. 27. N. Lat. 44. 5.

DIGNITARY, in the canon law, a person who holds a dignity, that is, a benefice which gives him some pre-eminence over mere priests and canons. Such is a bishop, dean, arch-deacon, prebendary, &c.

DIGNITY, as applied to the titles of noblemen, signifies honour and authority. And *dignity* may be divided into superior and inferior; as the titles of duke, earl, baron, &c. are the highest names of *dignity*; and those of baronet, knight, squire, at law, &c. the lowest. **NOBILITY** only can give so high a name of dignity as to supply the want of a surname in legal proceedings;

Dignity.

ings; and as the omission of a name of dignity may be pleaded in abatement of a writ, &c. so it may be where a peer who has more than one name of dignity, is not named by the Most Noble. No temporal dignity of any foreign nation can give a man a higher title here than that of *ESQUIRE*.

DIGNITY, in the human character, the opposite of *Meanness*.

Elements of
Criticism.

Man is endued with a *SENSE* of the worth and excellence of his nature: he deems it more perfect than that of the other beings around him; and he perceives that the perfection of his nature consists in virtue, particularly in virtues of the highest rank. To express that sense, the term *dignity* is appropriated. Further, to behave with dignity, and to refrain from all mean actions, is felt to be, not a virtue only, but a duty: it is a duty every man owes to himself. By acting in that manner, he attracts love and esteem: by acting meanly, or below himself, he is disapproved and contemned.

This sense of the dignity of human nature, reaches even our pleasures and amusements. If they enlarge the mind by raising grand or elevated emotions, or if they humanize the mind by exercising our sympathy, they are approved as suited to the dignity of our nature: if they contract the mind by fixing it on trivial objects, they are contemned as not suited to the dignity of our nature. Hence, in general, every occupation, whether of use or amusement, that corresponds to the dignity of man, is termed *manly*; and every occupation below his nature, is termed *childish*.

To those who study human nature, there is a point which has always appeared intricate: How comes it that generosity and courage are more esteemed, and below more dignity, than good-nature, or even justice; though the latter contribute more than the former to private as well as to public happiness? This question, bluntly proposed, might puzzle even a philosopher; but, by means of the foregoing observations, will easily be solved. Human virtues, like other objects, obtain a rank in our estimation, not from their utility, which is a subject of reflection, but from the direct impression they make on us. Justice and good-nature are a sort of negative virtues, that scarce make any impression but when they are transgressed: courage and generosity, on the contrary, producing elevated emotions, enliven greatly the sense of a man's dignity, both in himself and in others; and for that reason, courage and generosity are in higher regard than the other virtues mentioned: we describe them as grand and elevated, as of greater dignity, and more praise-worthy.

This leads us to examine more directly emotions and passions with respect to the present subject: and it will not be difficult to form a scale of them, beginning with the meanest, and ascending gradually to those of the highest rank and dignity. Pleasure felt as at the organ of sense, named *corporeal pleasure*, is perceived to be low; and when indulged to excess, is perceived also to be mean: for that reason, persons of any delicacy dissemble the pleasure they take in eating and drinking. The pleasures of the eye and ear, having no organic feeling, and being free from any sense of meanness, are indulged without any shame: they even rise to a certain degree of dignity when their objects are grand or elevated. The same is the case of the sym-

Dignity.

pathetic passions: a virtuous person behaving with fortitude and dignity under cruel misfortunes, makes a capital figure; and the sympathizing spectator feels in himself the same dignity. Sympathetic distress at the same time never is mean: on the contrary, it is agreeable to the nature of a social being, and has general approbation. The rank that love possesses in the scale, depends in a great measure on its object: it possesses a low place when founded on external properties merely; and is mean when bestowed on a person of inferior rank without any extraordinary qualification: but when founded on the more elevated internal properties, it assumes a considerable degree of dignity. The same is the case of friendship. When gratitude is warm, it animates the mind; but it scarce rises to dignity. Joy bestows dignity when it proceeds from an elevated cause.

If we can depend upon induction, dignity is not a property of any disagreeable passion: one is slight, another severe; one depresses the mind, another animates it; but there is no elevation, far less dignity, in any of them. Revenge, in particular, though it enflame and swell the mind, is not accompanied with dignity, not even with elevation: it is not however felt as mean or groveling, unless when it takes indirect measures for gratification. Shame and remorse, though they sink the spirits, are not mean. Pride, a disagreeable passion, bestows no dignity in the eye of a spectator. Vanity always appears mean; and extremely so where founded, as commonly happens, on trivial qualifications.

We proceed to the pleasures of the understanding, which possess a high rank in point of dignity. Of this every one will be sensible, when he considers the important truths that have been laid open by science; such as general theorems, and the general laws that govern the material and moral worlds. The pleasures of the understanding are suited to man as a rational and contemplative being, and they tend not a little to ennoble his nature; even to the Deity he stretcheth his contemplations, which, in the discovery of infinite power, wisdom, and benevolence, afford delight of the most exalted kind. Hence it appears, that the fine arts, studied as a rational science, afford entertainment of great dignity; superior far to what they afford as a subject of taste merely.

But contemplation, however in itself valuable, is chiefly respected as subservient to action; for man is intended to be more an active than a contemplative being. He accordingly shows more dignity in action than in contemplation: generosity, magnanimity, heroism, raise his character to the highest pitch: these best express the dignity of his nature, and advance him nearer to divinity than any other of his attributes.

Having endeavoured to assign the efficient cause of dignity and meanness, by unfolding the principle on which they are founded, we proceed to explain the final cause of the dignity or meanness bestowed upon the several particulars above-mentioned, beginning with corporeal pleasures. These, as far as useful, are, like justice, fenced with sufficient sanctions to prevent their being neglected: hunger and thirst are painful sensations; and we are incited to animal love by a vigorous propensity: were corporeal pleasures dignified over and above with a place in a high class, they would infallibly

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Digynia.

libly overturn the balance of the mind, by outweighing the social affections. This is a satisfactory final cause for refusing to these pleasures any degree of dignity: and the final cause is not less evident of their meanness, when they are indulged to excess. The more refined pleasures of external sense, conveyed by the eye and the ear from natural objects and from the fine arts, deserve a high place in our esteem, because of their singular and extensive utility: in some cases they rise to a considerable dignity; and the very lowest pleasures of the kind are never esteemed mean or grovelling. The pleasure arising from wit, humour, ridicule, or from what is simply ludicrous, is useful, by relaxing the mind after the fatigue of more manly occupation: but the mind, when it surrenders itself to pleasure of that kind, loses its vigour, and sinks gradually into sloth. The place this pleasure occupies in point of dignity, is adjusted to these views: to make it useful as a relaxation, it is not branded with meanness; to prevent its usurpation, it is removed from that place but a single degree: no man values himself for that pleasure, even during gratification; and if it have engrossed more of his time than is requisite for relaxation, he looks back with some degree of shame.

In point of dignity, the social emotions rise above the selfish, and much above those of the eye and ear: man is by his nature a social being; and to qualify him for society, it is wisely contrived, that he should value himself more for being social than selfish.

The excellency of man is chiefly discernible in the great improvements he is susceptible of in society: these, by perseverance, may be carried on progressively, above any assignable limits; and even abstracting from revelation, there is great probability, that the progress begun here will be completed in some future state. Now, as all valuable improvements proceed from the exercise of our rational faculties, the Author of our nature, in order to excite us to a due use of these faculties, hath assigned a high rank to the pleasures of the understanding: their utility, with respect to this life as well as a future, intitles them to that rank.

But as action is the aim of all our improvements, virtuous actions justly possess the highest of all the ranks. These, we find, are by nature distributed into different classes, and the first in point of dignity assigned to actions that appear not the first in point of use: generosity, for example, in the sense of mankind is more respected than justice, though the latter is undoubtedly more essential to society; and magnanimity, heroism, undaunted courage, rise still higher in our esteem: The reason of which is explained above.

DIGNITY, in composition. See ORATORY, n° 48.

DIGON, an ancient, handsome, rich, and very considerable town of France; capital of Burgundy, and of the Digois; with a parliament, bishop's see, a mint, an university, academy of sciences, an abbey, and a citadel: most part of the churches and public structures are very beautiful, and in one of the squares there is an equestrian statue of Lewis XIV. It is seated in a very pleasant plain between two small rivers, which produces excellent wine. E. Long. 5. 7. N. Lat. 47. 19.

DIGRESSION. See ORATORY, n° 37.

DIGYNIA, (from *dis* twice, and *gyn* a woman),

the name of an order or secondary division in each of the first 13 classes, except the 9th, in Linnæus's sexual method; consisting of plants, which to the classic character, whatever it is, add the circumstance of having two styles or female organs.

DIKE, a ditch, or drain, made for the passage of waters.—The word seems formed from the verb, to *dig*; tho' others choose to derive it from the Dutch, *diik*, a dam, sea-bank, or wall.

DIKE, or *Dyke*, also denotes a work of stone, timber, or fascines, raised to oppose the entrance or passage of the waters of the sea, a river, lake, or the like.—The word comes from the Flemish *dyk*, or *diik*, a heap of earth to bound or stem the water. Junius and Menage take the Flemish to have borrowed their word from the Greek *ταχος*, wall. Guichard derives it from the Hebrew *daghah*.

Dikes are usually elevations of earth, with hurdles of stakes, stones, and other matters.

The dike of Rochel is made with vessels fastened to the bottom. The dikes of Holland are frequently broke through, and drown large tracts of land.

DILAPIDATION, in law, a wasteful destroying or letting buildings, especially parsonage-houses, &c. run to decay, for want of necessary reparation. If the clergy neglect to repair the houses belonging to their benefices, the bishop may sequester the profits thereof for that purpose. And in these cases, a prosecution may be brought either in the spiritual court, or at common law, against the incumbent himself, or against his executor or administrator.

DILATATION, in physics, a motion of the parts of any body, by which it is so expanded as to occupy a greater space. This expansive motion depends upon the elastic power of the body; whence it appears that dilatation is different from rarefaction, this last being produced by the means of heat.

DILATATOIRES, in anatomy, a name given to several muscles in the human body. See ANATOMY, *Table of the Muscles*.

DILEMMA, in logic, an argument equally conclusive by contrary suppositions*.

DILIGENCE, in Scots law, signifies either that care and attention which parties are bound to give, in implementing certain contracts or trusts, and which varies according to the nature of the contract; as to which, see LAW, N° clxi. 12, 13. clxxiii. 8. & clxxxi. 18. Or it signifies certain forms of law, whereby the creditor endeavours to operate his payment, either by affecting the person or estate of the debtor; *ibid*. N° clxxi. clxxii.

DILL, in botany. See ANETHUM.

DILLEMBURG, a town of Germany, in Wetteravia, and capital of a county of the same name. It is subject to a prince of the house of Nassau, and is situated in E. Long. 8. 24. N. Lat. 50. 45.

DILLENGEN, a town of Germany, in the circle of Suabia, with an university, and where the bishop of Augsburg resides. It is seated near the Danube, in E. Long. 11. 35. N. Lat. 48. 38.

DILUTE. To dilute a body is to render it liquid; or, if it were liquid before, to render it more so, by the addition of a thinner thereto. These things thus added, are called *diluents*, or *dilutors*.

DIMENSION, in geometry, is either length, breadth,

Dike
Dimension.

* See LEGIS, n° 100, 101.

Dimination breadth, or thickness: hence, a line hath one dimension, *viz.* length; a superficies two, *viz.* length and breadth; and a body, or solid, has three, *viz.* length, breadth, and thickness.

DIMINATION, in architecture, a contraction of the upper part of a column, by which its diameter is made less than that of the lower part *.

* See Architecture, no 43.

DIMINUTIVE, in grammar, a word formed from some other, to soften or diminish the force of it, or to signify a thing is little in its kind. Thus, *cellula* is a diminutive of *cell*, *globule* of *globe*, *hillock* of *hill*.

DINGWEL, a parliament-town of Scotland in the shire of Ross, seated on the frith of Cromarty, 15 miles west of the town of Cromarty. Near it runs the river Conel, famous for producing pearls. W. Long. 4. 15. N. Lat. 57. 45.

DINNER, the meal taken about the middle of the day.—The word is derived from the French *dîner*, which Du Cange derives from the barbarous Latin *dinsare*. Henry Stephens derives it from the Greek *deinai*; and will have it wrote *dinner*. Menage deduces it from the Italian *desinare*, to dine; and that from the Latin *desinere*, to leave off work.

It is generally agreed to be the most salutary to make a plentiful dinner, and to eat sparingly at supper. This is the general practice among us. The French, however, in imitation of the ancient Romans, defer their good cheer to the evening; and Bernardinus Paternus, an eminent Italian physician, maintains it to be the most wholesome method, in a treatise expressly on the subject.

The grand Tartar emperor of China, after he has dined, makes publication by his heralds, that he gives leave for all the other kings and potentates of the earth to go to dinner; as if they waited for his leave.

DINOCRATES, a celebrated architect of Macedonia, who rebuilt the temple of Ephesus, when burned by Erostratus, with much more magnificence than before. Vitruvius informs us that Dinocrates proposed to Alexander the Great to convert mount Athos into the figure of a man, whose left hand should contain a walled city, and all the rivers of the mount flow into his right, and from thence into the sea? He also conceived a scheme for building the dome of the temple of Arsinoe at Alexandria, of loadstone; that should by its attraction uphold her iron image in the centre, suspended in the air! Projects which at least shewed a vast extent of imagination.

DIO CASSIUS, a famous Greek historian, a native of Nicea, a city of Phrygia, was governor of Pergamus and Smyrna, and commanded in Africa and Pannonia. In the year 229, he was raised by Alexander Severus to the dignity of consul; but not being agreeable to the troops, was obliged to retire to the place of his birth, where he ended his days. He composed a Roman History in Greek, a part of which only has been handed down to us. He is accused of partiality against Pompey, Cicero, Seneca, and several other great men. He is chiefly esteemed for the speeches he puts into the mouths of Agrippa and Mecenas, when Augustus advised with them whether he should preserve the empire, or restore the ancient government.

DIO Chrysostom, that is, *Golden Mouth*, a cele-

brated orator and philosopher of Greece, in the first century, was born at Prusa in Bithynia. He attempted to persuade Vespasian to quit the empire; was hated by Domitian; but acquired the esteem of Trajan. This last prince took pleasure in conversing with him, and made him ride with him in his triumphal chariot. There are still extant, 80 of Dio's orations, and some other of his works: the best edition of which is that of Hermand Samuel Raimarus, in 1750, in folio.

DIOCESE, or **DIOCESS** the circuit, or extent of the jurisdiction of a **BISHOP**.—The word is formed from the Greek *διοικησις* government, administration; formed of *διοικω*, which the ancient glossaries render *administro*, *moderor*, *ordino*: hence *διοικησις της πολιως*, the administration or government of a city.

DIOCESE is also used in ancient authors, &c. for the province of a **METROPOLITAN**.

Diocesis, *diocesis*, was originally a civil government, or prefecture, composed of diverse provinces.

The first division of the empire into dioceses is ordinarily ascribed to Constantine; who distributed the whole Roman state into four, *viz.* the diocese of Italy, the diocese of Illyria, that of the east, and that of Africa. And yet, long time before Constantine, Strabo, who wrote under Tiberius, takes notice, lib. xiii. p. 432. that the Romans had divided Asia into dioceses; and complains of the confusion such a division occasioned in geography, Asia being no longer divided by people, but by dioceses, each whereof had a tribunal, or court, where justice was administered. Constantine, then, was only the institutor of those large dioceses, which comprehended several metropolises and governments; the former dioceses only comprehending one jurisdiction or district, or the country that had resort to one judge, as appears from this passage in Strabo, and (before Strabo) from Cicero himself, lib. iii. *epist. ad fam.* 9. and lib. xiii. *ep.* 67.

Thus, at first a province included divers dioceses; and afterwards a diocese came to comprise divers provinces. In after-times the Roman empire became divided into XIII dioceses or prefectures; though, including Rome, and the suburbicary regions, there were XIV. These XIV dioceses comprehended 120 provinces: each province had a proconsul, who resided in the capital or metropolis; and each diocese of the empire had a consul, who resided in the principal city of the district.

On this civil constitution, the ecclesiastical one was afterwards regulated: each diocese had an ecclesiastical vicar, or primate, who judged finally of all the concerns of the church within his territory.

At present there is some further alteration: for diocese does not now signify an assemblage of divers provinces; but is limited to a single province under a metropolitan, or more commonly to the single jurisdiction of a bishop.

Gul. Brito affirms diocese to be properly the territory and extent of a baptismal or parochial church; whence divers authors use the word to signify a simple parish. See **PARISH**.

DIOCELESIAN, the Roman emperor: see (*History of*) **ROME**. His bloody persecution of the Christians forms a chronological æra, called the *era of Dioclesian*, or of the martyrs. It was for a long time in use in theological writings, and is still followed by the

Diocesi
Dioclesia

the Copts and Abyssinians. It commenced Aug. 29th, A. D. 284.

DIOCTAHEDRIA, in natural history, a genus of pellucid and crystalliform spars, composed of two octangular pyramids, joined base to base, without any intermediate column. Of these some have long pyramids, others short and sharp-pointed ones, and others short and obtuse-pointed ones; the two former species being found in the Hartz-forest, and the last in the mines of Cornwall.

DIODON, or **SUN-FISH**, in ichthyology, a genus belonging to the order of amphibia nantes.

There are three species, 1. The oblong sun-fish grows to a great bulk: one examined by Sylvianus was above 100 pounds in weight; and Dr Borlase mentions another taken at Plymouth in 1734, that weighed 500. In form it resembles a bream or some deep fish cut off in the middle. The mouth is very small, and contains in each jaw two broad teeth, with sharp edges. The eyes are little; before each is a small semilunar aperture; the pectoral fins are very small, and placed behind them. The colour of the back is dusky, and dappled; the belly silvery; between the eyes and the pectoral fins are certain streaks pointing downwards. The skin is free from scales.

When boiled, it has been observed to turn into a glutinous jelly, resembling boiled starch when cold, and served the purposes of glue on being tried on paper and leather. The meat of this fish is uncommonly rank: it feeds on shell-fish.

There seems to be no satisfactory reason for the old English name. Care must be taken not to confound it with the sun-fish of the Irish *, which differs in all respects from this.

2. The mola, or short sun-fish, differs from the former, in being much shorter and deeper. The back and the anal fins are higher, and the aperture to the gills not semilunar, but oval. The situation of the fins are the same in both.

Both kinds are taken on the western coasts of this kingdom, but in much greater numbers in the warmer parts of Europe.—Mr Brunnich informs us, that between Antibes and Genoa, he saw one of this species lie asleep on the surface of the water: a sailor jumped overboard, and caught it.

3. The levigatus, or globe, is common to Europe and South Carolina. As yet only a single specimen has been discovered in our seas; taken at Penzance in Cornwall. The length was one foot seven: the length of the belly, when distended, one foot; the whole circumference in that situation two feet six. The form of the body is usually oblong; but when alarmed, it has the power of inflating the belly to a globular shape of great size. This seems designed as a means of defence against fish of prey: as they have less means of laying hold of it; and are besides terrified by the numbers of spines with which that part is armed, and which are capable of being erected on every part. The mouth is small: the irides white, tinged with red: the back from head to tail almost straight, or at least very slightly elevated; of a rich deep blue colour. It has the pectoral, but wants the ventral fins: the tail is almost even, divided by an angular projection in the middle; tail and fins brown. The belly and sides are white, tinged or wrinkled; and beset with innumerable small

sharp spines, adhering to the skin by four processes.

DIODORUS SICULUS, a celebrated historian, under Julius Cæsar and Augustus, was thus named from his being a native of Agrigium in Sicily. He spent 50 years in composing his *Bibliotheca Historica*; and travelled into the places he describes, for perfect information. This important work, which he composed in Greek, contained 40 books, of which there are only 15 remaining. The style is clear and neat, and very suitable to history. The best edition is that of Amsterdam, 1745, in two volumes, folio.

DIOECIA, (from *dis* twice, and *oikia* a house or habitation) two houses. The name of the 22d class in Linnæus's sexual method, consisting of plants, which having no hermaphrodite flowers, produce male and female flowers on separate roots. These latter only ripen seeds; but require for that purpose, according to the sexualists, the vicinity of a male plant; or the aspersum, that is, sprinkling, of the male dust. From the seeds of the female flowers are raised both male and female plants. The plants then in the class dioecia are all male and female; not hermaphrodite, as in the greater number of classes; nor with male and female flowers upon one root, as in the class monœcia of the same author. See BOTANY, p. 1292.

DIOGENES of Apollonia, in the island of Crete, held a considerable rank among the philosophers who taught in Ionia before Socrates appeared at Athens. He was the scholar and successor of Anaximenes, and in some measure rectified his master's opinion concerning air being the cause of all things. It is said, that he was the first who observed that air was capable of condensation and rarefaction. He passed for an excellent philosopher, and died about the 450th year before the Christian æra.

DIOGENES the Cynic, a famous philosopher, was the son of a banker of Sinope in Pontus. Being banished with his father for coining false money, he retired to Athens, where he studied philosophy under Antisthenes. He added new degrees of austerity to the sect of the Cynics, and never did any philosopher carry so far a contempt for the conveniences of life. He was one of those extraordinary men who run every thing to extremity, without excepting even reason itself; and who confirm the saying, that "there is no great genius without a tincture of madness." He lodged in a tub; and had no other movables besides his staff, wallet, and wooden bowl, which last he threw away on seeing a boy drink out of the hollow of his hand. He used to call himself a vagabond, who had neither house nor country; was obliged to beg, was ill clothed, and lived from hand to mouth: and yet, says Ælian, he took as much pride in these things as Alexander could in the conquest of the world. He was not indeed a jot more humble than those who are clothed in rich apparel, and fare sumptuously every day. He looked down on all the world with scorn; he magisterially censured all mankind, and thought himself unquestionably superior to all other philosophers. Alexander one day paid him a visit, and made him an offer of riches or any thing else: but all that the philosopher requested of him was, to stand from betwixt the sun and him. As if he had said, "Do not deprive me of the benefits of nature, and I leave to you those of fortune." The conqueror was so affected with the vigour and elevation of his

his.

* See *Syllabus* Ins.

See Plate I. XXXVII. fig. 8.

Diogenes,
Dionæda.

his soul, as to declare, that "if he was not Alexander, he would choofe to be Diogenes:" that is, if he was not in poffeffion of all that was pompous and fplendid in life, he would, like Diogenes, heroically defpife it. Diogenes had great prefence of mind, as appears from his fmart fayings and quick repartees; and Plato feems to have hit off his true charaâer when he called him a Socrates run mad. He fpent a great part of his life at Corinth, and the reafon of his living there was as follows: As he was going over to the ifland of Ægina, he was taken by pirates, who carried him into Crete, and there expofed him to fale. He answered the crier, who asked him what he could do, that "he knew how to command men:" and perceiving a Corinthian who was going by, he fhewed him to the crier, and faid, "Sell me to that gentleman, for he wants a mafter." Xeniaades, for that was the Corinthian's name, bought Diogenes, and carried him with him to Corinth. He appointed him tutor to his children, and entrusted him alfo with the management of his houfe. Diogenes's friends being defirous of redeeming him, "You are fools, (faid he); the lions are not the flaves of thofe who feed them, but they are the fervants of the lions." He therefore plainly told Xeniaades, that he ought to obey him, as people obey their governors and phyficians. Some fay, that Diogenes fpent the remainder of his life in Xeniaades's family; but Dion Chryfoftom afferts that he paffed the winter at Athens, and the fummer at Corinth. He died at Corinth when he was about 90 years old: but authors are not agreed either as to the time or manner of his death. The following account, Jerom fays, is the true one. As he was going to the Olympic games, a fever feized him in the way; upon which he lay down under a tree, and refufed the affiftance of thofe who accompanied him, and who offered him either a horfe or a chariot. "Go you to the games, (fays he), and leave me to contend with my illnefs. If I conquer, I will follow you: If I am conquered, I fhall go to the fhades below." He difpatched himfelf that very night; faying, that "he did not fo properly die, as get rid of his fever." He had for his difciples Oneficritus, Phocion, Stilpo of Megara, and feveral other great men. His works are loft.

DIÖGENES Laertius, from Laerta in Cilicia where he was born, was an hiftorian in the time of Antoninus the philofopher. He is reputed to have been an epicurean; and wrote ten books of "The lives of the philofophers," which are ftill extant: they were infcribed to a learned lady, as he intimates in his life of Plato.

DIOMEDEA, in ornithology, a genus belonging to the order of anferes. The bill is ftrait; the fuperior mandible is crooked at the point, and the lower one is truncated; the noftrils are oval, open, a little prominent, and placed on the fides. There are two fpecies, viz. 1. The exulans, has pennated wings, and three toes on each foot. It is the albatros of Edwards; and is found in the ocean betwixt the tropics, and at the Cape of Good Hope. It flies pretty high, feeds upon flying-fifh, and is about the fize of a pelican. 2. The dæmæfa, has no quill-feathers on the wings; and the feet have four toes, connected together by a membrane. It is the black penguin of Edwards, about the fize of a goofe, and is found at the Cape of Good Hope.

DIOMEDES, king of Etolia, the fon of Tydeus, and the moft valiant of the Grecian heroes, next to Achilles and Ajax, fignalized himfelf at the fiege of Troy againft Æneas and Hector, and carried off the Palladium.

DIONIS (Peter), a famous furgeon, born at Paris, diftinguifhed himfelf by his fkill in his profefſion, and by his works, the principal of which are, 1. A courſe of operations in furgery; 2. The anatomy of man; and, 3. A treatife on the manner of affifting women in child-birth. He died in 1718.

DIONÆA MUSCIPULA, or *Venus's Fly-trap*, in botany, a newly difcovered fenſitive plant.

Every one ſkilled in natural hiftory knows, that the mimofæ, or fenſitive plants, clofe their leaves, and bend their joints, upon the leaſt touch: and this has aſtoniſhed us; but no end or deſign of nature has yet appeared to us from theſe furprizing motions: they ſoon recover themſelves again, and their leaves are expanded as before. But the plant we are now going to deſcribe, ſhews that nature may have ſome view towards its nourifhment, in forming the upper joint of its leaf like a machine to catch food: upon the middle of this, lies the bait for the unhappy infect that becomes its prey. Many minute red glands that cover its inner ſurface, and which perhaps diſcharge ſome ſweet liquor, tempt the poor animal to taſte them; and the infant theſe tender parts are irritated by its feet, the two lobes riſe up, graſp it faſt, lock the two rows of ſpines together, and ſqueeze it to death. And further, leſt the ſtrong efforts for life, in the creature thus taken, ſhould ſerve to diſengage it, three ſmall erect ſpines are fixed near the middle of each lobe among the glands, that effectually put an end to all its ſtruggles. Nor do the lobes ever open again, while the dead animal continues there. But it is nevertheleſs certain, that the plant cannot diſtinguiſh an animal from a mineral ſubſtance; for, if we introduce a ſtraw or a pin between the lobes, it will graſp it full as faſt as if it was an infect.—The plant is one of the monogynia order, belonging to the decandria claſs. It grows in America, about 35 deg. N. Lat. in wet ſhady places, and flowers in July and Auguſt. The largeſt leaves are about three inches long, and an inch and half acroſs the lobes: the glands of thoſe expoſed to the fun are of a beautiful red colour; but thoſe in the ſhade are pale, and inclining to green. The roots are ſquamous, ſending forth but few fibres, and are perennal. The leaves are numerous, inclining to bend downwards, and are placed in a circular order; they are jointed and ſucculent; the lower joint, which is a kind of ſtalk, is flat, longiſh, two-edged, and inclining to heart-shaped. In ſome varieties they are ferrated on the edges near the top. The upper joint conſiſts of two lobes; each lobe is of a ſemi-oval form, with their margins furniſhed with ſtiff hairs like eye-brows, which embrace or lock in each other when they cloſe: this they do when they are inwardly irritated. The upper ſurfaces of theſe lobes are covered with ſmall red glands; each of which appears, when highly magnified, like a compressed arbutus berry.—Among the glands, about the middle of each lobe, are three very ſmall erect ſpines. When the lobes incloſe any ſubſtance, they never open again while it continues there. If it can be ſhoved out ſo as not to ſtrain the lobes, they expand again; but if force is uſed to open them, ſo ſtrong has nature formed

Diomedes
Dionæa.

Dionysia
||
Dionysius.

formed the spring of their fibres, that one of the lobes will generally snap off rather than yield. The stalk is about six inches high, round, smooth, and without leaves; ending in a spike of flowers. The flowers are milk-white, and stand on footstalks, at the bottom of which is a little painted bractea or flower leaf. The soil in which it grows, as appears from what comes about the roots of the plants when they are brought over, is a black, light, mould, intermixed with white sand, such as is usually found in our moorish heaths. Being a swamp plant, a north-east aspect will be properest for it at first, to keep it from the direct rays of the sun; and in winter, till we are acquainted with what cold weather it can endure, it will be necessary to shelter it with a bell-glass, such as is used for melons. This should be covered with straw or a mat, in hard frosts. By this means several of these plants have been preserved through the winter in a very vigorous state. Its sensitive quality will be found in proportion to the heat of the weather, as well as the vigour of the plant. Our summers are not warm enough to ripen the seed; or possibly we are not yet sufficiently acquainted with the culture of it. In order to try further experiments on its sensitive powers, some of the plants might be placed in pots of light moorish earth, and placed in pans of water, in an airy stove in summer; where the heat of such a situation, being like that of its native country, will make it surprisingly active.

DIONYSIA, in Grecian antiquity, solemnities in honour of Bacchus, sometimes called by the general name of *Orgia*; and by the Romans *Bacchanalia*, and *Liberalia*. See *BACCHANALIA* and *BACCHUS*.

DIONYSIAN PERIOD. See *ASTRONOMY*, no 308.

DIONYSIUS I. from a private secretary became general and tyrant of Syracuse and all Sicily. He was likewise a poet; and having, by bribes, gained the tragedy-prize at Athens, he indulged himself so immoderately at table from excess of joy, that he died of the debauch, 386 B. C. but some authors relate that he was poisoned by his physicians.

DIONYSIUS II. (his son and successor) was a greater tyrant than his father: his subjects were obliged to apply to the Corinthians for succour; and Timoleon, their general, having conquered the tyrant, he fled to Athens, where he was obliged to keep a school for subsistence. He died 343 B. C.

DIONYSIUS (*Halicarnassensis*), a celebrated historian, and one of the most judicious critics of antiquity, was born at Halicarnassus; and went to Rome after the battle of Actium, where he died 22 years, under the reign of Augustus. He there composed in Greek, his History of the Roman Antiquities, in 20 books, of which the first 11 only are now remaining. There are also still extant several of his critical works. The best edition of the works of this author is that of Oxford, in 1704; in Greek and Latin, by Dr Hudson.

DIONYSIUS, a learned geographer, to whom is attributed a *Periegesis*, or Survey of the Earth, in Greek verse. Some suppose that he lived in the time of Augustus; but Scaliger and Saumaisius place him under the reign of Severus, or Marcus Aurelius. He wrote many other works, but his *Periegesis* is the only one we have remaining; the best and most useful edition of which is that improved with notes and illustrations by Hill.

DIONYSIUS (*Arcopagita*), was born at Athens, and educated there. He went afterwards to Heliopolis in Egypt; where, if we may believe some writers of his life, he saw that wonderful eclipse which happened at our Saviour's passion, and was urged by some extraordinary impulse to cry out, *Aut Deus patitur, aut cum patiente dolet*; "either God himself suffers, or condescends with him who does." At his return to Athens he was elected into the court of Arcopagus, from whence he derived his name of *Arcopagite*. About the year 50 he embraced Christianity; and, as some say, was appointed first bishop of Athens by St Paul. Of his conversion we have an account in the 17th Chapter of the Acts of the Apostles.—He is supposed to have suffered martyrdom; but whether under Domitian, Trajan, or Adrian, is not certain. We have nothing remaining under his name, but what there is the greatest reason to believe spurious.

DIOPHANTUS, a celebrated mathematician of Alexandria, reputed to have been the inventor of algebra. When he lived, is not known: some have placed him before Christ, and some after, with equal uncertainty. He wrote 13 books of arithmetic; which, the astronomer Regiomontanus tells us, are still preserved in MSS. in the Vatican library: Meziriac's edition of seven of these books has been several times reprinted, with notes and illustrations.

D I O P T R I C S,

THAT part of *OPTICS* which treats of the laws of refraction, and the effects which the refraction of light has in vision. The word is originally Greek, formed of *dia*, per, "through," and *optoma*, I see.

As this and the other branches of *OPTICS* are fully treated under the collective name, we shall here, 1. Just give a summary of the general principles of the branch, in a few plain aphorisms, with some preliminary definitions; and, 2. Present our readers with a set of entertaining experiments illustrative of, or dependent upon, those principles.

DEFINITIONS.

1. When a ray of light passing out of one medium

into another of a different density, is turned from that straight line in which it would otherwise proceed into one of a different direction, it is said to be refracted. Thus the rays AB, AC, &c. by passing out of air into the glass BGC, are turned from their natural course into XCII. that of BF, CF, &c. and are therefore said to be re-fig. 11. fracted by the lens BGC.

2. Any spherical transparent glass, that converges or diverges the rays of light as they pass through it, is called a *lens*.

3. Of lenses there are five sorts: 1. A plane or single convex lens, which is plane on one side, and convex on the other; as AZ, fig. 3. 2. A double convex lens, as B. 3. A plano-concave lens, that is, plane on one side

side and concave on the other, as C. 4. A double concave, as D. And, 5. A meniscus, which is convex on one side and concave on the other, as E.

4. The point C, round which the spherical surface of a lens, as AZ, is described, is called its *centre*; the line XY, drawn from that centre perpendicular to its two surfaces, is the axis; and the point V, to which the axis is drawn, is the vertex of that lens.

5. When the rays of light that pass through a single or double convex lens are brought into their smallest compass, that point is the focus of the lens.

6. In optical instruments, that lens which is next the object is called the *object-glass*; and that next the eye, the *eye glass*.

Fig. 13.

7. The distance between the line AB, and the perpendicular EF, is called the *angle of incidence*; and the distance between the line BD, and the perpendicular EF, is called the *angle of refraction*.

A P H O R I S M S.

Fig. 13.

1. A ray of light passing obliquely out of one medium into another that is denser, will be refracted toward the perpendicular; as the ray AB, by passing out of air into glass, is refracted into B F, inclined to the perpendicular A F. On the contrary, a ray passing out of a denser into a rarer medium, will be refracted from the perpendicular; as the ray BC, passing out of the glass G H into air, is refracted into D I.

2. The angles of incidence and refraction, when the lines that contain them are all equal, will have a determinate proportion to each other, in the same mediums: which between air and water will be as 4 to 3; between air and glass, as 3 to 2, nearly; and in other mediums in proportion to their densities.

3. When an object is viewed through a glass whose two surfaces are parallel, it will appear of its natural dimensions; its situation only being a small matter altered, in proportion to the thickness of the glass, and the obliquity of the rays.

4. All the rays of light, whether diverging, parallel, or converging, that fall on a single or double convex lens, will meet in a focus behind the glass: and the distance of that focus will be greatest in diverging, and least in converging, rays.

5. When parallel or converging rays fall on a single or double concave lens, they will diverge behind it. If they be diverging at their incidence, they will become more so by passing through it.

6. When an object is viewed thro' two convex lenses, its apparent length, or diameter, will be to its real length, as the distance of the focus of the object-glass is to that of the eye-glass.

By these, and the foregoing aphorisms we are enabled to account for the various effects of dioptric machines, as refracting telescopes, microscopes, the camera obscura, &c. See OPTICS.

ENTERTAINING EXPERIMENTS.

I. Optical illusions.

Fig. 4.

On the bottom of the vessel ABCD, place three pieces of money, as a shilling, a half-crown, and crown; the first at E, the second at F, and the last at G. Then place a person at H, where he can see no further into the vessel than I: and tell him, that by

pouring water into the vessel you will make him see three different pieces of money; bidding him observe carefully whether any money goes in with the water.

Here you must observe to pour in the water very gently, or contrive to fix the pieces, that they may not move out of their places by its agitation.

When the water comes up to K, the piece at E will become visible; when it comes up to L, the pieces at E and F will appear; and when it rises to M, all the three pieces will be visible.

From what has been said of the refraction of light, the cause of this phenomenon will be evident: for while the vessel is empty, the ray H I will naturally proceed in a straight line: but in proportion as it becomes immersed in water, it will be necessarily refracted into the several directions NE, OF, PG, and consequently the several pieces must become visible.

II. Optical Augmentation.

TAKE a large drinking glass of a conical figure, that is small at bottom and wide at top; in which put a shilling, and fill the glass about half full with water: then place a plate on the top of it, and turn it quickly over, that the water may not get out. You will then see on the plate, a piece of the size of a half crown; and somewhat higher up, another piece of the size of a shilling.

This phenomenon arises from seeing the piece thro' the conical surface of the water at the side of the glass, and through the flat surface at the top of the water, at the same time: for the conical surface dilates the rays, and makes the piece appear larger; but by the flat surface the rays are only refracted, by which the piece is seen higher up in the glass, but still of its natural size. That this is the cause will be further evident by filling the glass with water; for as the shilling cannot then be seen from the top, the large piece only will be visible.

III. Optical Subtraction.

AGAINST the wainscot of a room fix three small pieces of paper, as A, B, C, at the height of your eye; and placing yourself directly before them, shut your right eye and look at them with the left; when you will see only two of those papers, suppose A and B: but altering the position of your eye, you will then see the third and one of the first, suppose A; and by altering your position a second time, you will see B and C; but never all three of them together.

The cause of this phenomenon is, that one of the three pencils of rays that come from these objects, falls constantly on the optic nerve at D; whereas to produce distinct vision, it is necessary that the rays of light fall on some part of the retina E, F, G, H. We see by this experiment, one of the uses of having two eyes; for he that has one only, can never see three objects placed in this position, nor all the parts of one object of the same extent, without altering the situation of his eye.

IV. Alternate Illusion.

WITH a convex lens of about an inch focus, look attentively at a silver seal, on which a cipher is engraved. It will at first appear cut in, as to the naked eye; but if you continue to observe it some time, without changing

changing your situation, it will seem to be in relief, and the lights and shades will appear the same as they did before. If you regard it with the same attention till longer, it will again appear to be engraved: and so on alternately.

If you look off the seal for a few moments, when you view it again, instead of seeing it, as at first, engraved, it will appear in relief. If, while you are turned toward the light, you suddenly incline the seal, while you continue to regard it, those parts that seemed to be engraved will immediately appear in relief: and if, when you are regarding these seeming prominent parts, you turn yourself so that the light may fall on the right hand, you will see the shadows on the same side from whence the light comes, which will appear not a little extraordinary. In like manner the shadows will appear on the left, if the light fall on that side. If, instead of a seal, you look at a piece of money, these alterations will not be visible, in whatever situation you place yourself.

It has been suspected that this illusion arises from the situation of the light: and in fact, "I have observed, (says M. Guyot, from whom this article is taken) that when I have viewed it with a candle on the right, it has appeared engraved; but by changing the light to the left side, it has immediately appeared in relief." It still, however, remains to be explained, why we see it alternately hollow and prominent, without changing either the situation or the light. Perhaps it is in the light itself that we must look for the cause of this phenomenon; and this seems the more probable, as all these appearances are not discernable by all persons.

V. *The Camera Obscura, or Dark Chamber.*

MAKE a circular hole in the shutter of a window, from whence there is a prospect of the fields, or any other object not too near; and in this hole place a convex glass, either double or single, whose focus is at the distance of five or six feet (A). Take care that no light enter the room but by this glass: at a distance from it, equal to that of its focus, place a pasteboard, covered with the whitest paper; which should have a black border, to prevent any of the side rays from disturbing the picture. Let it be two feet and a half long, and 18 or 20 inches high: bend the length of it inwards, to the form of part of a circle, whose diameter is equal to double the focal distance of the glass. Then fix it on a frame of the same figure, and put it on a moveable foot, that it may be easily fixed at that exact distance from the glass where the objects paint

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(A) The distance should not be less than three feet; for if it be, the images will be too small, and there will not be sufficient room for the spectators to stand conveniently. On the other hand, the focus should never be more than 15 or 20 feet, for then the images will be obscure, and the colouring faint. The best distance is from 6 to 12 feet.

(B) This inverted position of the images may be deemed an imperfection, but it is easily remedied: for if you stand above the board on which they are received, and look down on it, they will appear in their natural position: or if you stand before it, and, placing a common mirror against your breast in an oblique direction, look down in it, you will there see the images erect, and they will receive an additional lustre from the reflection of the glass; or place two lenses, in a tube that draws out; or, lastly, if you place a large concave mirror at a proper distance before the picture, it will appear before the mirror, in the air, and in an erect position.

(C) There is another method of making the dark chamber; which is by a scioptropic ball, that is, a ball of wood, through which a hole is made, in which hole a lens is fixed: this ball is placed in a wooden frame, in which it turns freely round. The frame is fixed to the hole in the shutter; and the ball, by turning about, answers, in great part, the use of the mirror on the outside of the window. If the hole in the window be no bigger than a pea, the objects will be represented without any lens, though by no means so distinctly, or with such vivid colours.

(D) When the sun is directly opposite to the hole, the lens will itself be sufficient: or by means of the mirror on the outside of the window, as in Experiment V. the lens will answer the purpose at any time.

themselves to the greatest perfection. When it is thus placed, all the objects that are in the front of the window will be painted on the paper, in an inverted position (a), with the greatest regularity and in the most natural colours.

If you place a moveable mirror without the window; by turning it more or less, you will have on the paper all the objects that are on each side of the window (c).

If instead of placing the mirror without the window you place it in the room, and above the hole (which must then be made near the top of the shutter), you may receive the representation on a paper placed horizontally on a table; and draw, at your leisure, all the objects that are there painted.

Nothing can be more pleasing than this experiment, especially when the objects are strongly enlightened by the sun: and not only land-prospects, but a sea-port, when the water is somewhat agitated, or at the setting of the sun, presents a very delightful appearance.

This representation affords the most perfect model for painters, as well for the tone of colours, as that degradation of shades, occasioned by the interposition of the air, which has been so justly expressed by some modern painters.

It is necessary that the paper have a circular form; for otherwise, when the centre of it was in the focus of the glass, the two sides would be beyond it, and consequently the images would be confused. If the frame were contrived of a spherical figure, and the glass were in its centre, the representation would be still more accurate. If the object without be at the distance of twice the focal length of the glass, the image in the room will be of the same magnitude with the object.

The lights, shades, and colours, in the camera obscura, appear not only just, but, by the images being reduced to a smaller compass, much stronger than in nature. Add to this, that these pictures exceed all others, by representing the motion of the several objects: thus we see the animals walk, run, or fly; the clouds float in the air; the leaves quiver; the waves roll, &c.; and all in strict conformity to the laws of nature. The best situation for a dark chamber is directly north, and the best time of the day is noon.

VI. *To show the Spots on the Sun's Disk, by its Image in the Camera Obscura.*

PUT the object-glass of a 10 or 12 foot telescope into the scioptropic ball, and turn it about till it be directly opposite to the sun (D). Then place the pasteboard,

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board, mentioned in the last experiment, in the focus of the lens; and you will see a clear bright image of the sun, of about an inch diameter, in which the spots on the sun's surface will be exactly described.

As this image is too bright to be seen with pleasure by the naked eye, you may view it thro' a lens whose focus is at six or eight inches distance; which at the same time that it prevents the light from being offensive, will, by magnifying both the image and the spots, make them appear to greater advantage.

VII. *To magnify small Objects by means of the Sun's Rays let into a Dark Chamber.*

LET the rays of light that pass through the lens in the shutter be thrown on a large concave mirror, properly fixed in a frame. Then take a slip or thin plate of glass; and sticking any small object on it, hold it in the incident rays, at a little more than the focal distance from the mirror; and you will see, on the opposite wall, amidst the reflected rays, the image of that object, very large, and extremely clear and bright. This experiment never fails to give the spectator the highest satisfaction.

VIII. *The Portable Camera Obscura.*

THE great pleasure produced by the camera obscura in the common form, has excited several to render it more universally useful by making it portable; easily fixed on any spot, and adapted to every prospect. We shall not here examine the merits of the various sorts that have been invented; but content ourselves with describing one that may have some advantages not to be found in others, and which appears to be the invention of M. Guyot.

Let ABCD be a frame of wood, of two feet long and about 20 inches wide; let its four sides be two inches and a half thick, and firmly joined together. In a groove formed in this frame place a plate of clear glass, E; and if the upper side of the glass were convex, it would be still better. To each of the corners of this frame join a leg, with a hinge, that it may turn up under the table. To the under part of the frame join four pieces of light wood, as H, which must also have hinges to fold up; and observe, that when they are let down, as in the figure, they must closely join, by means of hooks, it being quite necessary that no light enter the box. For this reason, the inside of the box should be lined with black cloth.

To that just described, there must be added a smaller box M, in which must be an inclined mirror N, and in one of its sides a moveable tube O, five or six inches long. This tube must be furnished with a convex glass, the focus of which, by the reflection of the mirror, must reach the glass E in the frame. There must also be a covering of black stuff, in form of a tent, to place over the top of the frame, by means of four little poles that go into holes in the corners of it. There must be an opening to this tent on the side A B, by a curtain to be drawn up; and which you are to let down over you, when you place yourself under it; that no light may enter. The three other sides should hang down some inches over the frame.—This camera is, indeed, something more cumbersome than those that have been hitherto invented; and yet, if properly made, it will not weigh more than from 20 to 25 pounds. On the other

hand, it is much more convenient; for as the coloured rays of objects paint themselves on the bottom of the glass in the frame, you may draw them without having your hand between the rays and their image.

When you have placed the frame on a spot a little elevated, that nothing may intercept the rays from falling on the glass in the tube, you fix a sheet of transparent varnished paper on the glass in the frame, by means of wax at its corners. Then placing yourself under the curtain, you trace on the paper all the outlines of the objects there represented; and if you think fit, you may also mark the extent of the shadows. If you want only the outlines, you may lay a thin plate of glass on that in the frame, and trace the strokes with a pencil and carmine. After which you must dip a sheet of paper in water, without making it too wet; and spreading it lightly over that glass, you will have the impression of the design there drawn.

Note, By each of these methods you will have the objects either in their natural position, or reversed; which will be an advantage when the design is to be engraved, and you would have it then appear in the natural position. In using this machine, you should make choice of those objects on which the sun then shines, as the appearance of the shadows add greatly to the beauty of the design. There are, however, circumstances in which it is to be avoided, as when you would paint a rising or setting sun, &c.

IX. *The Magic Lantern.*

THIS very remarkable machine, which is now known over all the world, caused great astonishment at its origin. It is still beheld with pleasing admiration; and the spectator very frequently contents himself with wondering at its effects, without endeavouring to investigate their cause. The invention of this ingenious illusion is attributed to the celebrated P. Kircher, who has published, on various sciences, works equally learned, curious, and entertaining. Its design is to represent at large, on a cloth or board, placed in the dark, the images of small objects, painted with transparent colours on plates of glass.

The construction is as follows. Let ABCD be a tin box, eight inches high, ten long, and six wide (or any other similar dimensions). At the top must be a funnel E, of four inches in diameter, with a cover F, which, at the same time that it gives a passage to the smoke, prevents the light from coming out of the box.

On the side A C there is a door, by which is adjusted a concave mirror G, of metal or tin, and of five inches diameter; being part of a sphere whose diameter is 18 inches. This mirror must be so disposed that it may be pushed forward or drawn back by means of the handle H, that enters the tin tube I, which is foldered to the door. In the middle of the box must be placed a low tin lamp K, which is to be moveable. It should have three or four lights, that must be at the height of the focus of the mirror G. In the side B D, and opposite to the mirror, there must be an aperture of three inches wide and two inches and a half high; in which is to be fixed a convex glass L, of the same dimension, whose focus must be from four inches and a half to five inches, so that the lamp may be placed both in its focus, and in that of the concave mirror.

On the same side is to be placed a piece of tin MN, of four inches and a half square, having an opening at the sides of about four inches and a half high, and a quarter of an inch wide. Through this opening or groove are to pass the glasses, on which are painted the figures that are to be seen on the cloth. In this tin piece, and opposite to the glass L, let there be an aperture of three inches and a quarter long, and two inches and a quarter high; to which must be adjusted a tube O, of the same form, and six inches long. This tube is to be fixed into the piece MN. Another tube, six inches long, and moveable, must enter that just mentioned, in which must be placed two convex lenses, P and Q; that of P may have a focus of about three inches; and that of Q, which is to be placed at the extremity of the tube, one of 10 or 12 inches. The distance between these glasses is to be regulated by their foci. Between these glasses there must be placed a pasteboard R, in which is an aperture of an inch wide, and $\frac{4}{5}$ ths of an inch high. By placing this tube farther in or out of the other, the images on the cloth will appear larger or smaller.

From what has been said of the preceding machines, the construction of this will be easily understood. The foci of the concave mirror, and the lens L, meeting in the flame of the lamp, they together throw a strong light on the figures painted on the glasses that pass through the groove MN, and by that means render their colours distinct on the cloth. The rays from those glasses passing through the lens P are collected by the aperture in the pasteboard R, and conveyed to the lens Q, by which they are thrown on the cloth.

The lantern being thus adjusted, you must provide plates of clear glass, of 12 or 15 inches long, and three inches wide, which are to be placed in thin frames, that they may pass freely through the groove MN, after being painted in the manner we shall now describe.

Method of Painting the Glasses for the Lantern.

DRAW on a paper the subject you desire to paint, and fix it at each end to the glass. Provide a varnish with which you have mixed some black paint; and with a fine pencil draw on the other side of the glass, with very light touches, the design drawn on the paper. If you are desirous of making the painting as perfect as possible, you should draw some of the outlines in their proper colours, provided they are the strongest tints of those colours that are used. When the outlines are dry, you colour the figures with their proper tints or degradations. Transparent colours are most proper for this purpose, such as carmine, lake, Prussian blue, verdigris, &c. and these must be tempered with a strong white varnish, to prevent their peeling off. You are then to shade them with black mixed with the same varnish, or with bistre, as you find convenient. You may also leave strong lights in some parts, without any colours, in order to produce a more striking effect. Observe, in particular, not to use more than four or five colours, such as blue, red, green, and yellow. You should employ, however, a great variety of tints, to give your painting a more natural air; without which they will represent vulgar objects, which are by no

means the more pleasing because they are gawdy.

When the lamp in this lantern is lighted, and, by drawing out the tube to a proper length, the figures painted on the glass appear bright and well defined, the spectator cannot fail of being highly entertained by the success of natural or grotesque figures that are painted on the glasses. This piece of optics may be rendered much more amusing, and at the same time more marvellous, by preparing figures to which different natural motions may be given (ϵ), which every one may perform according to his own taste; either by movements in the figures themselves, or by painting the subject on two glasses, and passing them at the same time through the groove, as will be seen in the next experiment.

X. To represent a Tempest by the Magic Lantern.

PROVIDE two plates of glass, whose frames are so thin that they may both pass freely through the groove MN, at the same time, (fig. 7.)

On one of these glasses you are to paint the appearance of the sea, from the slightest agitation to the most violent commotion. Representing from A to B a calm; from B to C a small agitation, with some clouds; and and so on to F and G, which should exhibit a furious storm. Observe, that these representations are not to be distinct, but run into each other, that they may form a natural gradation: remember also, that great part of the effect depends on the perfection of the painting, and the picturesque appearance of the design.

On the other glass you are to paint vessels of different forms and dimensions, and in different directions, together with the appearance of clouds in the tempestuous parts.

You are then to pass the glass slowly through the groove; and when you come to that part where the storm begins, you are to move the glass gently up and down, which will give it the appearance of a sea that begins to be agitated: and so increase the motion, till you come to the height of the storm. At the same time you are to introduce the other glass with the ships, and moving that in like manner, you will have a natural representation of the sea, and of ships in a calm and in a storm. As you draw the glasses slowly back, the tempest will seem to subside, the sky grow clear, and the ships glide gently over the waves.—By means of two glasses disposed in this manner you may likewise represent a battle, or sea-fight, and numberless other subjects, that every one will contrive according to his own taste. They may also be made to represent some remarkable or ludicrous action between different persons, and many other amusements that a lively imagination will easily suggest.

XI. The Nebulous Magic Lantern.

THE light of the magic lantern, and the colour of images, may not only be painted on a cloth, but also reflected by a cloud of smoke.

Provide a box of wood or pasteboard A B, of about four feet high, and of seven or eight inches square at bottom, but diminishing as it ascends, so that its aperture at top is but six inches long, and half an inch wide. At the bottom of this box there must be a door

14 L 2

that

(ϵ) There are in the Philosophical Essays of M. Muschenbroek, different methods of performing all these various movements, by some mechanical contrivances that are not difficult to execute.

Fig. 8.

Fig. 9.

Fig. 10.

that shuts quite close, by which you are to place in the box a chafing-dish with hot coals, on which is to be thrown incense, whose smoke goes out in a cloud at the top of the box. It is on this cloud that you are to throw the light that comes out of the lantern, and which you bring into a smaller compass by drawing out the moveable tube. The common figures will here serve. It is remarkable in this representation, that the motion of the smoke does not at all change the figures; which appear so conspicuous, that the spectator thinks he can grasp them with his hand.

Notes. In this experiment some of the rays passing through the smoke, the representation will be much less vivid than on the cloth; and if care be not taken to reduce the light to its smallest focus, it will be still more imperfect.

XII. To produce the appearance of a Phantom, upon a pedestal placed on the middle of a table.

Fig. 11.

INCLOSE a common small magic lantern in a box A B C D, that is large enough to contain also an inclined mirror M; which must be moveable, that it may reflect the cone of light thrown on it by the lantern, in such a manner that it may pass out at the aperture made in the top of the box. There should be a flap with hinges to cover the opening, that the inside of the box may not be seen when the experiment is not making. This aperture should likewise be oval, and of a size adapted to the cone of light that is to pass thro' it. There must be holes made in that part of the box which is over the lantern, to let out the smoke; and over that part must be placed a chafing-dish of an oblong figure, and large enough to hold several lighted coals. This chafing-dish may be inclosed in a painted tin box of about a foot high, and with an aperture at top something like fig. 10. It should stand on four short feet, to give room for the smoke of the lamp to pass out. There must also be a glass that will ascend and descend at pleasure in the vertical groove *ab*. To this glass let there be fixed a cord, that, going over a pulley *c*, passes out of the box at the side C D, by which the glass may be drawn up, and will descend by its own weight. On this glass may be painted a spectre, or any other more pleasing figure. Observe that the figures must be contracted in drawing, as the cloud of smoke does not cut the cone of light at right angles, and therefore the figures will appear longer than they do on the glass.

After you have lighted the lamp in the lantern, and put the mirror in a proper direction, you place the box or pedestal A B C D on a table; and putting the chafing-dish in it, throw some incense in powder on the coals. You then open a trap-door, and let down the glass slowly; and when you perceive the smoke diminish you draw up the glass, that the figure may disappear, and shut the trap-door. This appearance will occasion no small surprize, as the spectre will seem to rise gradually out of the pedestal, and on drawing up the glass will disappear in an instant. Observe, that when you exhibit this experiment, you must put out all the lights in the room; and the box should be placed on a high table, that the spectators may not perceive the aperture by which the light comes out. Tho'

we have mentioned a small magic lantern, yet the whole apparatus may be so enlarged, that the phantom may appear of a formidable size.

XIII. The Magical Theatre.

By making some few additions to the magic lantern with the square tube, used in Experiment ix. various scenes, characters, and decorations of a theatre, may be represented in a lively manner. In this experiment it is quite necessary to make the lantern much larger than common, that the objects painted on the glasses, being of a larger size, may be represented with greater precision, and consequently their several characters more strongly marked.

Let there be made a wooden box A B C D, a foot Fig. 12. and a half long, 15 inches high, and 10 wide. Let it be placed on a stand E F, that must go round it, and by which it may be fixed with two screws to a table. Place over it a tin cover, as in the common lantern. Make an opening in its two narrowest sides; in one of which place the tube H, and in the other the tube I: let each of them be six inches wide, and five inches high: in each of these tubes place another that is moveable, in order to bring the glasses, or concave mirror, that are contained in them, to a proper distance. In the middle of the bottom of this box place a tin lamp, M; which must be moveable in a groove, that it may be placed at a proper distance with regard to the glasses and mirror: this lamp should have five or six lights, each of them about an inch long. At the beginning of the tube H, toward the part N, make an opening of an inch wide, which must cross it laterally: another of three quarters of an inch, that must cross it vertically, and be nearer the box than the first; and a third of half an inch, that must be before the first. The opening made laterally must have three or four grooves, the second two, and the third one: that different subjects of figures and decorations may be passed, either sideways, ascending, or descending, so that the scenes of a theatre may be the more exactly imitated (F). Inclose these grooves between two convex rectangular glasses, of six inches long, and five inches high, and of about 20 inches focus; one of which must be placed at O, and the other toward P. Have another tube Q, of about a foot long, which must enter that marked H; and at its outward extremity place a lens of about 15 inches focus. There must also be a third tube R, four inches long, into which that marked I is to enter: to the exterior end of this adjust a concave mirror, whose focus must be at seven or eight inches from its reflecting surface.

The magic lantern being thus adjusted, nothing more is necessary than to provide glasses, painted with such subjects as you would represent, according to the grooves they are to enter. The lamp is then to be lighted; and placing a glass in one of the grooves, you draw out the moveable tubes till the object paints itself on a cloth to the most advantage: by which you determine the distance of the lantern, and the size of the image. You then make a hole in the partition of that size, and fix in it a plate of clear glass, over which you paste a very thin paper, which must be varnished, that it may be as transparent as possible.

On

(F) In the decorations, the clouds and the palaces of the gods should descend; caves and infernal palaces should ascend; earthly palaces, gardens, &c. enter at the sides.

On this paper are to be exhibited the images of all those objects, that, by passing successively through the grooves, are to represent a theatric entertainment. The exhibition will be very agreeable; because the magic lantern being concealed behind the partition, the cause of the illusion cannot by any means be discovered.

In order to shew more clearly in what manner a subject of this sort should be painted, and the glasses disposed, we will here make choice of the siege of Troy for a theatric subject; in which will be found all the incidents necessary to the exhibition of any other subject whatever.—In the first act, the theatre may represent, on one side, the ramparts of Troy; toward the back part, the Grecian camp; and at a further distance, the sea, and the isle of Tenedos. We will suppose the time to be that when the Greeks feigned to raise the siege; and embarked, leaving behind them the wooden horse, in which were contained the Grecian soldiers.—On a glass, therefore, of the same width with the aperture made in the side AC of the box, you are to paint a deep blue curtain, lightly charged with ornaments, quite transparent. This glass is to be placed in the first vertical groove; so that by letting it gently down, its image may appear to rise in the same manner as the curtain of a theatre. All the glasses that are to ascend or descend must be bordered with thin pieces of wood, and so exactly fill the grooves, that they may not slide down of themselves.—You must have several glasses of a proper size to pass through the horizontal grooves, and of different lengths according to the extent of the subject. You may paint, on the first, the walls of Troy. On the second, the Grecian camp. On the third, the sea, the isle of Tenedos, and a serene sky. On the fourth, the Grecian troops by detached figures. On the fifth, other troops, disposed in battalions, and placed at a distance. On the sixth, divers vessels, which as the glass advances in the groove diminish in size. On the seventh, the wooden horse and Sinon. On the eighth, Trojan men and women.

These glasses being properly painted, you place in the horizontal grooves the first, second, third, and fourth. Then draw up the curtain, by letting down the glass on which it is painted, and draw away gently the fourth glass, and after that the second; then advance, very gently, the fifth, that represents the embarkment, and pass it quite through. Next pass, the opposite way, the sixth, which represents the Grecian fleet. The objects painted on the fourth, fifth, and sixth, quite disappearing, you are to advance the seventh, on which is painted the wooden horse; and at the same time the eighth, where the Trojans will appear to draw the horse into the city. The curtain is then to be let down, that you may withdraw the scenes of the first act, and place in the grooves those that are to compose the second.—In the second act may be represented the interior part of the city of Troy: on one side may be seen the wooden horse, and in the back part the temple of Pallas. The glasses for this act may be painted in the following manner.—On the first, may be palaces and houses, representing the inside of a city. On the second, the temple of Pallas in the centre, with a clear night and the moon. In the front may be seen the wooden horse, that the Trojans have

placed near the temple of Pallas. On the third, a troop of Greeks, with Sinon at their head, who are going to open the gates of the city to the Grecians. On the fourth, different troops of armed Greeks; painted on a long glass, to afford variety. On the fifth, several troops of Trojans. On the sixth, various appearances of fire and smoke, so disposed, that, this glass being drawn up above the others, the objects painted on the first glass may appear in a conflagration.

Before you draw up the curtain, you should place the first and second glasses. You then pass the whole third glass slowly; a little after, the fourth, on which are painted the different bodies of armed Greeks; and at the same time, from the opposite side, the sixth glass, that represents the Trojan troops; observing to move them slowly both in advancing and retreating, to imitate a combat (c). Then draw up, by degrees, the sixth, on which are painted the fire, flame, and smoke, so that the palaces and houses painted on the first glass may appear to take fire gradually, and at last present a general conflagration. After having represented these incidents with the greatest attention, you let fall the curtain to prepare for the third act. In this may be represented the inside of Priam's palace; where is seen an altar, round which several Trojan princesses appear, who have fled thither for safety.—On the first glass may be painted the palace. On the second, a view of the back part of the palace, with the altar. On the third, Priam with several Trojan men and women. On the fourth, Pyrrhus, and a troop of Greeks. On the fifth, the same actors, with the palace in flames. On the sixth, a conflagration.—The two first glasses which are to be drawn up, should be placed before you raise the curtain. Then pass the third; next advance the fourth, which being drawn up, discovers on the fifth the palace in flames; then drawing up the sixth, let down the first, that the palace may appear entirely destroyed by the conflagration.

The fourth act may represent the environs of Troy, with a distant prospect of the sea. The first and third glasses of the first act may be here used; to which may be added a third, representing Eneas bearing his father Anchises, followed by his son Iulus, and some Trojans. With this glass may be represented the flight of the Trojans, and the embarkment of Eneas; with another glass, on which are painted certain vessels.—To this act the following scenes may be added. The cave of Æolus; the back part of the cave; Æolus; the winds; Juno in her chariot.

The fifth act should represent the open sea, with the fleet of Eneas sailing for Italy.—On the first glass must be painted the sea, as in the tenth Experiment; or else the waves should be imitated by another glass under the first. On the second, the Trojan fleet. On the third, Neptune in his car. On the fourth, the palace of Jupiter. On the fifth, the inside of the palace; the gods assembled in council; with Venus, obtaining leave of Jupiter for Eneas to land in Italy.—After having placed the first glass, that represents a calm sea, the curtain is raised, and the second scene is advanced, which contains the Trojan fleet. The first is then brought forward, to represent a violent tempest: then raising the third glass, Neptune appears, who commands

(c) He that moves the glasses, seeing the effect they produce, is the better able to render the representation as natural as possible.

mands the waves to be still, which is done by making the tempest subside by degrees. The fleet then advances, and passes over the whole theatre: presently after the fourth and fifth scenes descend, that represent Olympus, and finish the exhibition.

Note, We must here repeat, that if you would represent a subject of this sort to advantage, it is quite necessary that the glasses be well painted: and those that are to be in front, should be in stronger and more opaque colours, that the images of those behind may

not appear mixed with them, which will be the case if they are all equally transparent. The glasses should also be of different lengths; that, some being placed before the others are drawn away, their extremities may not be perceived.

The larger these subjects are represented, the better effect they will have: the front of the theatre should appear to be about three feet wide; and if some parts of the figures were moveable, it would still add to the variety of the entertainment.

D I O

Dioscorea
||
Diosma.

DIOSCOREA, in botany, a genus of the hexandria order, belonging to the diœcia class of plants, for which there is no English name. There are eight species, of which the only remarkable one is the bulbifera or yam. This hath triangular winged stalks, which trail upon the ground, and extend a great way: these frequently put out roots from their joints as they lie upon the ground, by which the plants are multiplied. The roots are eaten by the inhabitants of both the Indies; and are particularly serviceable in the West India islands, where they make the greatest part of the negroes food. The plant is supposed to have been brought from the East to the West Indies; for it has never been observed to grow wild in any part of America; but in the island of Ceylon, and on the coast of Malabar, it grows in the woods, and there are in those places a great variety of sorts. It is propagated by cutting the root in pieces, observing to preserve an eye in each, as is practised in planting potatoes. One plant will produce three or four large roots. The skin of these roots is pretty thick, rough, unequal, covered with many stringy fibres or filaments, and of a violet colour approaching to black. The inside is white, and of the consistence of red beet. It resembles the potatoe in its meanness, but is of closer texture. When raw, the yams are viscous and clammy: when roasted or boiled, they afford very nourishing food; and are often preferred to bread by the inhabitants of the West Indies, on account of their lightness, and facility of digestion. When first dug out of the ground, the roots are placed in the sun to dry: after which, they are either put into sand, dry garrets, or casks; where, if kept from moisture, they may be preserved whole years, without being spoiled, or diminished in their goodness. The root commonly weighs two or three pounds; though some yams have been found upwards of 20 pounds weight.

DIOSCORIDES (Pedacius), a physician of Anaxarba, since named *Cæsaria*, in Cilicia; lived in Nero's reign, and composed seven books de *Materia Medica*.

DIOSMA, **AFRICAN SPIRÆA**; a genus of the monogynia order, belonging to the pentandria class of plants. There are nine species; of which the most remarkable are the hirsuta, with narrow hairy leaves; and the oppositifolia, with leaves placed in the form of a cross. The first is a very handsome shrub, growing to the height of five or six feet: the stalks are of a fine coral colour: the leaves come out alternately on every side of the branches, and are narrow-pointed and hairy: the flowers are produced in small clusters at the end of the shoots, and are of a white colour. They are succeeded by starry seed-vessels having five corners; in each

D I O

of which corners is a cell, containing one smooth, shining, oblong, black seed: these seed-vessels abound with a resin which emits a grateful scent, as doth also the whole plant.—The second species rises to the height of three or four feet: the branches are slender, and produced from the stem very irregularly; the leaves are placed cross-ways; the flowers are produced at the ends of the branches, between the leaves: the plants continue a long time in flower, and make a fine appearance when they are intermixed with other exotics in the open air. Both species are propagated by cuttings; which may be planted during any of the summer-months in pots, and plunged into a moderate hot-bed, where they should be shaded from the sun, and frequently watered. In about two months they will have taken root; when each should be transplanted into a small pot where they are to remain; but during winter, like most other exotic plants, they must be preserved in a green-house.

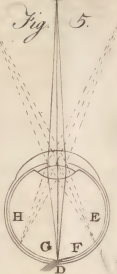
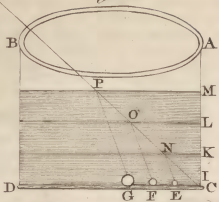
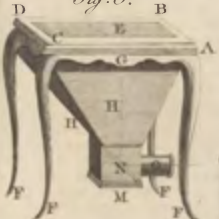
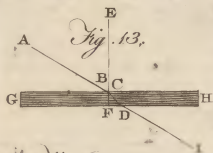
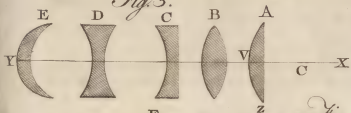
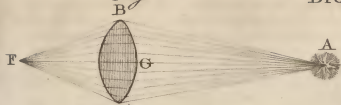
DIOSPYROS, **THE INDIAN DATE-PLUMB**; a genus of the diœcia order, belonging to the polygamia class of plants. There are two species. 1. The lotus is supposed to be a native of Africa, from whence it was transplanted into several parts of Italy, and also into the south of France. The fruit of this tree is supposed to be the lotus with which Ulysses and his companions were enchanted. In the warm parts of Europe this tree grows to the height of 30 feet. In the botanic garden at Padua, there is one very old tree which has been described by some of the former botanists under the title of *guaiacum patavinum*. This tree produces plenty of fruit every year; from the seeds of which many plants have been raised. 2. The virginiana, pishanon, persimon, or pitchumon plumb, is a native of America, but particularly of Virginia and Carolina. The seeds of this sort have been frequently imported into Britain, and the trees are common in many nurseries about London. It rises to the height of 12 or 14 feet; but generally divides into many irregular trunks near the ground, so that it is very rare to see a handsome tree of this sort. Though plenty of fruit is produced on these trees, it never comes to perfection in this country. In America the inhabitants preserve the fruit till it is rotten, as is practised with medlars in England; when they are esteemed very pleasant. Both species are propagated by seeds: and the plants require to be treated tenderly while young; but when they are grown up, they resist the greatest cold of this country.

DIPHTHONG, in grammar, a double vowel, or the mixture of two vowels pronounced together, so as to make one syllable.

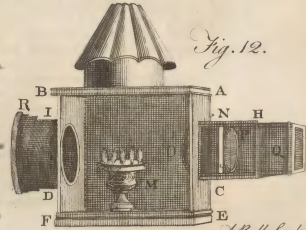
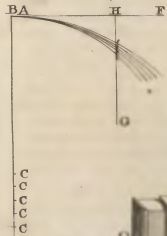
The Latins pronounced the two vowels in their diphthongs

Diosma
||
Diphthong.

DIOPTRICS.



DIVISIBILITY.



A. Bell Sculp.^t



thongs *ae* or *æ*, *oe* or *œ*, much as we do; only that the one was heard much weaker than the other, tho' the division was made with all the delicacy imaginable. Diphthongs, with regard to the eyes, are distinguished from those with regard to the ears: In the former, either the particular sound of each vowel is heard in the pronunciation; or the sound of one of them is drowned; or, lastly, a new sound, different from either, results from both: the first of these only are real diphthongs, as being such both to the eye and ear. Diphthongs with regard to the ear are either formed of two vowels meeting in the same syllable, or whose sounds are severally heard; or of three vowels in the same syllable, which only afford two sounds in the pronunciation.

English diphthongs, with regard to the eye and ear, are *ai, au, ea, eo, oi, ou, oo*. Improper English diphthongs, with regard to the eye only, are *aa, ea, eo, eu, ie, ei, oa, oe, ue, ui*.

DIPLOE, in anatomy, the soft medullium, or medullary substance, which lies between the two laminae of the bones of the CRANIUM.

DIPLOMA. See DIPLOMATICS.

In a peculiar sense, it is used for an instrument or licence given by colleges, societies, &c. to a clergyman to exercise the ministerial function, or to a physician to practise the profession, &c. after passing examination, or admitting him to a degree.

DIPLOMATICS, the science of diplomas, or of ancient literary monuments, public documents, &c. It does not, however, nor can it, absolutely extend its researches to antiquity; but is chiefly confined to the middle age, and the first centuries of modern times. For though the ancients were accustomed to reduce their contracts and treaties into writing; yet they grav'd them on tables, or covered them over with wax, or brass, copper, stone, or wood, &c. And all that in the first ages were not traced on brass or marble, has perished by the length of time, and the number of destructive events.

1. The word *diploma* signifies, properly, a letter or epistle, that is folded in the middle, and that is not open. But, in more modern times, the title has been given to all ancient epistles, letters, literary monuments, and public documents, and to all those pieces of writing which the ancients called *Syngrapha, Chirographa, Codicilli*, &c. Is the middle age, and in the diplomas themselves, these writings are called *Litteræ, Præcepta, Placita, Chartæ indidula, Sigilla, and Bullæ*; as also *Parcharte, Pantocharte, Tractorie, Descriptions*, &c. The originals of these pieces are named *Exemplaria, or Autographa, Chartæ authentica, Originalia*, &c. and the copies, *Apographa, Copiæ, Particulæ*, and so forth. The collections that have been made of them, are called *Chartaria* and *Chartulæ*. The place where these papers and documents were kept, the ancients named *Scrinia, Tabularium, or Ærarium*, words that were derived from the tables of brass, and, according to the Greek idiom, *Archeum* or *Archicum*.

2. In order to understand the nature of these ancient papers, diplomas, and manuscripts, and to distinguish the authentic from the counterfeit, it is necessary to know that the paper of the ancients came from Egypt, and was formed of thin leaves or membranes, taken from the branches of a tree named *Papyrus*, or *Bibulum*

Egyptiacum, and which were pasted one over the other with the slime of the Nile, and were pressed and polished with a pumice-stone. This paper was very scarce; and it was of various qualities, forms, and prices, which they distinguished by the names of *charta hieratica, luria, augusta, amphitheatica, fœtica, tanirica, empetrica*, &c. They cut this paper into square leaves, which they pasted one to the other, in order to make rolls of them: from whence an entire book was called *volumen, from volvendo*; and the leaves of which it consisted, *pagina*. Sometimes, also, they pasted the leaves all together by one of their extremities, as is now practised in binding; by this method they formed the back of a book, and these the learned call *codices*. They rolled the volume round a stick, which they named *umbilicus*; and the two ends that came out beyond the paper, *cornua*. The title, wrote on parchment, in purple characters, was joined to the last sheet, and served it as a cover. They made use of all sorts of strings or ribbands, and even sometimes of locks, to close the book; and sometimes also it was put into a case. But there is not now to be found, in any library or cabinet whatever, any one of these volumes. We have been assured, however, by a traveller, that he had seen several of them in the ruins of Herculaneum; but so damaged, the paper so stiff and brittle, by the length of time, that it was impossible to unroll them, and consequently to make any use of them; for on the first touch they fell into shatters. We shall speak hereafter of those books they call *codices*.

3. We are ignorant of the precise time when our modern paper was invented; and when they began to make use of pens in writing, instead of the stalks of reeds. The ink that the ancients used, was not made of vitriol and galls, like the modern, but of foot. Sometimes also they wrote with red ink made of vermilion; or in letters of gold, on purple or violet parchment. It is not difficult for those whose apply themselves to this study, to distinguish the parchment of the ancients from that of the moderns, as well as their ink and various exterior characters: but that which best distinguishes the original from the counterfeit, is the writing or character itself; which is so distinctly different from one century to another, that we may tell with certainty, within about 40 or 50 years, when any diploma was written. There are two works which furnish the clearest lights on this matter, and which may serve as sure guides in the judgments we may have occasion to make on what are called ancient diplomas. The one is the celebrated treatise on the Diplomatic, by F. Mabillon; and the other, the first volume of the *Chronicon Gotvicensæ*. We there find specimens of all the characters, the flourishes, and different methods of writing, of every age. For these matters, therefore, we must refer our readers to those authors; and shall here only add, that,

4. All the diplomas are wrote in Latin, and consequently the letters and characters have a resemblance to each other: but there are certain strokes of the pen which distinguish not only the ages, but also the different nations; as the writings of the Lombards, French, Saxon, &c. The letters in the diplomas are also usually longer, and not so strong as those of manuscripts. There has been also introduced a kind of court-hand, of a very disproportionate length, and the letters of

Diplomatics. which are called *Exiles litteræ, crispæ ac protrahiores*. The first line of the diploma, the signature of the sovereign, that of the chancellor, notary, &c. are usually wrote in this character.

5. The signature of a diploma consists either of the sign of the cross, or of a monogram or cipher, composed of the letters of the names of those who subscribed it. The initial letters of the name, and sometimes also the titles, were placed about this cross. By degrees the custom changed, and they invented other marks; as for example, the sign of Charlemagne was thus:



They sometimes added also the dates and epoch of the signature, the feasts of the church, the days of the calendar, and other like matters. The successive corruption of the Latin language, the style and orthography of each age, as well as their different titles and forms; the abbreviations, accentuation, and punctuation, and the various methods of writing the diphthongs; all these matters united, form so many characters and marks by which the authenticity of a diploma is to be known.

6. The seal annexed to a diploma was anciently of white wax, and artfully imprinted on the parchment itself. It was afterward pendent from the paper, and inclosed in a box or case, which they called *bulia*. There are some also that are stamped on metal, and even on pure gold. When a diploma bears all the characters that are requisite to the time and place where it is supposed to be written, its authenticity is not to be doubted: but, at the same time, we cannot examine them too scrupulously, seeing that the monks and priests of former ages have been very adroit in making of counterfeits; and the more, as they enjoyed the confidence of princes and statesmen, and were even sometimes in possession of their rings or seals.

7. With regard to manuscripts that were wrote before the invention of printing, it is necessary, (1.) to know their nature, their essential qualities, and matter; (2.) to be able to read them freely, and without error; (3.) to judge of their antiquity by those characters which we have just mentioned with regard to the diplomas; and, (4.) to render them of use in the sciences. As there are scarce any of the ancient codes now remaining, (see par. 2.) wrote on the Egyptian paper, or on wood, ivory, &c. we have only to consider those that are written on parchment or vellum (*membranes*), and such as are wrote on our paper (*chartaceæ*). The former of these are in most esteem. With regard to the character, these codes are written either in square and capital letters, or in half square, or round and small letters. Those of the first kind are the most ancient. There are no intervals between the words, no letters different from the others at the beginning of any word, no points, nor any other distinction. The codes which are wrote in letters that are half square, resemble those we have in Gothic characters, as well for the age as the form of the letters. Such as are wrote in round letters are not so ancient as the former, and do not go higher than the ninth or tenth century. These have spaces between the words, and some punctuation. They are likewise not so well wrote as the preceding, and are

frequently disfigured with comments. The codes are divided, according to the country, into Lombard, Italian, Gaulic, Franco-Gaulic, Saxon, Anglo-Saxon, &c.

8. In the ancient Greek books, they frequently terminated the periods of a discourse, instead of all other division, by lines; and these divisions were called, in Latin, *versus*, from *vertendo*: for which reason these lines are still more properly named *versus* than *lineæ*. At the end of a work, they put down the number of verses of which it consisted, that the copies might be more easily collated: and it is in this sense we are to understand Trebonius, when he says, that the pandects contain 150,000 *pæne versusum*. These codes were likewise *vel probæ vel deterioris notæ*, more or less perfect, not only with regard to the calligraphy or beauty of the character, but to the correction of the text also.

9. It is likewise necessary to observe, in ancient codes, the abbreviations, as they have been used in different centuries. Thus, for example, A. C. D. signifies, Aulus Caius Decimus; Ap. Cn. Appius Cneius; Ang. Imp. Augustus Imperator. The characters that are called *notæ*, are such as are not to be found in the alphabet; but which, notwithstanding, signify certain words. All these matters are explained in a copious manner by Vossius, and in the Chronicon Gotviciense. Lastly, the learned divide all the ancient codes into *codices minus raros, rariore, editos, & anecdotos*. The critical art is here indispensably necessary: its researches, moreover, have no bounds; and the more, as the use of it augments every day, by the discoveries that are made in languages, and by the increase of erudition.

DIPONDIOUS, in the scripture-language, is used by St Luke to signify a certain coin, which was of very little value: our translation of the passage is, *Are not five sparrows sold for two farthings?* In St Matthew, who relates the same thing, we read, *Are not two sparrows sold for a farthing?*

DIPPING, among miners, signifies the interruption, or breaking off, of the veins of ore; an accident that gives them a great deal of trouble before they can discover the ore again.

DIPPING Needle. See NEEDLE.

DIPSACUS, TEAZEL; a genus of the monogynia order, belonging to the tetrandria class of plants. There are four species, the most remarkable of which is the *carduus fullonum*, which grows wild in many parts of England. It is of singular use in raising the knap upon woollen cloth. For this purpose, the heads are fixed round the circumference of a large broad wheel, which is made to turn round, and the cloth is held against them. In the west of England, great quantities of the plant are cultivated for the use just now mentioned. It is propagated by sowing the seeds in March, upon a soil that is well prepared. About one peck of seed is sufficient for an acre, as the plants must have room to grow; otherwise the heads will not be large enough, nor in great quantity. When the plants come up, they must be hoed in the same manner as is practised for turnips, cutting down all the weeds, and thinning the plants to about eight inches distance; and as the plants advance, and the weeds begin to grow again, they must be hoed a second time, cutting out the plants to a wider distance, so that they may finally stand a

foot

Diplomatics
Diplomatics

Disas
Director.

foot distant from each other. The second year they will shoot up heads, which may be cut about the beginning of August. They are then to be tied up in bunches, and let in the sun if the weather is fair; or if not, in rooms to dry them. The common produce is about 160 bundles or staves upon an acre, which are sold for one shilling each.

The leaves of the common wild teal, dried, and given in powder or infusion, are a very powerful remedy against statutes and crudities in the stomach. There is also another, though somewhat whimsical, use for which this plant is famous among the country people in England. If the heads are opened longitudinally, about September or October, there is generally found a small worm in them: one of these only is found in each head, whence naturalists have named it the *vermis solitarius displaci*. They collect three, five, or seven of these, always observing to make it an odd number; and, sealing them up in a quill, give them to be worn as an amulet against the ague. This superstitious remedy is of much higher repute than the bark, in many parts of England.

DIPSAS, a sort of serpent, the bite of which produces such a thirst as proves mortal; whence its name *dispas*, which signifies thirsty. In Latin it is called *fitula*, a pail. Moses speaks of it in Deut. viii. 15.

DIPTOTES, in grammar, are such nouns as have only two cases, as *suppetia*, *suppetiar*, &c.

DIPTYCHS, in antiquity, a public register in which were written the names of the consuls and other magistrates among the heathens; and among the Christians, they were a sort of tablets, on one of which were written the names of the deceased, and on the other those of the living, patriarchs, bishops, &c. or those who had done any service to the church, for whom prayers were offered, the deacon reading the names at mass.

DIRÆ, the general name of the three Furies in the Pagan system of theology. They were so called, as being *quasi Deorum ira*, the ministers of divine vengeance in punishing guilty souls after death. They were the daughters of *Night* and *Acheron*. See FURIES.

DIRECT HARMONY. See HARMONY.

DIRECTION, in mechanics, signifies the line or path of a body's motion, along which it endeavours to proceed according to the force impressed upon it. See MECHANICS.

DIRECTOR, in commercial polity, a person who has the management of the affairs of a trading company: thus we say, the directors of the India company, South-sea company, &c. See COMPANY.

The directors are considerable proprietors in the stocks of their respective companies, being chosen by plurality of votes from among the body of proprietors. The Dutch East India company have 60 such directors; that of France, 21; the British East India company has 24, including the chairman, who may be re-elected for four years successively. These last have salaries of 150 l. a-year each, and the chairman 200 l. They meet at least once a-week, and commonly oftener, being summoned as occasion requires.

DIRECTOR, in surgery, a grooved probe, to direct the edge of the knife or scissars in opening sinuses or fistule, that by this means the adjacent vessels, nerves, and tendons, may remain unharmed. See SURGERY.

VOL. IV

DIRIBITORES, among the Romans, officers appointed to distribute tablets to the people at the comitia. See COMITIA.

DIRIGENT, or DIRECTRIX, a term in geometry, signifying the line of motion, along which the deficient line or surface is carried in the genesis of any plane or solid figure.

DIS, an inseparable article prefixed to divers words, the effect whereof is either to give them a signification contrary to what the simple words have, as *disoblige*, *disobey*, &c.; or to signify a separation, detachment, &c. as *disposing*, *distributing*.

DIS, a town of Norfolk, seated on the river Wavenay, on the side of a hill. It is a neat flourishing town, with one large church, a Presbyterian and a Quaker meeting. It has about 600 good houses, the streets are well paved, pretty wide, and always clean. At the west end of the town is a large meer, or lake; but so muddy, that the inhabitants can make no other use of it but in catching of eels. In the town are carried on manufactories of fail-cloth, hofe, and the making of staves. E. Long. 1. 16. N. Lat. 52. 25.

DISABILITY, in law, is when a man is disabled, or made incapable to inherit any lands, or take that benefit which otherwise he might have done: and this may happen four ways; by the act of an ancestor, or of the party himself, by the act of God, or of the law. 1. Disability by the act of the ancestor, is where the ancestor is attainted of high treason, &c. which corrupts the blood of his children, so that they may not inherit his estate. 2. Disability by the act of the party is where a man binds himself by obligation, that, upon surrender of a lease, he will grant a new estate to a lessee; and afterwards he grants over the reversion to another, which puts it out of his power to perform it. 3. Disability by the act of God is where a man is *non sane memorie*, whereby he is incapable to make any grant, &c. So that, if he passeth an estate out of him, it may after his death be made void; but it is a maxim in law, "That a man of full age, shall never be received to disable his own person." 4. Disability by the act of the law, is where a man by the sole act of the law, without any thing by him done, is rendered incapable of the benefit of the law; as an alien born, &c.

ISLANDS OF DISAPPOINTMENT, are a cluster of small islands, lying in S. Lat. 14. 10. W. Long. 141. 16. They were discovered by Commodore Byron in 1765, who gave them their name from the shores affording no anchorage for his ships; for which reason he was obliged to quit them without landing, or procuring any refreshments for his crew, who were then languishing with sickness. They are inhabited by Indians, who appeared on the beach with spears in their hands, that were at least 16 feet long. They every where discovered hostile intentions, and seemed by signs to threaten the people in the boat with death if they came ashore. There are cocoa-trees in great abundance, and the shore abounds with turtle.

DISC, in antiquity, a quoit made of stone, iron, or copper, five or six fingers broad, and more than a foot long, inclining to an oval figure, which they hurled in form of a bowl, to a vast distance, by the help of a leathern thong tied round the person's hand who threw it, and put through a hole in the middle. Homer has made Ajax and Ulysses great artists at this sport.

14 M

sport.

Disibiores
Dife.

Disc
||
Discord.

sport.

DISC, in astronomy, the body and face of the sun and moon, such as it appears to us on the earth; or the body and face of the earth, such as it appears to a spectator in the moon.

DISC, in optics, is the width of the aperture of telescopic glasses, whatever their form be, whether plain, convex, concave, &c.

DISCERNING, or DISCERNMENT, a faculty of the mind whereby it distinguishes between ideas. See METAPHYSICS, n^o 44, &c.

DISCIPLE, one who learns any thing from another: thus, the followers of any teacher, philosopher, &c. are called *disciples*. In the Christian sense, they were followers of Jesus Christ, in general; but in a more restrained sense, the disciples denote those alone who were the immediate followers and attendants on his person, of which there were 70 or 72. The names *disciple* and *apostle* are often synonymously used in the gospel-history; but sometimes the apostles are distinguished from disciples, as persons selected out of the number of disciples, to be the principal ministers of his religion: of these there were only 12. The Latins kept the festival of the 70 or 72 disciples on July 15th, and the Greeks on January 4th.

DISCIPLINE, in a general sense, denotes instruction and government, as military discipline, ecclesiastical discipline, &c.

Ecclesiastical discipline consists in putting those laws in execution by which the church is governed, and inflicting the penalties enjoined by them against the several sorts of offenders that profess the religion of Jesus. The primitive church never pretended to exercise discipline upon any but such as were within her pale, in the largest sense, by some act of their own profession; and even upon these she never pretended to exercise her discipline so far as to cancel or disannul their baptism: all that she pretended to, was to deprive men of the benefits of external communion, such as public prayer, receiving the eucharist, and other acts of divine worship. The church-discipline was only confined to the admonition of the party, and to the lesser and greater excommunication.

As to the objects of ecclesiastical discipline, they were all such delinquents as fell into great and scandalous crimes after baptism.

Discipline, in a more peculiar sense, is used for the chastisements or bodily punishments inflicted on a religious of the Romish church who has been found a delinquent; or even for that which the religious voluntarily undergo or inflict on themselves, by way of mortification.

DISCLAMATION. See LAW, N^o clxv. 23.

DISCORD, in general, signifies disagreement, or opposition between different persons or things.

DISCORD, in music, every sound which, joined with another, forms an assemblage disagreeable to the ear; or rather, every interval whose extremes do not coalesce. Now, as there are no other concords or consonances, except those which form amongst themselves, and with their fundamental sound, perfect chords, it follows, that every other interval must be a real dissonance or discord: even the third and sixth were reckoned such among the ancients, who excluded them from the number of consonant chords.

The term *dissonance*, which is synonymous with discord, is compounded of two words, the inseparable preposition *dis* and the verb *sonare*; which, both in a literal and metaphorical sense, signifies *disagreement* or *disunion*. In reality, that which renders dissonances grating, is, that the sounds which form them, far from uniting in the ear, seem to repel each other, and are heard each by itself as two distinct sounds tho' produced at the same time.

This repulsion or violent oscillation of sounds is heard more or less as the vibrations which produce it are more or less frequently coincident. When two vocal strings are gradually tuned, till they approach a consonant interval, the pulsations become slower, as the chord grows more just, till at last they are scarcely heard, if heard at all; from whence it appears certain, that the pleasure produced in us by harmony results from the more or less exact and frequent coincidence of vibrations; tho' the reason why this coincidence should give pleasure, more than any other modification or combination of sounds, appears to us inscrutable. The agreeable effects of dissonance in harmony, are no objection to this theory; since it is allowed, that the sensations excited by discord are not in themselves immediately and necessarily pleasing, but only please by auricular deception. The ear is surprized with the shock it receives, without being able to imagine how it should have happened; and in proportion as it is harsh and grating, we feel the pleasure of returning harmony enhanced, and the disappointment of being artfully and insensibly extricated more agreeable.

The name of *dissonance*, is given sometimes to the interval, and sometimes to each of the two sounds which form it. But though two sounds equally form a dissonance between themselves, the name is most frequently given to that sound in particular which is most extraneous to the chord.

The number of possible *dissonances* is indefinite; but as in music we exclude all intervals which are not found in the system received, the number of dissonances is reduced to a very few: besides, in practice, we can only select from those few, such as are agreeable to the species, and the mode in which we compose; and from this last number we must exclude such as cannot be used consistently with the rules prescribed. But what are these rules? Have they any foundation in nature, or are they merely arbitrary? This is what Rousseau, whom in this article we have followed or abandoned as his observations appeared useful or frivolous, proposes to investigate as its principal object.

But where does his scrutiny terminate? Not in the abolition of the rules prescribed. These have still subsisted, and will still subsist, while the frame of man, and the nature of music, remain what they are. If then the rules be permanent and universal, the principle upon which they are founded may be latent or ambiguous; but the rules themselves can never be purely arbitrary. How else could it happen, that Rameau, D'Alembert, and Rousseau, should admit the force and effect of these rules, whilst each of those masters exerts his whole genius to give a different account of their cause and origin? Rousseau himself, as we have seen in a former article, inculcates the necessity of dissonances for the completion of harmony; (see CHORD). Now if this be true, the easiest methods of introducing and
dimin-

D'scord.

Discord
Discrete.

dismissing these discords must be the most eligible, and of consequence the rules for using them must be established. It is not then upon the subsistence or demolition of any particular theory, that they depend. Should we attend to the particular objections which may be urged against any system whatever; where is the theory which will be found proof to the efforts of scepticism? After all, the objections of Rousseau against Rameau's theory, as applied by D'Alembert to the origin of consonances, (see MUSIC, art. 94, 95, 96, 97, 98, 99.) appear to be much more frivolous than the analogies from which he pretends this origin to be deduced. It appears from D'Alembert's exposition of this theory, that, if not for all, it affords a solution for the most material and essential phenomena in harmony, which is sufficient for its establishment, till another can be found, which gives a rational and consistent account of the whole: a discovery which has not yet been made. But, whilst we acknowledge the utility of Rousseau's objections against D'Alembert's explication of dissonances, we must at the same time admire the ingenuity with which he has deduced them from principles purely mechanical, without departing from the system of M. Rameau. This mechanical explication will be found in his Musical Dictionary, under the article *Dissonance*.

DISCORD, (the goddess of), in Pagan theology She is represented by Ariettes with fiery eyes, a pale countenance, livid lips, and wearing a dagger in her bosom. It was she who at the marriage of Peleus and Thetis threw in the golden apple, whereon was written "To the fairest;" which occasioned a contention between the goddesses Juno, Minerva, and Venus; each pretending a title to the apple.—She was likewise called *Ate* and *Eris*.

DISCOVERY, in dramatic poetry, a manner of unravelling a plot, or fable, in tragedies, comedies, and romances; wherein, by some unforeseen accident, a discovery is made of the name, fortune, quality, &c. of a principal person, which were before unknown. See CATASTROPHE.

DISCOUNT, in commerce, a term among traders, merchants, and bankers. It is used by the two former on occasion of their buying commodities on the usual time of credit, with a condition that the seller shall allow the buyer a certain discount at the rate of so much per cent. per annum, for the time for which the credit is generally given, upon condition that the buyer pays ready money for such commodities, instead of taking the time of credit. Traders and merchants also frequently taking promissory notes for moneys due payable to them or order at a certain time, and sometimes having occasion for money before the time is elapsed, procure these notes to be discounted by bankers before the time of payment. Bills of exchange are also discounted by bankers; and in this consists one article of the profits of banking. See BANK.

DISCRETE, or DISJUNCT, PROPORTION, is when the ratio of two or more pairs of numbers or quantities is the same, but there is not the same proportion between all the four numbers. Thus if the numbers 3 : 6 :: 8 : 16 be considered, the ratio between 3 : 6 is the same as that between 8 : 16, and therefore the numbers are proportional: but it is only discretely or disjunctly, for 3 is not to 6 as 6 to 8; that is, the

proportion is broken off between 8 and 3, and is not continued as in the following continual proportionals, 3 : 6 :: 12 : 24.

DISCUS, in antiquity. See DISC.

DISCUS, in botany, the middle part of a radiated compound flower, generally consisting of small florets, with a hollow regular petal. It is commonly surrounded by large, plain, or flat, tongue-shaped petals, in the circumference or margin; as in daisy, groundsel, and leopards bane: sometimes the circumference is naked, as in cotton-weed and some species of colts-foot.

DISCUS *Folii*, the surface of the leaf.

DISCUSSION, in matters of literature, signifies the clear treating or handling of any particular point, or problem, so as to shake off the difficulties with which it is embarrassed: thus we say, *such a point was well discussed*, when it was well treated of and cleared up.

DISCUTIENTS, in medicine, are such remedies, as, by their subtilty, dissolve a stagnating or coagulated fluid, and dissipate the same without an external solution of continuity.

DISDIACLASTIC CRYSTAL, in natural history, a name given, by Bartholine and some others, to the pellucid fossil substance more usually called from the place whence it was first brought, *Island crystal*; tho' properly it is no crystal at all, but a fine pellucid spar, called by Dr Hill, from its shape, *parallelopipedum*. See *ISLAND CRYSTAL*.

DISDIAPASON, or BISIAPASON, in music, a compound concord, described by F. Parran, in the quadruple ratio of 4 : 1, or 8 : 2.

DISDIAPASON *Diapente*, a concord in a sextuple ratio of 1 : 6.

DISDIAPASON *Semi-Diapente*, a compound concord in the proportion of 16 : 3.

DISDIAPASON *Ditone*, a compound consonance in the proportion of 10 : 2.

DISDIAPASON *Semi-Ditone*, a compound concord in the proportion of 24 : 5.

DISEASE, has been variously defined by physicians, almost every founder of a new system having given a definition of *disease*, differing in some respects from his predecessors. For a particular account of these definitions, see MEDICINE.

It has always been observed, that people of particular places are subject to particular diseases, owing to their manner of living, or to the air and effluvia of the waters. The colder the country, the fewer and less violent the diseases in general are. Scheffer tells us, that the Laplanders know no such thing as the plague, or fevers of the burning kind, nor are subject to half the distempers we have. Some particular distempers, however, they are subject to more than other nations: thus they have often distempers of the eyes, which arise from their living continually in smoke, or from the glaring of the snow which covers their country for a great part of the year. Pleurifies, and inflammations of the lungs, are also very common among them; and the small-pox often rages with great violence. They have one general remedy against these and all other internal diseases: this is the root of that sort of moss which they call *jerib*. They make a decoction of this root in the whey of rein-deer milk, and drink very

Disease
Disease.

Disease. large doses of it warm, to keep up a breathing sweat. If they cannot get this, they use the stalks of Angelica boiled in the same manner. They have not so great an opinion of this remedy as of the former. The quantity of diluting liquors, however, that is drunk on these occasions, most probably contributes more to the cure of their diseases, than either of the drugs.

Hoffman has made some very curious observations on the diseases incident to particular places. He informs us, that swellings of the throat have been always common to the inhabitants of mountainous countries. The people of Switzerland, Carinthia, Styria, the Hartz-forest, Transylvania, and the inhabitants of Cronstadt, he observes, are all subject to this disease from the same cause: which probably is their using great quantities of snow water; and this, in all probability, derives its pernicious quality from the expulsion of the fixed air contained in it by the congelation, and which is not restored by melting.—The French are peculiarly troubled with fevers, worms, hydroceles, and farcoceles: and all these disorders are thought to proceed originally from their eating very large quantities of chestnuts. The British are peculiarly afflicted with hoarseness, catarrhs, coughs, dysenteries, consumptions; the women with the fluor-albus or whites; and children with a particular distemper scarce known any where else, called the *ricketts*. In different parts of Italy, different diseases prevail. At Naples, the venereal disease is more common than in other part of the world. At Venice people are peculiarly subject to the bleeding piles. At Rome, tertian agues and lethargic distempers are the most common; in Tuscany, the epilepsy or falling-sickness; and in Apulia, they are most subject to burning fevers, pleuritis, &c. In Spain, apoplexies are common, as also melancholy, hypochondriacal complaints, and bleeding piles. The Dutch are peculiarly subject to the scurvy, and to the stone in the kidneys. Denmark, Norway, Sweden, Pomerania, and Livonia, are all terribly afflicted with the scurvy: and it is remarkable, that, in Denmark, Sweden, and Norway, fevers are very common; but in Iceland, Lapland, and Finland, such a disease is scarce ever to be met with; though peripneumonies are very common in these places, and likewise diseases of the eyes, and violent pains in the head. The Russians and Tartars are afflicted with ulcers made by the cold, of the nature of what we call *chilblains*, but greatly worse; and in Poland there reigns a disease called the *plica Polonica*, so terribly offensive and painful, that scarce any thing can be worse. The people of Hungary are very much subject to the gout and rheumatism: they are also more infested with lice and fleas than any other people in the world. The Germans in different parts of the empire are subject to different reigning diseases. In Westphalia, they are peculiarly troubled with peripneumonies and the itch. In Silesia, Franconia, Aultria, and other places thereabout, they are very liable to fevers of the burning kind, to bleedings at the nose, and to other hæmorrhages; also to the gout, inflammations, and consumptions. In Misnia, they have purple fevers; and the children are peculiarly infested with worms. In Greece, Macedonia, and Thrace, there are very few diseases; but what they have are principally burning fevers and pleuritis. At Constantinople the plague always rages; and in the West India islands, ma-

lignant fevers, and the most terrible colics. See MEDICINE.

DISEASES of *Horses*. See FARRIERY.

DISEASES of *Dogs*. See DOGS.

DISEASES of *Plants*. See AGRICULTURE, n^o 67, *et seq.* and BLIGHT, MILDEW, MOSS, &c.

DISFRANCHISING, among civilians, signifies the depriving a person of the rights and privileges of a free citizen or subject.

DISGUISE, a counterfeit habit. Persons doing unlawful acts in disguise are by our statutes sometimes subjected to great penalties, and even declared felons. Thus by an act, commonly called the *black act*, persons appearing disguised and armed in a forest or grounds inclosed, or hunting deer, or robbing a warren or a fish-pond, are declared felons.

DISH, in mining, is a trough made of wood, about 28 inches long, four inches deep, and six inches wide; by which all miners measure their ore. If any be taken selling their ore, not first measuring it by the bar-masser's dish, and paying the king's duty, the seller forfeits his ore, and the buyer forfeits for every such offence 40 shillings to the lord of the field or farmer.

DISJUNCTIVE, something that separates or disjoins. Thus, *or, neither*, &c. which in connecting a discourse yet separates the parts of it, are called *disjunctive conjunctions*.

DISLOCATION, the same with LUXATION.

DISPART, in gunnery, is the setting a mark upon the muzzle-ring, or thereabouts, of a piece of ordnance, so that a light-line taken upon the top of the base-ring against the touch-hole, by the mark set on or near the muzzle, may be parallel to the axis of the concave cylinder. The common way of doing this, is to take the two diameters of the base ring, and of the place where the dispart is to stand, and divide the difference between them into two equal parts, one of which will be the length of the dispart which is set on the gun with wax or pitch, or fastened there with a piece of twine or marlin. By means of an instrument it may be done with all possible nicety.

DISPAUPER. A person suing in *forma pauperis*, is said to be dispaupered, if, before the suit is ended, he has any lands or other estate fallen to him, or if he has any thing to make him lose his privilege. See the article *FORMA PAUPERIS*.

DISPENSARY, or DISPENSATORY, denotes a book containing the method of preparing the various kinds of medicines used in pharmacy. Such are those of Bauderon, Quercetan, Zwelfer, Charas, Bates, Mesue, Salmon, Lemery, Quincy, &c. but the latest and most esteemed are the Edinburgh and London dispensaries, and Dr Lewis's dispensatory.

DISPENSARY, or *Dispensatory*, is likewise a magazine or office for selling medicines at prime cost to the poor. The college of physicians maintain three of these in London; one at the college itself in Warwick-lane; another in St Peter's alley, Cornhill; and a third in St Martin's lane. Dispensaries have also been established in several of the principal towns in Scotland and England; particularly in Edinburgh, Dundee, and Kello; as also at Newcastle upon Tyne. The first of these hath given risen to a course of Medical Lectures there, which promises to be of much advantage

Disease
Dispensary

tage to the students of medicine : and though the undertaking hath not been patronised by people of the first rank, yet the support of some generous and humane citizens hath made some progress towards rendering the institution permanent ; and some hundreds of patients, who could not be admitted into the royal infirmary, have found relief from the medicines charitably bestowed on them in the dispensary.

DISPENSATION, in law, the granting a license of doing some certain action that otherwise is not permitted.

DISPERSION, in general, signifies the scattering or dissipating something. Hence,

DISPERSION, in optics, the same with the divergency of the rays of light.

Point of DISPERSION, in dioptrics, the point from which refracted rays begin to diverge, where their refraction renders them divergent.

DISPERSION of Inflammation, in medicine and surgery, is the removing the inflammation, and restoring the inflamed part to its natural state.

DISPLAYED, in heraldry, is understood of the position of an eagle, or any other bird, when it is erect, with its wings expanded or spread forth.

DISPONDEE, in the Greek and Latin poetry, a double spondee or foot, consisting of four long syllables ; as *mæcênâtes*, *conclûdêntes*.

DISPOSITION, in Scots law, is that deed or writing which contains the sale or grant of any subject : when applied to heritable subjects, it in some cases gets the name of *charter*, which differs from a disposition in nothing else than a few immaterial forms *.

* See Char-
ter.

DISPOSITION, in architecture, the just placing the several parts of an edifice according to their nature and office. See **ARCHITECTURE**, n° 30, &c.

DISPOSITION, in oratory. See **ORATORY**, Part I.

DISPOSITION, in painting. See **PAINTING**, n° 14.

DISPOSITION, in human nature.—In every man there is something original, that serves to distinguish him from others, that tends to form a character, and to make him meek or fiery, candid or deceitful, resolute or timorous, cheerful or morose. This original bent, termed *disposition*, must be distinguished from a *principle* : the latter, signifying a law of human nature, makes part of the common nature of man ; the former makes part of the nature of this or that man. *Propensity* is a name common to both ; for it signifies a principle, as well as a disposition.

DISQUISITION, a serious and exact examination into the circumstances of any affair, in order to discourse clearly about it.

DISSECTION, in anatomy, the cutting up a body, with a view of examining the structure and use of the parts. See **ANATOMY**.

Le Gendre observes, that the dissection of a human body, even dead, was held a sacrilege till the time of Francis I. And the same author assures us, he has seen a consultation held by the divines of Salamanca, at the request of Charles V. to settle the question whether or no it were lawful in point of conscience to dissect a human body in order to learn the structure thereof.

DISSEISIN, in law, an unlawful dispossessing a person of his lands or tenements.

DISSEPIMENTUM, in botany, the name by which Linnæus denominates the partitions which in

dry seed-vessels, as *capsules* and pods (*siliqua*), divide the fruit internally into cells. Diffenters
Dissolution.

DISSENTERS, separatists from the service and worship of any established church.

DISSIMILITUDE, unlikeness, or want of similitude. See the article **RESEMBLANCE** and *Dissimilitude*.

DISSIPATION, in physics, an insensible loss or consumption of the minute parts of the body ; or, that flux whereby they fly off, and are lost.

Circle of DISSIPATION, in optics, is used for that circular space upon the retina, which is taken up by one of the extreme pencils or rays issuing from an object.

DISSOLUTION, in general, whatever dissolves or reduces a solid body into such minute parts as to be sustained in a fluid.

The principal dissolvents for metals, are *aqua-regia* and *aqua-fortis* ; for salts, earths, and gums, water ; for coral, and other alkaline substances, distilled vinegar or spirits of wine. Dissolvents are the same with what the chemists call *menstruans*. See the article **MENSTRUUM**.

Universal DISSOLVENT. See the article **ALKAHEST**.

DISSOLUTION, in physics : a discontinuation, or analysis, of the structure of a mixed body ; whereby, what was one, and contiguous, is divided into little parts, either homogeneous, or heterogeneous.

Dissolution, then, is a general name for all reductions of concrete bodies into their smallest parts, without any regard either to solidity or fluidity : though in the usual acceptation of the word among authors, it is restrained to the reduction of solid bodies into a state of fluidity ; which is more properly expressed by *solution*, as a branch of *dissolution*.

According to the opinion of Fr. Tertius de Lanis, Boerhaave, and some other learned men, the power or faculty of dissolving is lodged in fire alone. See **FIRE** and **HEAT**.

According to this hypothesis, other fluids commonly supposed dissolvents, only produce their effect by means of the fiery spicula they abound with ; and even air, which is judged a powerful menstruum, owes all its force to the rays of light diffused therein.

Sir Isaac Newton accounts for all dissolutions, and the several phenomena thereof, from the great principle of attraction ; and, in effect, the phenomena of dissolution furnish a great part of the arguments and considerations whereby he proves the reality of that principle. The following is a specimen of that great author's way of philosophising on the subject of dissolution.

“ When salt of tartar dissolves by lying in a moist place, is not this done by an attraction between the particles of the salt of tartar, and those of the water which float in the air in form of vapours ? and why does not common salt, or salt-petre, or vitriol, do the like, but for want of such an attraction ? And when *aqua-fortis*, or spirit of vitriol, poured on steel-slings, dissolves the filings, with a great heat, and ebullition ; is not this heat and ebullition effected by a violent motion of the parts ? and does not that motion argue, that the acid parts of the liquor rush towards the parts of the metal with violence, and run forcibly into its pores ; till, getting between the utmost particles and the main mass of metal, they loosen them therefrom, and set them

at

Diffolution

at liberty to float off into the water? When a solution of iron in aqua fortis dissolves lapis calamaris, and lets go the iron; or a solution of copper dissolves iron immersed in it, and lets go the copper; or a solution of mercury in aqua-fortis poured on iron, copper, tin, or lead, dissolves the metal, and lets go the mercury; Does not this argue, that the acid particles of the aqua-fortis are attracted more strongly by the lapis calamaris than by iron; by iron than by copper; by copper than by silver; and by iron, copper, tin, and lead, than by mercury? And is it not for the same reason, that iron requires more aqua-fortis to dissolve it than copper, and copper more than the other metals; and that of all metals iron is dissolved most easily, and is most apt to rust; and next after iron, copper? When aqua-fortis dissolves silver, and not gold; and aqua-regia dissolves gold, and not silver; May it not be said, that aqua-fortis is subtle enough to penetrate the pores of gold as well as of silver, but wants the attractive force to give it entrance: and the same of aqua-regia, and silver? And when metals are dissolved in acid menstruums, and the acids in conjunction with the metal act after a different manner, so as that the taste of the compound is milder than that of the simples, and sometimes a sweet one; Is it not because the acids adhere to the metallic particles, and thereby lose much of their activity? And if the acid be in too small a proportion to make the compound dissolvable in water; will it not, by adhering strongly to the metal, become unactive, and lose its taste; and the compound become a tasteless earth? for such things as are not dissolvable by the moisture of the tongue, are infipid."

Dr Freind gives us a mechanical account of dissolution, in the instance of salt dissolved in water, which is the most simple operation that falls under this head. This motion he ascribes to that attractive force, which is so very extensive in natural philosophy, that there is no kind of matter but what is under its influence. It may be observed, says he, that the corpuscles of salts, which are the most simple of any, are withal very minute, and for their bulk very solid; and, therefore, exert a very strong attractive force, which, *ceteris paribus*, is proportional to the quantity of matter. Hence it comes to pass, that the particles of water are more strongly attracted by the saline particles, than they are by one another: the particles of water, therefore, cohering but loosely, and being easily moveable, approach the corpuscles of salts, and run, as it were, into their embraces: and the motion of them is quicker, or slower, according to their less or greater distances; the attractive force in all bodies being strongest, at the point of contact. Therefore, if salt be thrown into the middle of a dish full of water, we shall find the aqueous particles which are in the middle of the dish sharp and pungent to the taste, but the water upon the sides of the vessel almost infipid; so that, when such a motion once arises, the aqueous particles are carried with the same force towards the salts, and the moment of them is to be estimated from the ratio of their weight and celerity conjunctly. By the force of this impulse, they open to themselves a passage into the pores of the salts, which are very numerous; and at length so break and divide their texture, that all cohesion of their parts is destroyed: hereupon, being separated, and removed to a convenient distance from one

another, they are dispersed, and float here and there about the water.

The simple dissolution of saline substances of every kind in water, may indeed be plausibly enough explained on the hypothesis of attraction; but where the dissolution is attended with heat, the emission of vapours, &c. it seems necessary to seek for some other principle than mere attraction to solve these phenomena. When diluted oil of vitriol, for instance, is poured upon iron-slings, a great quantity of vapour arises, which, if it was attempted to be confined, would certainly break the containing vessel.—It is impossible to imagine any connection between attraction and the emission of a vapour; and what is still more unaccountable, this vapour is *inflammable*, though neither the oil of vitriol nor the iron are so by themselves. Another very strong objection against the hypothesis of attraction may be derived from the phenomena of metallic dissolutions in general; for they do not dissolve completely in acids, as salts do in water. By dissolution they are always decomposed, and cannot be recovered in their proper form without a good deal of trouble. One metal, indeed, will very often precipitate another from an acid in its metalline form; but this is attended with the decomposition of the second metal; so that this can by no means be reckoned a fair experiment. But, whatever other method is used, the dissolved metal is always recovered in form of an earthy powder, that we could scarcely imagine capable of ever becoming malleable, and assuming the splendid appearance of a metal. Now, if there was a strong attraction between this and the acid, we might very justly conjecture, that the dissolution happened by means of that attraction; but so far from this, after a metal has been dissolved by any acid, and the calx has been separated from it, it is always difficult, and very often impossible, to procure a dissolution of the calx in the same acid. The action of the acid in this case seems not unlike that of fire upon wood or any other inflammable substance. Dry wood, thrown into the fire, burns and flames with great violence; but the same wood reduced to ashes, instead of burning, extinguishes fire already kindled. In like manner, a piece of clear metal thrown into an acid, dissolves with great violence; but the same metal, deprived of its phlogistic principle, and reduced to a calx, cannot be acted upon by acids, in whatever manner they are applied; at least, not without the greatest difficulty; and the more perfect the calx is, *i. e.* the more completely it is deprived of its inflammable principle, the greater the difficulty is of combining it afterwards with an acid.

Another thing in which the dissolution of metals by an acid resembles the burning of combustibles by fire is, that in both cases there is a separation of the principle of inflammability. In the case of oil of vitriol and iron filings, this is exceedingly obvious; for there the vapour which arises from the mixture takes fire, and explodes with great vehemence. In all other cases it is very easily proved; for the calx is always capable of being revived into metal by the addition of any substance containing the phlogiston. The calces prepared by fire, and by precipitation from acids, also resemble one another so much, that in many cases they are scarce to be distinguished.

These considerations seem to favour the hypothesis of

Diffoluti

ce of Dr Boerhaave; and much more does the following, namely, that almost all metallic solutions produce some degree of sensible heat. In some metals this is very considerable; but the greatest heat producible by an aqueous solution of any substance is by dissolving quicklime in the nitrous acid. The heat here greatly exceeds that of boiling water. In some dissolutions of inflammable matters by a mixture of the vitriolic and nitrous acids, the heat is so great, that the whole mixture takes fire almost instantaneously. Hence the Boerhaavians think they have sufficient grounds to conclude, that fire alone is the agent by which all dissolutions are performed.

These appearances have also been explained on the hypothesis of attraction; and it has been said, that the heat, &c. was owing to nothing but the violent action of the particles of the acid and metal upon each other. But the late discoveries made by Dr Black, with regard to heat, show, that it is capable of remaining concealed in substances for any length of time, and afterwards breaking out in its proper form. It is probable therefore, that the heat produced in these dissolutions is no other than what existed before, either in the acid, or in the metal. But for a full discussion of this subject see the articles COLD, CONGELATION, EVAPORATION, FIRE, HEAT, &c.

DISSONANCE, in music. See DISCORD.

DISSYLLABLE, among grammarians, a word consisting only of two syllables: such are nature, science, &c.

DISTAFF, an instrument about which flax is tied in order to be spun.

DISTANCE, in general, an interval between two things, either with regard to time or place *.

ACCESSIBLE DISTANCES, in geometry, are such as may be measured by the chain, &c. See GEOMETRY.

INACCESSIBLE DISTANCES, are such as cannot be measured by the chain, &c. by reason of some river, or the like, &c. which obstructs our passing from one object to another. See GEOMETRY.

DISTANCE, in astronomy. The distance of the sun, planets, and comets, is found only from their parallax, as it cannot be found either by eclipses or their different phases: for from the theory of the motions of the earth and planets we know, at any time, the proportion of the distances of the sun and planets from us; and the horizontal parallaxes are in a reciprocal proportion to these distances. See ASTRONOMY, n° 182.

DISTASTE properly signifies an aversion or dislike to certain foods; and may be either constitutional, or owing to some disorder of the stomach.

DISTEMPER, among physicians, the same with DISEASE.

DISTEMPER, in painting, a term used for the working up of colours with something besides water or oil. If the colours are prepared with water, that kind of painting is called *limning*; and if with oil, it is called *painting in oil*, and simply *painting*. If the colours are mixed with size, whites of eggs, or any such proper glutinous or unctuous matter, and not with oil, then they say it is done in *distemper*.

DISTENSION, in general, signifies the stretching or extending a thing to its full length or breadth.

DISTICH, a couplet of verses making a complete sense. Thus hexameter and pentameter verses

are disposed in distichs. There are excellent morals in Cato's distichs.

DISTICHIASIS, in surgery, a disease of the eyelids, when under the ordinary eye-lashes there grows another extraordinary row of hair, which frequently eradicates the former, and, pricking the membrane of the eye, excites pain, and brings on a defluxion.—It is cured by pulling out the second row of hairs with nippers, and cauterizing the pores out of which they issued.

DISTILLATION. See CHEMISTRY, n° 75, *et seq.* The objects of distillation, considered as a trade distinct from the other branches of chemistry, are chiefly spirituous liquors, and those waters impregnated with the essential oils of plants, commonly called *simple distilled waters*. The distilling compound spirits and waters is reckoned a different branch of business, and they who deal in that way are commonly called *redifiers*. This difference, however, though it exists among commercial people, is not at all founded in the nature of the thing; compound spirits being made, and simple spirits being rectified, by the very same operations by which they are at first distilled, or at least with very trifling alterations.

The great object with every distiller ought to be, to procure a spirit perfectly flavourless, or at least as well freed from any particular flavour as may be; and in this country the procuring of such a spirit is no easy matter. The only materials for distillation that have been used in large quantity, are malt and molasses or treacle. Both of these, especially the first, abound with an oily matter, which, rising along with the spirit, communicates a disagreeable flavour to it, and from which it can scarce be freed afterwards by any means whatever.—Some experiments have been made upon carrots, as a subject for the distillers: but these are not as yet sufficiently decisive; nor is it probable, that a spirit drawn from carrots would be at all devoid of flavour, more than one drawn from malt.—To dissipate the essential oil which gives the disagreeable flavour to malt spirits, it has been proposed to inspissate the wort into a rob, or thin extract like a syrup; afterwards to thin it with water, and ferment it in the usual manner. This certainly promises great success; there is no subject we know of that is possessed of any kind of essential oil, but what will part with it by distillation, or by long boiling. The inspissating of the wort, however, does not seem to be either necessary, or safe to be attempted; for, in this case, there is great danger of its contracting an empyreuma, which never could be remedied. The quantity lost by evaporation, therefore, might be occasionally added, with an equal certainty of dissipating the obnoxious oil. Whether the yield of spirit would be as great in this case as in the other, is a question that can by no means be discussed without further experiments. According to a theory adopted by some

distillers, namely, that essential oils are convertible into ardent spirits; and that the more oily any subject is, the greater quantity of spirit is obtainable from it; the practice of dissipating the oil before fermentation must certainly be a loss. But we are too little acquainted with the composition of vinous spirits, to have any just foundation for adopting such theories. Besides, it is certain, that the quantity of ardent spirit producible from any substance, malt for instance, very greatly exceeds

Distichiasis,
Distillation.

Difference
between dis-
tillers and
rectifiers.

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procure a spirit perfectly flavourless, or at least as well freed from any particular flavour as may be; and in this country the procuring of such a spirit is no easy matter. The only materials for distillation that have been used in large quantity, are malt and molasses or treacle. Both of these, especially the first, abound with an oily matter, which, rising along with the spirit, communicates a disagreeable flavour to it, and from which it can scarce be freed afterwards by any means whatever.—Some experiments have been made upon carrots, as a subject for the distillers: but these are not as yet sufficiently decisive; nor is it probable, that a spirit drawn from carrots would be at all devoid of flavour, more than one drawn from malt.—To dissipate the essential oil which gives the disagreeable flavour to malt spirits, it has been proposed to inspissate the wort into a rob, or thin extract like a syrup; afterwards to thin it with water, and ferment it in the usual manner. This certainly promises great success; there is no subject we know of that is possessed of any kind of essential oil, but what will part with it by distillation, or by long boiling. The inspissating of the wort, however, does not seem to be either necessary, or safe to be attempted; for, in this case, there is great danger of its contracting an empyreuma, which never could be remedied. The quantity lost by evaporation, therefore, might be occasionally added, with an equal certainty of dissipating the obnoxious oil. Whether the yield of spirit would be as great in this case as in the other, is a question that can by no means be discussed without further experiments. According to a theory adopted by some

3
Essential
oil by some
thought
convertible
into spirit.

Distillation, ceeds the quantity of essential oil which can by any means be obtained from the fume; nor do we find that those substances, which abound most in essential oil, yield the greatest quantity of spirits. So far from this, fine fugar, which contains little or no essential oil, yields a great deal of ardent spirit.

4
Directions
concerning
fermenta-
tion.

Previous to the operation of distilling, those of brewing and fermentation are necessary; but as these are fully treated of under the article *Brewing*, we shall here only observe, that unless the boiling of the wort, before fermentation, is found to dissipate the essential oil, so as to take away the flavour of the malt, there is no necessity for being at the trouble of that operation. The wort may be immediately cooled and fermented. —The fermentation ought always to be carried on as slowly as possible, and performed in vessels closely stopp'd; only having at the bung a valve press'd down by a spring, which will yield with less force than is sufficient to burst the vessel. It should even be suffered to remain till it has become perfectly fine and transparent; as by this means the spirit will not only be superior in quantity, but also in fragrance, pungency, and viscosity, to that commonly produced.

5
For distilla-
tion.

With regard to performing the operation of distilling, there is only one general rule that can be given; namely, to let the heat, in all cases, be as gentle as possible. Accidents will be effectually prevented by having the worm of a proper wideness, and by rectifying the spirits in a water-bath; which, if sufficiently large, will perform the operation with all the dispatch requisite for the most extensive business. —The vessel in which the rectification is performed, ought to be covered with water up to the neck, and to be loaded with lead at the bottom, so that it may sink in the water. Thus the operation will go on as quickly as if it was on an open fire, and without the least danger of a miscarriage; nor will it ever be necessary to make the water in the bath come to a boiling heat.

6
For distilla-
tion.

As the end of rectification is to make the spirit *clean* as well as *strong*, or to deprive it of the essential oil as well as the aqueous part, it will be proper to have regard to this even in the first distillation. For this purpose, the spirit, as it first comes over, should be received into a quantity of cold water; as by this means the connection betwixt it and the oily matter will be considerably lessened. For the same reason, after it has been once rectified in the water-bath, it should be again mixed with an equal quantity of water, and distilled a second time. Thus the spirit will be freed from most of the oily matter, even though it hath been very much impregnated with it at first. It is necessary to observe, however, that by using such a quantity of water, a considerable part of the spirit will be left in the residuum of each rectification. All these residuums, therefore, must be mixed together, and distilled on an open fire, with a brisk heat, that the remainder of the spirit may be got out.

After the spirit has been distilled once or twice in this manner from water, it may be distilled in a water-bath without any addition; and this last rectification will free it from most of the water it contains. But if it is required to be highly dephlegmated, a quantity of pure and dry salt of tartar must be added. The attraction betwixt this salt and water is greater than that betwixt water and spirit of wine. The salt therefore

imbibes the water contained in the spirit, and sinks with it to the bottom. The spirit, by a single distillation, may then be rendered perfectly free from water; but there is great danger of some of the alkaline salt rising along with it, and impregnating it with what is called an *urinous* flavour. When this once happens, it is impossible to be remedied; and the only way to prevent it, is to make the heat with which the spirit is distilled as gentle as possible. —It hath been propos'd, indeed, to prevent the rising of any thing alkaline, by the admixture of some calcined vitriol, sal catharticus amarus, or other imperfect neutral salt; but this can scarce be supposed to answer any good purpose, as the alkali unites itself with the oily matter of the spirit, and forms a kind of saponaceous compound, which is not so easily affected by the acid of the vitriol or other salt, especially as these salts will not dissolve in the spirit itself.

One very great desideratum among the distillers of this country, is a method of imitating the foreign spirits, brandy, rum, gin, &c. to a tolerable degree of perfection; and notwithstanding the many attempts that are daily made for this purpose, the success in general hath been but very indifferent. On this subject, Mr Cooper hath the following observations, in his

“Complete System of Distillation;” which, as they are applicable to all other spirits as well as brandy, we shall here transcribe. —“The general method of distilling brandies in France need not be formally described, as it differs in nothing from that practised here in working from malt-wash, or molasses; nor are they in the least more cleanly or exact in the operation. They only observe more particularly to throw in a little of the natural ley into the still along with the wine, as finding this gives their spirit the flavour for which it is generally admired abroad. —But, though brandy is extracted from wine, experience tells us that there is a great difference in the grapes from which the wine is made. Every soil, every climate, every kind of grapes, varies with regard to the quantity and quality of the spirits extracted from them. There are some grapes which are only fit for eating; others for drying, as those of Damascus, Corinth, Provence, and Avignon, but not fit to make wine. —Some wines are very proper for distillation, and others much less so. The wines of Languedoc and Provence afford a great deal of brandy by distillation, when the operation is performed on them in their full strength. The Orleans wines, and those of Blois, afford yet more; but the best are those of the territories of Cogniac and Andaye; which are, however, in the number of those the least drunk in France. Whereas those of Burgundy and Champagne, though of a very fine flavour, are improper, because they yield but very little in distillation.

“It must also be farther observed, that all the wines for distillation, as those of Spain, the Canaries, of Alicante, of Cyprus, of St Peres, of Toquet, of Grave, of Hungary, and others of the same kind, yield very little brandy by distillation; and consequently would cost the distiller considerably more than he could sell it for. What is drawn from them is indeed very good, always retaining the saccharine quality and rich flavour of the wine from whence it is drawn; but as it grows old, this flavour often becomes aromatic, and is not agreeable

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Of imita-
ting foreign
spirits.

8
Method of
making
brandies in
France.

Distillation. able to all palates.

"Hence we see that brandies always differ according as they are extracted from different species of grapes. Nor would there be so great a similarity as there is between the different kinds of French brandies, were the strongest wines used for this purpose: but this is rarely the case; the weakest and lowest flavoured wines only are distilled for their spirit, or such as prove absolutely unfit for any other use.

"A large quantity of brandy is distilled in France during the time of the vintage; for all those poor grapes that prove unfit for wine, are usually first gathered, pressed, their juice fermented, and directly distilled. This rids their hands of their poor wines at once, and leaves their casks empty for the reception of better. It is a general rule with them not to distil wine that will fetch any price as wine; for, in this state, the profits upon them are vastly greater than when reduced to brandies. This large stock of small wines, with which they are almost over-run in France, sufficiently accounts for their making such vast quantities of brandy in that country, more than in others which lie in warmer climates and are much better adapted to the production of grapes.—Nor is this the only fund of their brandies: for all the wine that turns eager, is also condemned to the still; and, in short, all that they can neither export nor consume at home, which amounts to a large quantity; since much of the wine laid in for their family provision is so poor as not to keep during the time of spending.

How brandy may be imitated in this country.

"Hence many of our English spirits, with proper management, are convertible into brandies that shall hardly be distinguished from the foreign in many respects, provided the operation be neatly performed.

"The common method of rectifying spirits from alkaline salts, destroys their vinosity, and in its stead introduces an urinous or lixivious taste. But as it is absolutely necessary to restore, or at least to substitute in its room, some degree of vinosity, several methods have been proposed, and a multitude of experiments performed, in order to discover this great desideratum. But none has succeeded equal to the spirit of nitre; and accordingly this spirit, either strong or dulcified, has been used by most distillers to give an agreeable vinosity to their spirits. Several difficulties, however, occur in the method of using it; the principal of which is, its being apt to quit the liquor in a short time, and consequently depriving the liquor of that vinosity it was intended to give. In order to remove this difficulty, and prevent the vinosity from quitting the goods, the dulcified spirit of nitre, which is much better than the strong spirit, should be prepared by a previous digestion, continued for some time, with alcohol; the longer the digestion is continued, the more intimately will they be blended, and the compound rendered the milder and softer.

"After a proper digestion, the dulcified spirit should be mixed with the brandy, by which the vinosity will be intimately blended with the goods, and not disposed to fly off for a very considerable time.—No general rule can be given for the quantity of this mineral acid requisite to be employed; because different proportions of it are necessary in different spirits. It should, however, be carefully attended to, that though a small quantity of it will undoubtedly give an agreeable vino-

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sity resembling that naturally found in the fine subtle spirits drawn from wines, yet an over large dose of it will not only cause a disagreeable flavour, but also render the whole delign abortive, by discovering the imposition. Those, therefore, who endeavour to cover a foul taste in goods by large doses of dulcified spirit of nitre, will find themselves deceived.

"But the best, and indeed the only method of imitating French brandies to perfection, is by an essential oil of wine; this being the very thing that gives the French brandies their flavour. It must, however, be remembered, that, in order to use even this ingredient to advantage, a pure, tasteless spirit must first be procured; for it is ridiculous to expect that this essential oil should be able to give the agreeable flavour of French brandies to our fulsome malt spirit, already loaded with its own nauseous oil, or strongly impregnated with a lixivious taste from the alkaline salts used in rectification. How a pure insipid spirit may be obtained, has already been considered; it only therefore remains to shew the method of procuring this essential oil of wine, which is this:

"Take some cakes of dry wine-lees, such as are used by our hatters, dissolve them in six or eight times their weight of water, distil the liquor with a slow fire, and separate the oil with a separating glass; reserving for the nicest uses only that which comes over first, the succeeding oil being coarser and more resinous.—Having procured this fine oil of wine, it may be mixed into a quintsence with pure alcohol; by which means it may be preserved a long time fully possessed of all its flavour and virtues; but, without such management, it will soon grow resinous and rancid.

"When a fine essential oil of wine is thus procured, and also a pure and insipid spirit, French brandies may be imitated to perfection, with regard to the flavour. It must however be remembered, and carefully adverted to, that the essential oil be drawn from the same kind of lees as the brandy to be imitated was procured from; we mean, in order to imitate Coniac brandy, it will be necessary to distil the essential oil from Coniac lees; and the same for any other kind of brandy. For, as different brandies have different flavours, and as these flavours are entirely owing to the essential oil of the grape, it would be preposterous to endeavour to imitate the flavour of Coniac brandy with an essential oil procured from the lees of Bordeaux wine.—When the flavour of the brandy is well imitated by a proper dose of the essential oil, and the whole reduced into one simple and homogeneous fluid, other difficulties are still behind: The flavour, though the essential part, is not, however, the only one; the colour, the proof, and the softness, must also be regarded, before a spirit that perfectly resembles brandy can be procured. With regard to the proof, it may be easily hit, by using a spirit rectified above proof; which, after being intimately mixed with the essential oil of wine, may be let down to a proper standard with fair water. And the softness may, in a great measure, be obtained by distilling and rectifying the spirit with a gentle fire; and what is wanting of this criterion in the liquor when first made, will be supplied by time: for it must be remembered, that it is time alone that gives this property to French brandies; they being at first acrid, foul, and fiery. But, with regard to the colour, a particular

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method

Distillation. method is required to imitate it to perfection.

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Spirits how
coloured.

“ The art of colouring spirits owes its rule to observations on foreign brandies. A piece of French brandy that has acquired by age a great degree of softness and ripeness, is observed, at the same time, to have acquired a yellowish brown colour; and hence our distillers have endeavoured to imitate this colour in such spirits as are intended to pass for French brandy. And in order to this, a great variety of experiments have been made on different substances. But in order to know a direct and sure method of imitating this colour to perfection, it is necessary we should be informed whence the French brandies themselves acquire their colour. This discovery is very easily made. The common experiment of trying whether brandy will turn blackish with a solution of iron, shews that the colour is owing to some of the resinous matter of the oak-cask dissolved in the spirit. There can be no difficulty, therefore, in imitating this colour to perfection. A small quantity of the extract of oak, or the shavings of that wood, properly digested, will furnish us with a tincture capable of giving the spirit any degree of colour required. But it must be remembered, that as the tincture is extracted from the cask by brandy, that is, alcohol and water, it is necessary to use both in extracting the tincture; for each of these dissolves different parts of the wood. Let, therefore, a sufficient quantity of oak shavings be digested in strong spirit of wine, and also at the same time other oak shavings be digested in water; and when the liquors have acquired a strong tincture from the oak, let both be poured off from the shavings into different vessels, and both placed over a gentle fire till reduced to the consistence of treacle. In this condition let the two extracts be intimately mixed together; which may be effectually done by adding a small quantity of loaf-sugar, in fine powder, and rubbing the whole well together. By this means a liquid essential extract of oak will be procured, and always ready to be used as occasion shall require.

“ There are other methods in use for colouring brandies; but the best, besides the extract of oak above-mentioned, are treacle and burnt sugar. The treacle gives the spirits a fine colour, nearly resembling that of French brandy; but as its colour is but dilute, a large quantity must be used: this is not, however, attended with any bad consequences; for notwithstanding the spirit is really weakened by this addition, yet the bubble proof, the general criterion of spirits, is greatly mended by the tenacity imparted to the liquor by the treacle. The spirit also acquires from the mixture a sweetish or luscious taste, and a fullness in the mouth; both which properties render it very agreeable to the palates of the common people, who are, in fact, the principal consumers of these spirits. A much smaller quantity of burnt sugar than of treacle will be sufficient for colouring the same quantity of spirits: the taste is also very different; for instead of the sweetness imparted by the treacle, the spirit acquires from the burnt sugar an agreeable bitterness, and by that means recommends itself to nicer palates, which are offended with a luscious spirit. The burnt sugar is prepared by dissolving a proper quantity of sugar in a little water, and scorching it over the fire till it acquires a black colour. Either treacle or burnt sugar will nearly imitate the genuine colour of old

French brandy; but neither of them will succeed when put to the test of the viriolic solution.

“ The spirit distilled from molasses or treacle is very clean or pure. It is made from common treacle dissolved in water, and fermented in the same manner as the wash for the common malt spirit. But if some particular art is not used in distilling this spirit, it will not prove so vinous as malt spirit, but more flat and less pungent and acid, though otherwise much cleaner tasted, as its essential oil is of a much less offensive flavour. Therefore, if good fresh wine lees, abounding in tartar, be added and duly fermented with the molasses, the spirit will acquire a much greater vinosity and briskness, and approach much nearer to the nature of foreign spirits. Where the molasses spirit is brought to the common proof-strength, if it is found not to have a sufficient vinosity, it will be very proper to add some good dulcified spirit of nitre; and if the spirit be clean worked, it may, by this addition only, be made to pass on ordinary judges for French brandy. Great quantities of this spirit are used in adulterating foreign brandy, rum, and arrack. Much of it is also used alone in making cherry-brandy, and other drams by infusion; in all which many, and perhaps with justice, prefer it to foreign brandies. Molasses, like all other spirits, is entirely colourless when first extracted; but distillers always give it as nearly as possible the colour of foreign spirits.”

If these principles hold good, the imitation of foreign spirits of all kinds must be an easy matter. It will only cost the procuring of some of those substances from which the spirit is drawn; and distilling this with water, the essential oil will always give the flavour desired. Thus, to imitate Jamaica rum, it will only be necessary to procure some of the tops, or other useless parts, of the sugar-canes; from which an essential oil being drawn, and mixed with clean molasses spirit, will give it the true flavour. The principal difficulty must lie in procuring a spirit totally, or nearly, free of all flavour of its own. The spirit drawn from the refuse of a sugar-house is by our author commended as superior to that drawn from molasses: though even this is not entirely devoid of some kind of flavour of its own; nor indeed is that drawn from the best refined sugar entirely flavourless. It is very probable, therefore, that to procure an absolutely flavourless spirit is impossible. The only method, therefore, of imitating foreign spirits, is by choosing such materials as will yield a spirit flavoured as much like them as possible. The materials most recommended by our author in this case, and probably the best that can be used, are raisins. Concerning these he gives the following directions. “ In order to extract this spirit, the raisins must be infused in a proper quantity of water, and fermented in the manner already directed. When the fermentation is completed, the whole is to be thrown into the still, and the spirit extracted by a strong fire. The reason why we here direct a strong fire is, because by that means a greater quantity of the essential oil will come over the helm with the spirit, which will render it fitter for the distiller's purpose: for this spirit is commonly used to mix with common malt goods; and it is surprising how far it will go in this respect, ten gallons of it being often sufficient to give a determining flavour and agreeable vinosity to a whole piece of malt spirits. It

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Rum how
imitated.

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Raisins the
best material for procuring
pure spirit.

Distillation.

Distillation.

is therefore well worth the distiller's while to endeavour at improving the common method of extracting spirits from raisins; and perhaps the following hint may merit attention. When the fermentation is completed, and the still charged with fermented liquor as above directed, let the whole be drawn off with as brisk a fire as possible; but, instead of the cask or can generally used by distillers for a receiver, let a large glass, called by chemists a *separating glass*, be placed under the nose of the worm, and a common receiver applied to the spout of the separating glass: by this means the essential oil will swim upon the top of the spirit, or rather low-wine, in the separating glass, and may be easily preserved at the end of the operation. The use of this limpid essential oil is well known to distillers; for in this resides the whole flavour, and consequently may be used to the greatest advantage in giving that distinguishing taste and true vinosity to the common malt spirits. After the oil is separated from the low-wine, the liquor may be rectified in balneo marie into a pure and almost tasteless spirit, and therefore well adapted to make the finest compound cordials, or to imitate or mix with the finest French brandies, arracks, &c. In the same manner a spirit may be obtained from cyder. But as its particular flavour is not so desirable as that obtained from raisins, it should be distilled in a more gentle manner, and carefully rectified according to the directions we have already given."

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Directions
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compound
spirits.

These directions may suffice for the distillation of any kind of simple spirits. The distillation of compound ones depends on the observation of the following general rules, which are very easy to be learned and practised.

1. The artist must always be careful to use a well cleansed spirit, or one freed from its own essential oil. For, as a compound water is nothing more than a spirit impregnated with the essential oil of the ingredients, it is necessary that the spirit should have deposited its own.

2. Let the time of previous digestion be proportioned to the tenacity of the ingredients, or the pondersity of their oil.

3. Let the strength of the fire also be proportioned to the pondersity of the oil intended to be raised with the spirit.

4. Let only a due proportion of the finest parts of the essential oil be united with the spirit; the grosser and less fragrant parts of the oil not giving the spirit so agreeable a flavour, and at the same time rendering it unlighty. This may in a great measure be effected by leaving out the faints, and making up to proof with fine soft water in their stead.

A careful observation of these four rules will render this part of distillation much more perfect than it is at present. Nor will there be any occasion for the use of burnt alum, white of eggs, infusions, &c. to fine down cordial waters; for they will presently be fine, sweet and pleasant tasted, without any further trouble. We shall now subjoin particular receipts for making some of those compound waters, or spirits, that are most commonly to be met with, and are in the most general estimation.

Strong Cinnamon-water. Take eight pounds of fine cinnamon bruised, 17 gallons of clean rectified spirit,

and two gallons of water. Put them into your still, and digest them 24 hours with a gentle heat; after which draw off 16 gallons with a pretty strong heat.—A cheaper spirit, but of an inferior quality, may be obtained, by using *casia lignea* instead of cinnamon. If you would dulcify your cinnamon water, take double-refined sugar in what quantity you please; the general proportion is about two pounds to a gallon; and dissolve it in the spirit, after you have made it up proof with clean water. One general caution is here necessary to be added; namely, that near the end of the operation, you carefully watch the spirit as it runs into the receiver, in order to prevent the faints from mixing with the goods. This you may discover by often catching some of it as it runs from the worm in a glass, and observing whether it is fine and transparent; for as soon as ever the faints begin to rise, the spirit will have an azure or bluish cast. As soon as this alteration in colour is perceived, the receiver must be immediately changed; for if the faints are suffered to mix themselves with the rest, the value of the goods will be greatly lessened.—Here we may observe, that the distillers call such goods as are made up proof, *double goods*; and those below proof, *single*.

Clove-water. Take of cloves bruised, four pounds; pimento, or all-spice, half a pound; proof spirit, 16 gallons. Digest the mixture 12 hours in a gentle heat, and then draw off 15 gallons with a pretty brisk fire. The water may be coloured red, either by a strong tincture of cochineal, alkanet, or corn-poppies flowers. It may be dulcified at pleasure with double-refined sugar.

Lemon-water. Take of dried lemon-peel, four pounds; clean proof spirit 10 gallons and a half, and one gallon of water. Draw off 10 gallons by a gentle fire, and dulcify with fine sugar.

Citron-water. Take of dry yellow rinds of citrons, three pounds; of orange-peel, two pounds; nutmegs bruised, three quarters of a pound; clean proof-spirit, ten gallons and a half; water, one gallon: digest with a gentle heat; then draw off ten gallons in balneo marie, and dulcify with fine sugar.

Aniseed-water. Take of aniseed bruised, two pounds; proof-spirit, 12 gallons and a half; water, one gallon: draw off ten gallons with a moderate fire.—This water should never be reduced below proof; because the large quantity of oil with which it is impregnated, will render the goods milky and foul when brought down below proof. But if there is a necessity for doing this, their transparency may be restored by filtration.

Orange-water. Take of the yellow part of fresh orange-peels, five pounds; clean proof-spirit, ten gallons and a half; water, two gallons: draw off ten gallons with a gentle fire.

Cedrat-water. The cedrat is a species of citron, and very highly esteemed in Italy where it grows naturally. The fruit is difficult to be procured in this country; but as the essential oil is often imported from Italy, it may be made with it according to the following receipt.—Take of the finest loaf-sugar reduced to powder, a quarter of a pound; put it into a glass mortar, with 120 drops of the essence of cedrat; rub them together with a glass pestle; and put them into a glass alembic, with a gallon of fine proof-spirits and a quart of water. Place the alembic in balneo marie,

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and draw off one gallon, or till the faints begin to rise; and dulcify with fine sugar. This is reckoned the finest cordial yet known; it will therefore be necessary to be particularly careful that the spirit is perfectly clean, and, as much as possible, freed from any flavour of its own.

Orange Cordial-water, or Eau de Bigarade. Take the outer or yellow part of the peels of 14 bigarades, (a kind of oranges); half an ounce of nutmegs, a quarter of an ounce of mace, a gallon of fine proof-spirit, and two quarts of water. Digest all these together two days in a close vessel; after which draw off a gallon with a gentle fire, and dulcify with fine sugar. This cordial is greatly esteemed abroad, but is not so well known in this country.

Ros Solis. Take of the herb called *Ros Solis*, picked clean, four pounds; cinnamon, cloves, and nutmegs, of each three ounces and a half; marigold-flowers, one pound; caraway-seeds, ten ounces; proof-spirit, ten gallons; water, three gallons. Distill with a pretty strong fire, till the faints begin to rise. Then take of liquorice-root sliced, half a pound; raisins stoned, two pounds; red saunders, half a pound: digest these three days in two quarts of water; then strain out the clear liquor, in which dissolve three pounds of fine sugar, and mix it with the spirit drawn by distillation.

Ufquebaugh. Take of nutmegs, cloves, and cinnamon, of each two ounces; of the seeds of anise, caraway, and coriander, of each four ounces; liquorice-root sliced, half a pound. Bruise the seeds and spices; and put them, together with the liquorice, into the still with 11 gallons of proof-spirits, and two gallons of water. Distil with a pretty brisk fire till the faints begin to rise. But, as soon as the still begins to work, fasten to the nose of the worm two ounces of English saffron tied up in a cloth, that the liquor may run thro' it, and extract all its tincture; and in order to this, you should frequently press the saffron with your fingers. When the operation is finished, dulcify your goods with fine sugar.

Ratafia. Is a liquor prepared from different kinds of fruits, and is of different colours according to the fruits made use of. Of red ratafia there are three kinds, the fine, the dry or sharp, and the common. The fruits most proper for making red ratafia, are the black heart-cherry, the common red cherry, the black cherry, the mery or honey cherry, the strawberry, the raspberry, the red gooseberry, and the mulberry. These fruits should be gathered when in their greatest perfection, and the largest and most beautiful of them chosen for the purpose.—The following is a receipt for making red ratafia, fine and soft. Take of the black heart-cherries 24 pounds; black cherries, four pounds; raspberries and strawberries, of each three pounds. Pick the fruits from their stalks, and bruise them; in which state let them continue 12 hours: press out the juice; and to every pint of it add a quarter of a pound of sugar. When the sugar is dissolved, run the whole through the filtering bag, and add to it three quarts of clean proof-spirits. Then take of cinnamon, four ounces; of mace, an ounce; and of cloves, two drams. Bruise these spices; put them into an alembic with a gallon of clean proof-spirits and two quarts of water, and draw off a gallon with a brisk fire. Add as much of this spicy spirit to your ratafia as will render it agreeable to your palate; about one

fourth is the usual proportion.

Ratafia made according to the above receipt will be of a very rich flavour and elegant colour. It may be rendered more or less of a spicy flavour, by adding or diminishing the quantity of spirit distilled from the spices.—Some, in making ratafia, suffer the expressed juices of their fruits to ferment several days: by this means the vinosity of the ratafia is increased; but, at the same time, the elegant flavour of the fruits is greatly diminished. Therefore, if the ratafia is desired stronger or more vinous, it may be done by adding more spirits to the expressed juice; by which means the flavour of the fruits may be preserved, as well as the ratafia rendered stronger. It is also a method with some to tie the spices in a linen bag, and suspend them in the ratafia. But if this method is taken, it will be necessary to augment the quantity of spirit first added to the expressed juice. There is no great difference in the two methods of adding the spices, except that by suspending them in the ratafia the liquor is rendered less transparent.

Dry or sharp Ratafia. Take cherries and gooseberries, of each 30 pounds; mulberries, seven pounds; raspberries, ten pounds. Pick all these fruits clean from their stalks, &c. bruise them, and let them stand 12 hours; but do not suffer them to ferment. Press out the juice, and to every pint add three ounces of sugar. When the sugar is dissolved, run it through the filtering bag, and to every five pints of liquor, add four pints of clean proof-spirit; together with the same proportion of spirit drawn from the spices in the foregoing composition.

Common Ratafia. Take of nutmegs, eight ounces; bitter almonds, ten pounds; Lisbon sugar, eight pounds; ambergrease, ten grains: infuse these ingredients three days in ten gallons of clean proof-spirit, and filter thro' a flannel bag for use. The nutmegs and bitter almonds must be bruised, and the ambergrease rubbed with the Lisbon sugar in a marble mortar, before they are infused in the spirit.

Gold Cordial. Take of the roots of angelica, four pounds; raisins stoned, two pounds; coriander-seeds, half a pound; caraway-seeds and cinnamon, of each half a pound; cloves, two ounces; figs and liquorice-root, of each one pound; proof spirit, eleven gallons; water, two gallons. The angelica, liquorice, and figs, must be sliced before they are added. Digest two days; and draw off by a gentle heat till the faints begin to rise; hanging in a piece of linen, fastened to the mouth of the worm, an ounce of English saffron. Then dissolve eight pounds of sugar in three quarts of rose-water, and add to it the distilled liquor.—This liquor derives its name of *Gold Cordial*, from a quantity of leaf-gold being formerly added to it; but this is now generally disused, as it cannot possibly add any virtue.

Cardamum, or All-four. Take of pimento, caraway, and coriander seeds, and lemon-peel, each three pounds; of malt spirits, eleven gallons; water, three gallons. Draw off with a gentle fire, dulcify with common sugar, and make up to the strength desired with clear water.—This is a dram greatly used by the poorer sort of people in some countries.

Genoa. There was formerly sold in the apothecaries shops a distilled spirituous water of juniper; but the vulgar being fond of it as a dram, the distillers sup-

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planted the apothecaries, and sold it under the name of *Geneva*. The common kind, however, is not made from juniper-berries, but from oil of turpentine; and indeed it is surprising, that people should accustom themselves to drink such liquors for pleasure.—The receipt for making this kind of spirit, sold in the gin-shops at London, is as follows. Take of the ordinary malt spirits, ten gallons; oil of turpentine, two ounces; bay-salt, three handfuls: Draw off by a gentle fire till the faints begin to rise; and make up your goods to the strength required with clear water.

The best kind is made by the following recipe.—Take of juniper-berries, three pounds; proof-spirit, ten gallons; water, four gallons: Draw off by a gentle fire till the faints begin to rise, and make up your goods to the strength required with clean water.

There is a sort of this liquor called *Holland's Geneva*, from its being imported from Holland, which is greatly esteemed.—The ingredients used by the Dutch, are the same with those given in the last recipe; only, instead of malt-spirits, they use French brandy. But from what has been already observed concerning the nature of these kinds of spirits, it is easy to see, that by the help of a well rectified spirit, *geneva* may be made in this country at least nearly equal to the Dutch, provided it is kept to a proper age; for all spirituous liquors contract a softness and mellowness by age, impossible to be imitated any other way.

DISTINCT SMALL-POX. See (the Index subjoined to) MEDICINE.

DISTINCTION, in logic, is an assemblage of two or more words, whereby disparate things, or their conceptions, are denoted.

DISTORTION, in medicine, is when any part of the human body remarkably deviates from its natural shape or position. Distortions of different parts may arise either from a convulsion or palsy; though sometimes a terrible distortion in the shape of the whole body hath arisen merely from carelessness and ill habits. Mr Winslow, in the Memoirs of the Academy of Sciences at Paris, gives a very remarkable account of a lady of quality, whom he had known to be perfectly straight for several years; but who taking afterwards to a sedentary course of life, got a custom of dressing herself very carelessly, and of leaning as the fat, either forwards, or to a side. It was not many months before she found it painful and troublesome to stand or sit upright; and soon afterwards she found an inequality in the lower part of the back-bone. Alarmed at this, she consulted the gentleman who gave the account. To prevent the increase of the malady, he ordered her to wear a particular sort of jumps instead of stays, and had a pad of a proper size applied: but this was soon neglected; and the consequence was, that in a little time the back-bone became more and more crooked, and at length bent itself sideways in two contrary directions, so as to represent the figure of the Roman S; and the lady, still refusing to take the proper measures, lost a fourth part of her height; and continued for the remainder of her life, not only crooked from right to left, and from left to right, but so oddly folded together, that the first of the false ribs on one side, approached very near the crest of the os ilium on that side, and the viscera of the lower belly became strangely pushed out of their regular places to

the opposite side; and the stomach itself was so strongly compressed, that whatever she swallowed seemed to her to fall into two separate cavities.

DISTRESS, in law, the seizing or distraining any thing for rent in arrear, or other duty unperformed.

The effect of this distress is to compel the party either to replevy the things distrained, and contest the taking, in an action of trespass against the distrainer; or rather to oblige him to compound and pay the debt or duty for which he was so distrained.

There are likewise compulsory distresses in actions, to cause a person appear in court; of which kind there is a distress personal of one's moveable goods, and the profits of his lands, for contempt in not appearing after summons: there is likewise distress real, of a person's immovable goods. In these cases none shall be distrained to answer for any thing touching their freedoms, but by the king's writ.

Distress may be either finite or infinite. Finite distress is that which is limited by law, in regard to the number of times it shall be made, in order to bring the party to a trial of the action. Infinite distress is that which is without any limitation, being made till the person appears: it is farther applied to jurors that do not appear; as, upon a certificate of affise, the process is *venire facias, habeas corpora*, and distress infinite.

It is also divided into grand distress, and ordinary distress: of these the former extends to all the goods and chattels that the party has within the county. A person, of common right, may distrain for rents and all manner of services; and where a rent is reserved on a gift in tail, lease for life, or years, &c. though there be no clause of distress in the grant or lease, so as that he has the reversion: but on a feoffment made in fee, a distress may not be taken, unless it be expressly reserved in the deed.

DISTRIBUTION, in a general sense, the act of dividing a thing into several parts, in order to the disposing each in its proper place.

DISTRIBUTION, in architecture, the dividing and disposing the several parts and pieces which compose a building, as the plan directs. See ARCHITECTURE.

DISTRIBUTION, in rhetoric, a kind of description, whereby an orderly division and enumeration is made of the principal qualities of the subject. David supplies us with an example of this kind, when, in the heat of his indignation against sinners, he gives a description of their iniquity: "Their throat is an open sepulchre; they flatter with their tongues; the poison of asps is under their lips; their mouth is full of cursing and lies; and their feet are swift to shed blood."

DISTRIBUTION, in printing, the taking a form asunder, separating the letters, and disposing them in the cases again, each in its proper cell. See PRINTING.

DISTRICT, in geography, a part of a province, distinguished by peculiar magistracies, or certain privileges; in which sense it is synonymous with hundred. See HUNDRED.

DISTRINGAS, in law, a writ commanding the sheriff, or other officer, that he distrain a person for debt to the king, &c. or for his appearance at a certain day.

DISTRINGAS Juratores, a writ directed to the sheriff, whereby he is commanded to distrain upon a jury to

Distress
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Distringas.

Ditch
Ditrihedria.

to appear, and to return info on their lands, &c. for non-appearance. This writ of distringas juratores issues for the sheriff to have their bodies in court, &c. at the return of the writ.

DITCH, a common fence or inclosure in marshes, or other wet land where there are no hedges. They allow these ditches six feet wide against highways that are broad; and against commons, five feet. But the common ditches about inclosures, dug at the bottom of the bank on which the quick is raised, are three feet wide at the top, one at the bottom, and two feet deep. By this means each side has a slope, which is of great advantage; for where this is neglected, and the ditches dug perpendicular, the sides are always washing down. Besides, in a narrow-bottomed ditch, if cattle get down into it, they cannot stand to turn themselves to crop the quick; but where the ditch is four feet wide, it should be two and a half deep; and where it is five wide, it should be three deep, and so in proportion.

DITCH-WATER is often used as an object for the microscope, and seldom fails to afford a great variety of animalcules. This water very often appears of a yellowish, greenish, or reddish colour; and this is wholly owing to the multitudes of animals of those colours which inhabit it. These animals are usually of the shrimp kind: and Swammerdam, who very accurately examined them, has called them, from the figure of their horns, *pulex aquaticus arborefcens*. They copulate in May or June; and are often so numerous at that season, that the whole body of the water they are found in, is seen to be of a red, green, or yellowish colour, according to the colours of their bodies. The green thin foam also, so frequently seen on the surface of standing waters in summer, is no other than a multitude of small animalcules of this or some of the other kinds. Dughill water is not less full of animals than that of ditches; and is often found so thronged with animalcules, that it seems altogether alive: it is then so very much crowded with these creatures, that it must be diluted with clear water before they can be distinctly viewed. There are usually in this fluid a sort of eels, which are extremely active; and besides these and many other of the common inhabitants of fluids, there is one species found in this, which seems peculiar to it: the middle part of them is dark, and beset with hairs, but the ends are transparent; their tails are tapering, with a long sprig at the extremity, and their motion is slow and waddling. See **ANIMALCULE**.

DITHYRAMBUS, in ancient poetry, a hymn in honour of Bacchus, full of transport and poetical rage.

This poetry owes its birth to Greece, and to the transport of wine; and yet art is not quite exploded, but delicately applied to guide and restrain the dithyrambic impetuosity, which is indulged only in pleasing flights. Horace and Aristotle tell us, that the ancients gave the name of dithyrambus to those verses wherein none of the common rules or measures were observed. As we have now no remains of the dithyrambus of the ancients, we cannot say exactly what their measure was.

DITONE, in music, an interval comprehending two tones. The proportion of the sounds that form the ditone is 4 : 5, and that of the semiditone is 5 : 6.

DITRIHEDRIA, in mineralogy, a genus of spars with twice three sides, or six planes, being formed of

two trigonal pyramids joined base to base, without any intermediate column. See **SPAR**.

The species of ditrihedria are distinguished by the different figures of these pyramids.

DITTANY, in botany. See **DICTAMNUS**.

DITTO, in books of accounts, usually written **D^o**, signifies the aforementioned. The word is corrupted from the Italian *detto*, "the said;" as in our law-phrase, "the said premises," meaning the same as were aforementioned.

DIVAL, in heraldry, the herb nightshade, used by such as blazon by flowers and herbs, instead of colours and metals, for fable or black.

DIVAN, a council-chamber, or court of justice, among the eastern nations, particularly the Turks.—The word is Arabic, and signifies the same with *sora* in the Turkish dialect.

DIVAN-BEGHI, the superintendent of justice in Persia, whose place is the last of the six ministers of the second rank, who are all under the athemadaler, or first minister. To this tribunal of the divan-beghi he appeals from sentences passed by the governors: he has a fixed stipend of 50,000 crowns for administering justice: all the sergeants, ushers, &c. of the court, are in his service: he takes cognizance of the criminal causes of the chams, governors, and other great lords of Persia, when accused of any fault. There are divan-beghis not only at court and in the capital, but also in the provinces and other cities of the empire. The alcoran is the sole rule of his administration of justice, which also he interprets at pleasure. He takes no cognizance of civil causes; but all differences arising between the officers of the king's household, and between foreign ministers, are determined by him.

DIVANDUROW, the name of seven islands which lie a league north of the Maldives, and twenty-four from the coast of Malabar, almost opposite to Cananor.

DIVER, in ornithology. See **COLYMBUS**.

DIVERGENT, or **DIVERGING**, **LINES**, in geometry, are those which constantly recede from each other.

DIVERGENT RAYS, in optics, are those which, going from a point of the visible object, are dispersed, and continually depart one from another, in proportion as they are removed from the object: in which sense it is opposed to convergent. See **OPTICS**.

DIVERSIFYING, in rhetoric, is of infinite service to the orator; it is an accomplishment essential to his character, and may fitly be called the subject of all his tropes and figures. Vossius lays down six ways of diversifying a subject. 1. By enlarging on what was briefly mentioned before. 2. By a concise enumeration of what had been insisted on at length. 3. By adding something new to what is repeated. 4. By repeating only the principal heads of what had been said. 5. By transposing the words and periods. 6. By imitating them.

DIVERSION, in military affairs, is when an enemy is attacked in one place where they are weak and unprovided, in order to draw off their forces from another place where they have made or intend to make an irruption. Thus the Romans had no other way in their power of driving Hannibal out of Italy, but by making a diversion in attacking Carthage.

DIVESTING, or **DIVESTITURE**, in law, is used for the act of surrendering one's effects.

Dittany
Divedling.

DIVIDEND, in arithmetic, the number proposed to be divided into equal parts *.

DIVIDEND OF STOCKS, is a share or proportion of the interest of stocks erected on public funds, as the South-sea, &c. divided among and paid to the adventurers half-yearly.

DIVINATION, the knowledge of things obscure, or future, which cannot be attained by any natural means.

It was a received opinion among the heathens, that the gods were wont to converse familiarly with some men, whom they endowed with extraordinary powers, and admitted to the knowledge of their councils and designs. Plato, Aristotle, Plutarch, Cicero, and others, divide divination into two sorts or species, viz. natural and artificial.

The former was so called, because not attained by any rules or precepts of art, but infused or inspired into the diviner, without his taking any further care about it than to purify and prepare himself for the reception of the divine afflatus. Of this kind were all those who delivered oracles, and foretold future events by inspiration, without observing external signs or accidents.

The second species of divination was called *artificial*, because it was not obtained by immediate inspiration, but proceeded upon certain experiments and observations arbitrarily instituted, and mostly superstitious. Of this sort there were various kinds, as by sacrifices, entrails, flame, cakes, flour, wine, water, birds, lots, verses, omens, &c.

In holy scripture we find mention made of nine different kinds of divination. The first performed by the inspection of planets, stars, and clouds : it is supposed to be the practice of this, whom Moses calls מְנַחֵם *menachem*, of אָנָן *anan*, "cloud," Dent. ch. xviii. v. 10. 2. Those, whom the prophet calls in the same place מְנַחֵם *menacheph*, which the vulgate and generality of interpreters render *augur*. 3. Those who in the same place are called מְנַחֵם *menacheph*, which the Sepuagint and vulgate translate *a man given to ill practices*. 4. Such authors, whom Moses in the same chapter, ver. 11. calls חֹבֵב *hobber*. 5. Those, who consult the spirits called *Python* ; or, as Moses expresses it in the same book, שְׂאֵל אוֹב, those who ask questions of *Python*. 6. Witches, or magicians, whom Moses calls יִדְּוֹנִי *judeoni*. 7. Those who consult the dead, *necromancers*. 8. The prophet Hosea, chap. iv. ver. 12. mentions such as consult slaves, שְׂאֵל מִלְּבַיִת : which kind of divination may be called *rhodomancy*. 9. The last kind of divination mentioned in scripture is *hepatoscopy*, or the consideration of the liver.

Divination of all kinds was necessarily made an occult science, which naturally remained in the hands of the priests and priestesses, the magi, the soothsayers, the augurs, the visionaries, the priests of the oracles, the false prophets, and other like professors, till the time of the coming of Jesus Christ. The light of the gospel, it is true, has dissipated much of this darkness ; but it is more difficult, than is commonly conceived, to eradicate from the human mind a deep-rooted superstition, even though the truth be set in the strongest light, especially when the error has been believed almost from the origin of the world : so we still find existing among us the remains of this pagan superstition,

in the following chimeras, which enthusiastic and designing men have formed into arts and sciences ; tho' it must be owned, to the honour of the 18th century, that the pure doctrines of Christianity, and the spirit of philosophy, which become every day more diffused, equally concur in banishing these visionary opinions. The vogue for these pretended sciences and arts, moreover, is past, and they can no longer be named without exciting ridicule in all sensible people. By relating them here, therefore, and drawing them from their obscurity, we only mean to show their futility, and to mark those rocks against which the human mind, without the assistance of a pilot, might easily run.

For the attaining of these supernatural qualifications, there are still existing in the world the remains of,

1. *Astrology* : a conjectural science which teaches to judge of the effects and influences of the stars ; and to predict future events by the situation of the planets and their different aspects. It is divided into *natural astrology*, or *meteorology* ; which is confined to the foretelling of natural effects, as the winds, rain, hail, and snow, frosts and tempests. In this consists one branch of the art of almanack-makers ; and by merely confronting these predictions in the calendar, with the weather each day produces, every man of sense will see what regard is to be paid to this part of astrology. The other part, which is called *judicial astrology*, is still far more illusive and rash than the former : and having been at first the wonderful art of visionaries, it afterwards became that of impostors ; a very common fate with all those chimerical sciences, of which we shall here speak. This art pretends to teach the method of predicting all sorts of events that shall happen upon the earth, as well such as relate to the public, as to private persons ; and that by the same inspection of the stars and planets, and their different constellations. The *cabala* signifies, in like manner, the knowledge of things that are above the moon, as the celestial bodies and their influences ; and in this sense it is the same with judicial astrology, or makes a part of it.

2. *Horsescopy*, which may also be considered as a part of astrology, is the art by which they draw a figure, or celestial scheme, containing the 12 houses, wherein they mark the disposition of the heavens at a certain moment ; for example, that at which a man is born, in order to foretell his fortune, or the incidents of his life. In a word, it is the disposition of the stars and planets at the moment of any person's birth. But as there cannot be any probable or possible relation between the constellations and the human race, all the principles they lay down, and the prophecies they draw from them, are chimerical, false, absurd, and a criminal imposition on mankind.

3. The art of *argury* consisted, among the ancient Romans, in observing the flight, the singing and eating of birds, especially such as were held sacred *.

4. The equally deceitful art of *haruspicy* consisted, on the contrary, in the inspection of the bowels of animals, but principally of victims ; and from thence predicting grand incidents relative to the republic, and the good or bad events of its enterprises.

5. *Aeromancy* was the art of divining by the air. This vain science has also come to us from the Pagans : but is rejected by reason as well as Christianity, as false and absurd.

6. *Pyromancy*

* See *Argury*

Divideid,
Divination.

* See *Arith-*
metic, 119 14.

Divination
||
Diving.

Diving.

6. *Pyromancy* is a divination made by the inspection of a flame, either by observing to which side it turns, or by throwing into it some combustible matter, or a bladder filled with wine, or any thing else from which they imagined they were able to predict.

7. *Hydromancy* is the supposed art of divining by water. The Persians, according to Varro, invented it; Pythagoras and Numa Pompilius made use of it; and we still admire like the wonderful prognosticators.

8. *Geomancy* was a divination made by observing of cracks or clefts in the earth. It was also performed by points made on paper, or any other substance, at a venture; and they judged of future events from the figures that resulted from thence. This was certainly very ridiculous; but it is nothing less so to pretend to predict future events by the inspection of the grounds of a dish of tea or coffee, or by cards, and many other like matters.—Thus have designing men made use of the four elements to deceive their credulous brethren.

9. *Chiromancy* is the art which teaches to know, by inspecting the hand, not only the inclinations of a man, but his future destiny also. The fools or impostors who practise this art pretend, that the different parts or the lines of the hand have a relation to the internal parts of the body, as some to the heart, others to the liver, spleen, &c. On this false supposition, and on many others equally extravagant, the principles of chiromancy are founded: and on which, however, several authors, as Robert Flud an Englishman, Artemidorus, M. de la Chambre, John of Indaginia, and many others, have wrote large treatises.

10. *Physiognomy*, or *physiognomancy*, is a science that pretends to teach the nature, the temperament, the understanding, and the inclinations of men, by the inspection of their countenances, and is therefore very little less frivolous than chiromancy; tho' Aristotle, and a number of learned men after him, have wrote express treatises concerning it.

DIVINE, something relating to God. The word is also used, figuratively, for any thing that is excellent, extraordinary, and that seems to go beyond the power of nature and the capacity of mankind. In which sense, the compass, telescope, clocks, &c. are said to be *divine inventions*: Plato is called the *divine author*, the *divine Plato*; and the same appellation is given to Seneca: Hippocrates is called, "the divine old man," *divinus senex*, &c.

DIVING, the art or act of descending under water to considerable depths, and abiding there a competent time.

The uses of *diving* are very considerable, particularly in the fishing for pearls, corals, sponges, &c. See *PEARL-Fishing*, &c.

There have been various methods proposed, and machines contrived, to render the business of diving more safe and easy. The great point is to furnish the diver with fresh air; without which, he must either make a short stay, or perish.

Those who dive for sponges in the Mediterranean, help themselves by carrying down sponges dipt in oil in their mouths. But considering the small quantity of air that can be contained in the pores of a sponge, and how much that little will be contracted by the

pressure of the incumbent water, such a supply cannot long subsist the diver. For it is found by experiment, that a gallon of air included in a bladder, and by a pipe reciprocally inspired and expired by the lungs, becomes unfit for respiration in little more than one minute of time. For though its elasticity be but little altered in passing the lungs, yet it loses its vivifying spirit, and is rendered effete.

In effect, a naked diver, Dr Halley assures us, without a sponge, cannot remain above a couple of minutes enclosed in water; nor much longer with one, without suffocating; nor, without long practice, near so long; ordinary persons beginning to rise in about half a minute. Besides, if the depth be considerable, the pressure of the water in the vessels makes the eyes blood-shot, and frequently occasions a spitting of blood.

Hence, where there has been occasion to continue long at the bottom, some have contrived double flexible pipes, to circulate air down into a cavity, inclosing the diver as with armour, both to furnish air, and to bear off the pressure of the water and give leave to his breast to dilate upon inspiration; the fresh air being forced down one of the pipes with bellows, and returning by the other of them, not unlike to an artery and vein.

But this method is impracticable when the depth surpasses three fathoms; the water embracing the bare limbs so closely as to obstruct the circulation of the blood in them; and withal pressing so strongly on all the junctures where the armour is made tight with leather, that, if there be the least defect in any of them, the water rushes in, and instantly fills the whole engine, to the great danger of the diver's life.

It is certain, however, that people, by being accustomed to the water from their infancy, will at length be enabled, not only to stay much longer under water than the time above-mentioned, but put on a kind of amphibious nature, so that they seem to have the use of all their faculties as well when their bodies are immersed in water, as when they are on dry land. Most savage nations are remarkable for this. According to the accounts of our late voyagers, the inhabitants of the South-sea islands are such expert divers, that when a nail or any piece of iron was thrown overboard, they would instantly jump into the sea after it, and never failed to recover it notwithstanding the quick descent of the metal. Even among civilized nations, many persons have been found capable of continuing an incredible length of time below water. The most remarkable instance of this kind is the famous Sicilian diver *Nicolo Pesce*. The authenticity of the account, indeed, depends entirely on the authority of F. Kircher. He assures us, that he had it from the archives of the kings of Sicily: but, notwithstanding this assertion, the whole hath so much of the marvellous in it, that we believe there are few who will not look upon it to have been exaggerated. "In the times of Frederic king of Sicily, (says Kircher), there lived a celebrated diver, whose name was *Nicholar*, and who, from his amazing skill in swimming, and his perseverance under water, was surnamed the *sibb*. This man had from his infancy been used to the sea; and earned his scanty subsistence by diving for corals and oysters, which he sold to the villagers on shore. His long acquaintance with the sea, at last, brought it to be almost his natu-

ral element. He was frequently known to spend five days in the midst of the waves, without any other provisions than the fish which he caught there and ate raw. He often swam over from Sicily into Calabria, a tempestuous and dangerous passage, carrying letters from the king. He was frequently known to swim among the gulphs of the Lipari islands, noway apprehensive of danger.

"Some mariners out at sea, one day observed something at some distance from them, which they regarded as a sea-monster; but upon its approach it was known to be Nicholas, whom they took into their ship. When they asked him whither he was going in so stormy and rough a sea, and at such a distance from land, he shewed them a packet of letters, which he was carrying to one of the towns of Italy, exactly done up in a leather bag, in such a manner as that they could not be wetted by the sea. He kept them thus company for some time on their voyage, conversing, and asking questions; and after eating an hearty meal with them, he took his leave, and, jumping into the sea, pursued his voyage alone.

"In order to aid these powers of enduring in the deep, nature seemed to have assisted him in a very extraordinary manner: for the spaces between his fingers and toes were webbed, as in a goose; and his chest became so very capacious, that he could take in, at one inspiration, as much breath as would serve him for a whole day.

"The account of so extraordinary a person did not fail to reach the king himself; who commanded Nicholas to be brought before him. It was no easy matter to find Nicholas, who generally spent his time in the solitudes of the deep; but, at last, after much searching, he was found, and brought before his majesty. The curiosity of this monarch had been long excited by the accounts he had heard of the bottom of the gulph of Charybdis; he now therefore conceived, that it would be a proper opportunity to have more certain information. He therefore commanded our poor diver to examine the bottom of this dreadful whirlpool; and as an incitement to his obedience, he ordered a golden cup to be flung into it. Nicholas was not insensible of the danger to which he was exposed; dangers best known only to himself; and therefore he presumed to remonstrate: but the hopes of the reward, the desire of pleasing the king, and the pleasure of shewing his skill, at last prevailed. He instantly jumped into the gulph, and was as instantly swallowed up in its bosom. He continued for three quarters of an hour below; during which time the king and his attendants remained on shore, anxious for his fate; but he at last appeared, holding the cup in triumph in one hand, and making his way good among the waves with the other. It may be supposed he was received with applause when he came on shore: the cup was made the reward of his adventure; the king ordered him to be taken proper care of; and, as he was somewhat fatigued and debilitated by his labour, after an hearty meal he was put to bed, and permitted to refresh himself by sleeping.

"When his spirits were thus restored, he was again brought to satisfy the king's curiosity with a narrative of the wonders he had seen; and his account was to the following effect. He would never, he said, have

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obeyed the king's commands, had he been apprised of half the dangers that were before him. There were four things, he said, which rendered the gulph dreadful, not only to men, but to fishes themselves. 1. The force of the water bursting up from the bottom, which required great strength to resist. 2. The abruptness of the rocks that on every side threatened destruction. 3. The force of the whirlpool dashing against those rocks. And, 4. The number and magnitude of the polypous fish, some of which appeared as large as a man; and which, every where sticking against the rocks, projected their fibrous arms to entangle him. Being asked how he was able so readily to find the cup that had been thrown in, he replied, that it happened to be flung by the waves into the cavity of a rock against which he himself was urged in his descent. This account, however, did not satisfy the king's curiosity: being requested to venture once more into the gulph for further discoveries, he at first refused: but the king, desirous of having the most exact information possible of all things to be found in the gulph, repeated his solicitations; and, to give them still greater weight, produced a larger cup than the former, and added also a purse of gold. Upon these considerations the unfortunate diver once again plunged into the whirlpool, and was never heard of more."

To obviate the inconveniencies of diving to those who have not the extraordinary powers of the diver above-mentioned, different instruments have been contrived. The chief of these is the *diving-bell*; which is most conveniently made in form of a truncated cone, the smaller base being closed, and the larger open. It is to be poised with lead; and so suspended, that the vessel may sink full of air, with its open basis downward, and as near as may be in a situation parallel to the horizon, so as to close with the surface of the water all at once.

Under this coverle the diver sitting, sinks down with the included air to the depth desired; and if the cavity of the vessel can contain a tun of water, a single man may remain a full hour, without much inconvenience, at five or six fathoms deep. But the lower you go, still the included air contracts itself according to the weight of the water which compresses it: so that at 33 foot deep the bell becomes half full of water, the pressure of the incumbent water being then equal to that of the atmosphere; and at all other depths the space occupied by the compressed air in the upper part of the bell will be to the under part of its capacity filled with water, as 33 feet to the surface of the water in the bell below the common surface thereof. And this condensed air being taken in with the breath soon insinuates itself into all the cavities of the body, and has no ill effect, provided the bell be permitted to descend so slowly as to allow time for that purpose. One inconvenience that attends it, is found in the ears, within which there are cavities which open only outwards, and that by pores so small as not to give admission even to the air itself, unless they be dilated and distended by a considerable force. Hence, on the first descent of the bell, a pressure begins to be felt on each ear; which, by degrees, grows painful, till the force overcoming the obstacle, what constricts these pores yields to the pressure, and letting some condensed air slip in, presently ease ensues. The bell descending lower, the pain is renewed,

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and



and again eased in the same manner.

But the greatest inconvenience of this engine, is, that the water entering it, contracts the bulk of air into so small a compass, that it soon heats and becomes unfit for respiration: so that there is a necessity for its being drawn up to recruit it; besides the uncomfortable abiding of the diver almost covered with water.

To obviate the difficulties of the diving-bell, Dr Halley, to whom we owe the preceding account, contrived some further apparatus, whereby not only to recruit and refresh the air from time to time, but also to keep the water wholly out of it at any depth. The manner in which this was effected, he relates in the following words.

"The bell I made use of was of wood, containing about 60 cubic feet in its concavity; and was of the form of a truncate cone, whose diameter at the top was three feet, and at the bottom five. This I coated with lead so heavy that it would sink empty; and I distributed the weight so about its bottom, that it would go down in a perpendicular direction, and no other. In the top I fixed a strong but clear glass, as a window, to let in the light from above; and likewise a cock to let out the hot air that had been breathed: and below, about a yard under the bell, I placed a stage which hung by three ropes, each of which was charged with about one hundred weight to keep it steady. This machine I suspended from the mast of a ship by a sprit, which was sufficiently secured by stays to the mast-head, and was directed by braces to carry it overboard clear of the ship's side, and to bring it again within board as occasion required.

"To supply air to this bell when under water, I caulked a couple of barrels of about 36 gallons each to be cased with lead, so as to sink empty; each of them having a bung-hole in its lowest parts to let in the water, as the air in them condensed on their descent; and to let it out again when they were drawn up full from below. And to a hole in the uppermost part of these barrels, I fixed a leathern trunk or hose well liquored with bees wax and oil, and long enough to fall below the bung-hole, being kept down by a weight appended: so that the air in the upper part of the barrels could not escape, unless the lower ends of these hose were first lifted up.

"The air-barrels being thus prepared, I fitted them with tackle proper to make them rise and fall alternately, after the manner of two buckets in a well; which was done with so much ease, that two men, with less than half their strength, could perform all the labour required: and in their descent they were directed by lines fastened to the under edge of the bell, the which passed through rings on both sides the leathern hose in each barrel; so that, sliding down by these lines, they came readily to the hand of a man who stood on the stage on purpose to receive them, and to take up the ends of the hose into the bell. Through these hose, as soon as their ends came above the surface of the water in the barrels, all the air that was included in the upper parts of them was blown with great force into the bell; whilst the water entered at the bung-holes below, and filled them: and as soon as the air of one barrel had been thus received, upon a signal given, that was drawn up, and at the same time the

other descended; and, by an alternate succession, furnished air so quick, and in so great plenty, that I myself have been one of five who have been together at the bottom in nine or ten fathom water, for above an hour and an half at a time, without any sort of ill consequence: and I might have continued there as long as I pleased, for any thing that appeared to the contrary. Besides, the whole cavity of the bell was kept entirely free from water, so that I sat on a bench which was diametrically placed near the bottom, wholly dressed, with all my cloaths on. I only observed, that it was necessary to be let down gradually at first, as about 12 feet at a time; and then to stop and drive out the air that entered, by receiving three or four barrels of fresh air before I descended further. But being arrived at the depth designed, I then let out as much of the hot air that had been breathed, as each barrel would replenish with cool, by means of the cock at the top of the bell; through whose aperture, though very small, the air would rush with so much violence, as to make the surface of the sea boil, and to cover it with a white foam, notwithstanding the weight of the water over us.

"Thus I found that I could do any thing that required to be done just under us; and that, by taking off the stage, I could, for a space as wide as the circuit of the bell, lay the bottom of the sea so far dry, as not to be over-shoes thereon. And, by the glass window, so much light was transmitted, that when the sea was clear, and especially when the sun shone, I could see perfectly well to write or read; much more to fasten or lay hold on any thing under us that was to be taken up. And, by the return of the air-barrels, I often sent up orders written with an iron pen, on small plates of lead, directing how to move us from place to place as occasion required. At other times, when the water was troubled and thick, it would be as dark as night below; but in such cases I have been able to keep a candle burning in the bell as long as I pleased, notwithstanding the great expence of air necessary to maintain flame.—By an additional contrivance, I have found it not impracticable for a diver to go out of an engine to a good distance from it, the air being conveyed to him with a continued stream, by small flexible pipes; which pipes may serve as a clue, to direct him back again, when he would return to the bell."

Plate XCIV. fig. 1. shews Dr Halley's diving bell, with the divers at work. DBLKRIMP represents the body of the bell. D, the glass which serves as a window. B, the cock for letting out the air which has been breathed. LM, the seats. C, one of the air-barrels. P, H, two of the divers. F, another diver at a distance from the bell, and breathing through the flexible tube K.—This diver is supposed to have a head-piece of lead, made to fit quite close about his shoulders: this head-piece was capable of containing as much air as would supply him for a minute or two. When he had occasion for more air, he turned a cock at F, by which means a communication was opened with the air in the bell, and thus he could receive a new supply at pleasure.

Since the invention of this diving machine, there has been one contrived by Mr Triewald, F. R. S. and military architect to the king of Sweden, which, for a single

Diving.

Fig. 2.

single person, is in some respects thought to be more eligible than Dr Halley's, and is constructed as follows. AB is the bell, which is sunk by lead weights DD hung to its bottom. This bell is of copper, and tinned all over in the inside, which is illuminated by three strong convex lenses, G, G, G, with copper lids H, H, H, to defend them. The iron ring or plate E serves the diver to stand on when he is at work; and is suspended at such a distance from the bottom of the bell by the chains F, F, F, that when the diver stands upright, his head is just above the water in the bell, where the air is much better than higher up, because it is colder, and consequently more fit for respiration. But as the diver must always be within the bell, and his head of course in the upper part, the inventor has contrived, that even there, when he has breathed the hot air as well as he can, he may, by means of a spiral copper tube *bc*, placed close to the inside of the bell, draw the cooler and fresher air from the lowermost parts: for which purpose, a flexible leather tube, about two feet long, is fixed to the upper end of the copper tube at *b*; and to the other end of this tube is fixed an ivory mouth-piece, by which the diver draws in the air.

Fig. 3.

The greatest improvement, however, which the diving bell ever has received, or probably can receive, is from Mr Spalding of Edinburgh. A section of his improved diving-bell is represented fig. 3. This construction is designed to remedy some inconveniences of Dr Halley's, which are very evident, and of very dangerous tendency. These are, 1. By Dr Halley's construction, the sinking or raising of the bell depends entirely on the people who are at the surface of the water; and as the bell even when in the water has a very considerable weight, the raising it not only requires a great deal of labour, but there is a possibility of the rope breaking by which it is raised, and thus every person in the bell would inevitably perish. 2. As there are, in many places of the sea, rocks which lie at a considerable depth, the figure of which cannot possibly be perceived from above, there is danger that some of their ragged prominences may catch hold of one of the edges of the bell in its descent, and thus overset it before any signal can be given to those above, which would infallibly be attended with the destruction of the people in the bell: and as it must always be unknown, before trial, what kind of a bottom the sea has in any place, it is plain, that, without some contrivance to obviate this last danger, the descent in Dr Halley's diving-bell is not at all eligible.

How these inconveniences are remedied by Mr Spalding's new construction will be easily understood from the following description.—ABCD represents a section of the bell, which is made of wood: *e, e*, are iron hooks, by means of which it is suspended by ropes QBFe, and QAERe, and QS, as expressed in the figure: *e, e*, are iron hooks, to which are appended lead weights, that keep the mouth of the bell always parallel to the surface of the water, whether the machine taken all together is lighter or heavier than an equal bulk of water. By these weights alone, however, the bell would not sink: another is therefore added, represented at L; and which can be raised or lowered at pleasure, by means of a rope passing over the pulley *s*, and fastened to one of the sides of the bell at

M. As the bell descends, this weight, called by Mr Spalding the *balance-weight*, hangs down a considerable way below the mouth of the bell. In case the edge of the bell is caught by any obstacle, the balance-weight is immediately lowered down so that it may rest upon the bottom. By this means the bell is lightened so that all danger of oversetting is removed; for, being lighter, without the balance-weight, than an equal bulk of water, it is evident that the bell will rise, as far as the length of the rope affixed to the balance-weight will allow it. This weight, therefore, will serve as a kind of anchor to keep the bell at any particular depth which the divers may think necessary; or by pulling it quite up, the descent may be continued to the very bottom.

By another very ingenious contrivance, Mr Spalding hath rendered it possible for the divers to raise the bell, with all the weights appended to it, even to the surface, or to stop at any particular depth, as they think proper; and thus they could still be safe, even though the rope designed for pulling up the bell was broke. For this purpose the bell is divided into two cavities, both of which are made as tight as possible. Just above the second bottom EF, are small slits in the sides of the bell; through which the water, entering as the bell descends, displaces the air originally contained in this cavity, which flies out at the upper orifice of the cock GH. When this is done, the divers turn the handle G, which stops the cock; so that if any more air was to get into the cavity AEFB, it could not longer be discharged through the orifice H as before. When this cavity is full of water, the bell sinks; but when a considerable quantity of air is admitted, it rises. If therefore the divers have a mind to raise themselves, they turn the small cock *g*, by which a communication is made between the upper and under cavities of the bell. The consequence of this is, that a quantity of air immediately enters the upper cavity, forces out a quantity of the water contained in it, and thus renders the bell lighter by the whole weight of the water which is displaced. Thus, if a certain quantity of air is admitted into the upper cavity, the bell will descend very slowly; if a greater quantity, it will neither ascend nor descend, but remain stationary; and if a larger quantity of air is still admitted, it will arise to the top. It is to be observed, however, that the air which is thus let out into the upper cavity must be immediately replaced from the air-barrel; and the air is to be let out very slowly, or the bell will rise to the top with so great velocity that the divers will be in danger of being shaken out of their seats. But, by following these directions, every possible accident may be prevented, and people may descend to great depths without the least apprehension of danger. The bell also becomes so easily manageable in the water, that it may be conducted from one place to another by a small boat with the greatest ease, and with perfect safety to those who are in it.

Instead of wooden seats used by Dr Halley, Mr Spalding makes use of ropes suspended by hooks *bbb*; and on these ropes the divers may sit without any inconvenience. I and K are two windows made of thick strong glass, for admitting light to the divers. N represents an air-cask with its tackle, and OCP the flex-

Diving.

ible pipe through which the air is admitted to the bell. In the ascent and descent of this cask the pipe is kept down by a small weight appended, as in Dr Halley's machine. R is a small cock by which the hot air is discharged as often as it becomes troublesome. Fig. 4. is a representation of the whole diving apparatus, which it is hoped will be readily understood without any further explanation. Two air-barrels are represented in this figure; but Mr Spalding is of opinion, that one capable of containing 30 gallons is sufficient for an ordinary machine.

Fig. 4.

We are told of another method put in practice by a gentleman of Devonshire. He has contrived a large ease of strong leather, perfectly water-proof, which may hold about half an hoghead of air. This is so contrived, that, when he shuts himself up in this case, he may walk at the bottom of the sea, and go into any part of a wrecked vessel, and deliver out the goods. This method, we are told, he has practised for many years, and has thus acquired a large fortune. It would be a considerable improvement on this machine to condense the air in it as much as possible before the diver descended; as he would thus be furnished with an atmosphere endued with elasticity sufficient to resist the weight of the water, which otherwise would squeeze his case into much less room than it originally took up. The condensed air also would serve for respiration a much longer time than that which is in its ordinary state.

DIVING-Bladder, a machine invented by Borelli, and by him preferred, though without any good reason, to the diving-bell. It is a globular vessel of brass or copper, about two feet in diameter, which contains the diver's head. It is fixed to a goat's-skin habit exactly fitted to his person. Within the vessel are pipes, by means of which a circulation of air is contrived; and the person carries an air-pump by his side, by which he can make himself heavier or lighter as fishes do, by contracting or dilating their air-bladder. By this means he thought all the objections to which other diving machines are liable were entirely obviated, and particularly that of want of air; the air which had been breathed, being, as he imagined, deprived of its noxious qualities by circulating through the pipes. These advantages, however, it is evident, are only imaginary. The diver's limbs, being defended from the pressure of the water only by a goat's skin, would infallibly be crushed if he descended to any considerable depth; and from the discoveries now made by Dr Priestley and others, it is abundantly evident, that air, which is once rendered foul by breathing, cannot in any degree be restored by circulation through pipes. Concerning the use of copper machines in general, Mr Spalding has favoured us with the following curious observation, namely, That when a person has breathed in them a few minutes, he feels in his mouth a very disagreeable brassy taste, which continues all the time he remains in the vessel; so that, on this account, copper seems by no means an eligible material. This taste most probably arises from the action of the alkalescent effluvia of the body upon the copper; for volatile alkali is a strong dissolvent of this metal: but how these effluvia volatilise the copper in such a manner as to make the taste of it sensible in the mouth, is not easy to say.

DIVINITY, properly signifies the nature, quality,

and essence of God.

DIVINITY, is also used in the same sense with theology.

DIVISIBILITY, that property by which the particles of matter in all bodies are capable of a separation or diffusion from each other.

The Peripatetics and Cartesians hold divisibility to be an affection of all matter. The Epicureans, again, allow it to agree to every physical continuum; but they deny that this affection agrees to all bodies, for the primary corpuscles or atoms they maintain to be perfectly insecable and indivisible.

As it is evident that body is extended, so it is no less evident that it is divisible: for since no two particles of matter can exist in the same place, it follows, that they are really distinct from each other; which is all that is meant by being divisible. In this sense the least conceivable particle must still be divisible, since it will consist of parts which will be really distinct. To illustrate this by a familiar instance. Let the least imaginable piece of matter be conceived lying on a smooth plain surface, it is evident the surface will not touch it every where: those parts therefore which it does not touch, may be supposed separable from the others, and so on, as far as we please; and this is all that is meant when we say matter is infinitely divisible.

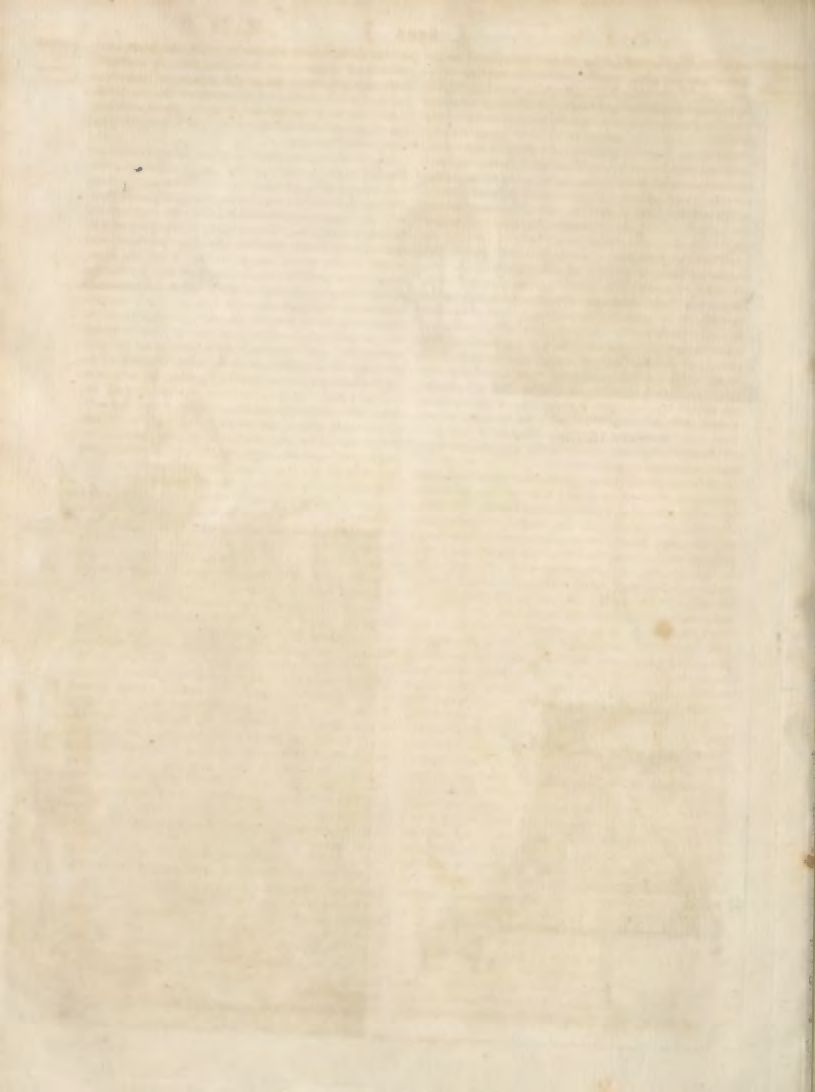
The infinite divisibility of mathematical quantity is demonstrated thus geometrically. Suppose the line AD perpendicular to BF; and another, as GH, at a small distance from it, also perpendicular to the same line: with the centers CCC, &c. describe circles entering the line GH in the points *eee*, &c. Now the greater the radius AC is, the less is the part eH. But the radius may be augmented in infinitum; so long, therefore, the part eH may be divided into still less portions; consequently it may be divided in infinitum.

All that is supposed in strict geometry (says Mr Maclaurin) concerning the divisibility of magnitude, amounts to no more than that a given magnitude may be conceived to be divided into a number of parts equal to any given or proposed number. It is true, that the number of parts into which a given magnitude may be conceived to be divided, is not to be fixed or limited, because no given number is so great but a greater may be conceived and assigned: but there is not, therefore, any necessity of supposing the number of parts actually infinite; and if some have drawn very abstruse consequences from such a supposition, yet geometry ought not to be loaded with them.

How far matter may actually be divided, may in some measure be conceived from hence, that a piece of wire gilt with so small a quantity as eight grains of gold, may be drawn out to a length of 13,000 feet, the whole surface of it still remaining covered with gold. We have also a surprising instance of the minuteness of some parts of matter from the nature of light and vision. Let a candle be lighted, and placed in an open plain, it will then be visible two miles round; and consequently was it placed two miles above the surface of the earth, it would fill with luminous particles a sphere whose diameter was four miles, and that before it had lost any sensible part of its weight. A quantity of vitriol being dissolved, and mixed with 9000 times as much water, will tinge the whole; consequently will be divided into as many parts as there

Diving.

Pl. XCIII.
fig. 2.



Dividing,
Division.

are visible portions of matter in that quantity of water. There are perfumes, which, without a sensible diminution of their quantity, shall fill a very large space with their odoriferous particles; which must therefore be of an inconceivable smallness, since there will be a sufficient number in every part of that space, sensibly to affect the organ of smelling. Dr Keill demonstrates, that any particle of matter how small soever, and any finite space how large soever, being given, it is possible for that small particle of matter to be diffused through all that space, and to fill it in such a manner, as that there shall be no pore in it whose diameter shall exceed any given line. See EFFLUVIA.

The chief objections against the divisibility of matter in infinitum are, That an infinite cannot be contained by a finite; and that it follows from a divisibility in infinitum, either that all bodies are equal, or that one infinite is greater than another. But the answer to these is easy; for the properties of a determined quantity are not to be attributed to an infinite considered in a general sense; and who has ever proved that there could not be an infinite number of infinitely small parts in a finite quantity, or that all infinities are equal? The contrary is demonstrated by mathematicians in innumerable instances. See the article INFINITE, and 'S Gravesande Elem. Mathem. l. i. c. 4.

DIVISION, in general, is the separating a thing into two or more parts.

Mechanical Division, signifies that separation which is occasioned in the parts of a body by help of mechanical instruments.—The mechanical division of bodies does indeed separate them into smaller, homogeneous, similar parts; but this separation cannot extend to the primary integrant molecules of any body; and consequently is incapable of breaking what is properly called their *aggregation*: also, no union is formed betwixt the divided and dividing bodies, in which respect division essentially differs from dissolution.

Division is not properly a chemical operation. It is only employed preparatorily to facilitate other operations, and particularly solution. For this purpose it is very useful, as it increases the quantity of surface, and consequently the points of contact of any body.—Different methods are used to divide bodies according to their nature. Those which are tenacious and elastic, as horns and gums, require to be cut, rasped, or filed. Metals, because of their ductility, require the same treatment: but as they are also fusible, they may be quickly and conveniently reduced into grains small enough for most operations, by pouring them, when melted, into water. All brittle bodies may be reduced conveniently into fine parts by being bruised in a mortar with a pestle. Very hard bodies, such as glass, crystals, stones, particularly those of the vitrifiable kind, before they are pounded, ought to be plunged when red-hot into water, by which they are split and cracked, and rendered more easily pulverable. Bodies of this kind may also be bruised or ground by means of a hard and flat stone, upon which the matter is to be put, and bruised by another hard stone so small as to be held and moved upon the larger stone with the hand. The larger stone is called a *porphyry*, from its being generally of that kind of stone; and the operation is called *porphyrisation*. Instead of porphyrisation, a mill may be used, composed of a hard grit millstone,

moving round upon another stone of the same kind, which must be fixed: in the upper stone is a groove, or channel, through which the matter to be ground passes. By this method a substance may be more quickly reduced to a fine powder than by porphyrisation. But these mills can be only employed for considerable quantities of matter.

These methods of mechanically dividing bodies are attended with some practical inconveniences; the most considerable of which is, that some parts of the dividing instruments are always struck off, and mixed with the matter to be divided. This may greatly affect the operations. For instance, instruments of iron and copper furnish metallic colouring particles, and copper is very prejudicial to health. Porphyry is coloured by a reddish brown matter, which injures the colour of crystal-glasses, enamels, and porcelains made with matters ground upon this stone. These matters therefore must be cleaned after their porphyrisation, or else no instruments capable of injuring the intended operations ought to be employed. Thus, for the preparation of all medicines to be taken internally, no copper instruments, as mortars, pestles, &c. ought to be used; those made of iron are preferable; and, instead of porphyries, mortars, grinding-stones and mill-stones made of hard and white stones ought to be employed for substances which are to enter into the composition of enamels, crystal-glass, and porcelain, the whiteness of which is a most necessary quality.

DIVISION, in algebra. See ALGEBRA, n° 7.

DIVISION, in arithmetic. See ARITHMETIC, n° II.

DIVISION, in sea affairs, a select number of ships in a fleet or squadron of men of war, distinguished by a particular flag or pendant, and usually commanded by a general officer. A squadron is commonly ranged into three divisions, the commanding officer of which is always stationed in the centre.

When a fleet consists of 60 sail of the line, that is, of ships having at least 60 cannon each, the admiral divides it into three squadrons, each of which has its divisions and commanding officers. Each squadron has its proper colours, according to the rank of the admiral who commands it, and every division its proper mast. Thus the white flag denotes the first division of France; the white and blue the second; and the third is characterised by the blue. In Britain, the first admiral, or the admiral of the fleet, displays the union-flag at the main-top-mast-head; next follows the white flag with St George's cross; and afterwards the blue. The private ships carry pendants of the same colour with their respective squadrons, at the masts of their particular divisions; so that the last ship in the division of the blue squadron carries a blue pendant at her *mizen-top-mast-head*.

DIVISOR, in arithmetic. See ARITHMETIC, n° II.

DIVORCE, a breach or dissolution of the bond of marriage. See MARRIAGE; and Law, N° clx. 23.

Divorce is of two kinds: the one, a *vinculo matrimonii*, which alone is properly *divorce*; the other, a *mensa & thoro*, a separation from bed and board.

The woman divorced a *vinculo matrimonii*, receives all again that she brought with her: the other has a suitable separate maintenance allowed her out of her husband's effects.

The first only happens thro' some essential impediment

Division
||
Divorce.

Diuretis
Dobson.

ment, as confluency or affinity within the degrees forbidden, pre-contract, impotency, adultery, &c. of which impediments the canon law allows 14, comprehended in these verses:

*Error, conditio, visum, cognatio, crimen,
Cultus, disparitas, vis, ordo, ligamen, honestas,
Si sis affinis, si forte coire nequibus,
Si parochi & duplici desit presbitero testis,
Raptave sit mulier, nec parvi reddita tui.*

DIURESIS, from *υρος*, urine. An excretion of urine.

DIURETICS, (from *δια*, by, and *υρος*, urine), medicines which provoke a discharge by urine.

Celsus says every fragrant herb that is cultivated in a garden is diuretic. However numerous diuretic medicines may be, there are none else whose efficacy is so uncertain considered as diuretic. Honey and sugar increase the virtue of diuretics; they should be often used to be effectual, and the body should be kept cool. — If a medicine is designed to pass off by urine, walking gently in a cool air will assist it; but sweating or considerable warmth directs it to the skin, or at least restrains its efficacy. Medicines of the saline kind are diuretic or perspirative, according as the body is kept cool or warm.

In administering this kind of medicines, they are rarely given with respect to their operation as diuretics, but with respect to the habit or state of the patient's body, as appears from the different classes of medicines that come under this denomination; the chief of which remove impediments to, rather than promote the discharge of, urine.

The following different classes of medicines are used with a view to promote the discharge of urine. 1. Cordial nervous medicines. These accelerate the motion of the blood when too languid, and increase its fluidity, and thus increase this discharge. 2. Emollient balsamics. These relax and lubricate, so obtain a passage for what is too bulky. 3. Substances consisting of salts and mucilages. These guard against stricture in the vessels, and at the same time fit the matter to be discharged for a more easy exclusion. 4. Detergent balsamics. These rarify and scour away viscous or fabulous matter which obstructs the passages. 5. Alkaline and lixivious salts. These keep the fluids at least in a due state of tenuity for being excreted. 6. Acid and nitrous salts. These determine the serum to the kidneys, if not counteracted by heat. 7. Antispasmodics. These relieve by taking off a stricture in the kidneys.

DIURNAL, in astronomy, something relating to day; in opposition to *nocturnal*, which regards the night.

DIVUS, DIVA, in antiquity, appellations given to men and women who had been deified, or placed in the number of the gods. See DEIFICATION, &c.

Hence it is, that on medals struck for the consecration of an emperor, or empress, they give them the title of *divus*, or *diva*: for example, DIVUS JULIUS. DIVO ANTONINO PIO. DIVO PIO. DIVO CLAUDIO. DIVA FAUSTINA AUG. &c.

DIZZINESS, in medicine. See VERTIGO.

DO, in music, a note of the Italian scale, corresponding to *ut* of the common gamut. See MUSIC.

DOBCHICK, in ornithology. See COLYMBUS.

DOBSON (William), an eminent English portrait

and history painter, born at London in 1610. He served an apprenticeship with one Peck, a stationer and picture-dealer; and owed his improvement to the copying some pictures of Titian and Van Dyck, whose manner he always retained. He had farther obligations to the latter of these artists: for it is said, that a picture of his painting being exposed at a shop on Snow-hill, Van Dyck passing by was struck with it exceedingly; and inquiring after the author, found him at work in a poor garret. Van Dyck had the generosity to equip him in a manner suitable to his merit. He presented him to king Charles I. who took him under his protection, kept him with him at Oxford all the time his majesty continued in that city, and not only sat to him several times for his picture, but caused the prince of Wales, prince Rupert, and most of the lords of his court, to do so too. Mr Dobson, however, being somewhat loose and irregular in his way of life, was far from improving the many opportunities he had of making his fortune; and died very poor in 1647, at his house in St Martin's lane.

DOCIMASIA, in Greek antiquity, a probation of the magistrates and persons employed in public business at Athens. It was performed publicly in the forum, where they were obliged to give account of themselves and their past life before certain judges. Among several questions propounded to them, we find the following, Whether they had been dutiful to their parents, had served in the wars, and had a competent estate?

DOCIMASTIC ART, a name given to the art of assaying by operations in small, the nature and quantity of metallic or other matters which may be obtained from mineral or other compound bodies. See REFINING and METALLURGY.

DOCIMENUM MARMOR, a name given by the ancients to a species of marble of a bright and clear white, much used in large and sumptuous buildings, such as temples and the like. It had its name from *Docimeneos*, a city of Phrygia, afterwards called Synaia; near which it was dug, and from whence it was sent to Rome. It was accounted little inferior to the Parian in colour, but not capable of so elegant a polish; whence it was less used by the statuary, or in other smaller works. The emperor Adrian is said to have used this marble in building the temple of Jupiter; and many others of the great works of the Romans are of it.

DOCK, in botany. See LAPATHUM.

DOCK, in the manege, is used for a large case of leather, as long as the dock of a horse's tail, which serves it for a cover. The French call the dock *troussequeue*. It is made fast by straps to the crupper, and has leathern thongs that pass between his thighs, and along his flanks to the saddle-straps, in order to keep the tail tight, and to hinder it from whisking about.

Dock, in maritime affairs, a sort of broad and deep trench, formed on the side of a harbour, or on the banks of a river; and commodiously fitted either to build ships, or receive them to be repaired and *breamed* therein. These sorts of docks have generally strong flood-gates to prevent the flux of the tide from entering the dock while the ship is under repair. — There are likewise docks of another kind, called *wet docks*, where

Docimasia
Dock.

Dock
Doddridge.

where a ship can only be cleaned during the recesses of the tide, or in the interval between the time when the tide left her dry a-ground, and the period when it again reaches her by the return of the flood. Docks of the latter kind are not furnished with the usual flood-gates.

Dock-Yards, certain magazines containing all sorts of naval stores and timber for ship-building. In England, the royal dock yards are at Chatham, Portsmouth, Plymouth, Deptford, Woolwich, and Sheerness. His majesty's ships and vessels of war are generally moored at these ports during the time of peace; and such as want repairing are taken into the docks, examined, and refitted for service.

The principal dock-yards are governed by a commissioner, resident at the port; who superintends all the matters of the officers, artificers, and labourers, employed in the dock-yard, and ordinary. He also controls their payment therein; examines the accounts; contracts, and draws bills on the navy-office to supply the deficiency of stores; and, finally, regulates whatever belongs to the dock-yard, maintaining due order in the respective offices.

These yards are generally supplied from the northern crowns with hemp, pitch, tar, rosin, canvas, oak-plank, and several other species. With regard to the masts, particularly those of the largest size, they are usually imported from New-England.

DOCTOR, a person who has passed all the degrees of a faculty, and is empowered to teach or practise the same: thus we say, doctor in divinity, doctor in physics, doctor of laws.

The title of *doctor* seems to have been created in the XIIIth century, instead of *maister*; and established, with the other scholastic degrees of bachelors and licentiates, by Peter Lombard and Gilbert Porreus, then the chief divines of the university of Paris. Gratian did the same thing, at the same time, in the university of Bologna.

Doctor of the Law, a title of honour among the Jews. The investiture, if we may so say, of this order was performed by putting a key and table-book in their hands; which is what some authors imagine our Saviour had in view, Luke xi. 52. when, speaking of the doctors of the law, he says, "Wo unto you doctors of the law, for you have taken away the key of knowledge: you entered not in yourselves, and them that were entering you hindered."

DOCTOR, is also an appellation adjoined to several specific epithets, expressing the merit of some of the schoolmen: thus, Alexander Hales is called the irrefragable doctor; Thomas Aquinas, the angelic doctor; St Bonaventure, the seraphic doctor; John Duns Scotus, the subtle doctor; Raymond Lully, the illuminated doctor; Roger Bacon, the admirable doctor, &c.

DOCTORS-Commons. See COLLEGE of Civilians.

DOCUMENT, in law, some written monument produced in proof of any thing asserted.

DODDER, in botany. See CUSCUTA.

DODDRIDGE (Phillip), D. D. an eminent Presbyterian minister, was the son of Daniel Doddridge an oil-man in London, where he was born on the 26th of June 1702; and having completed the study of the classics in several schools, was, in 1719, placed under the tuition of the reverend Mr John Jennings, who kept

an academy at Kilworth in Leicestershire. He was first settled as a minister at Kilworth, where he preached to a small congregation in an obscure village: but, on Mr Jennings's death, succeeded to the care of his academy; and soon after was chosen minister of a large congregation of Dissenters at Northampton, to which he removed his academy, and where the number of his pupils encreased. He instructed his pupils with the freedom and tenderness of a father; and never expected nor desired that they should blindly follow his sentiments, but encouraged them to judge for themselves. He checked any appearance of bigotry and uncharitableness, and endeavoured to cure them by shewing what might be said in defence of those principles they disliked. He died at Lisbon, whither he went for the recovery of his health; and his remains were interred in the burying-ground belonging to the British factory there, and a handsome monument was erected to his memory in the meeting-house at Northampton, at the expence of the congregation, on which is an epitaph written by Gilbert West, esq. He wrote, 1. Free thoughts on the most probable means of reviving the dissenting interest; 2. The life of Colonel James Gardiner; 4. Sermons on the education of children; 4. The rise and progress of religion in the soul; 5. The Family Expositor, in 6 vols. 4to, &c. And since the author's death, a volume of his Hymns have been published, and his Theological Lectures. Several of his works have been translated into Dutch, German, and French.

DODECAGON, in geometry, a regular polygon consisting of twelve equal sides and angles.

DODECAHEDRON, in geometry, one of the platonic bodies, or regular solids, contained under twelve equal and regular pentagons.

DODECANDRIA, (from *dodekax*, twelve, and *andria*, a man;) the name of the eleventh class in Linnaeus's sexual system, consisting of plants with hermaphrodite flowers, that, according to the title, have twelve stamina or male organs. This class, however, is not limited with respect to the number of stamina. Many genera have sixteen, eighteen, and even nineteen stamina; the essential character seems to be, that, in the class in question, the stamina, however numerous, are inserted into the receptacle: whereas, in the next class, Icosandria, which is as little determined in point of number as the present, they are attached to the inside of the calix or flower-cup.

The orders in this class, which are six, are founded upon the number of the styles, or female organs. Asarabacca, mangostan, florax, purple loose-strife, wild Syrian rue, and purslane, have only one style; agrimony and heliopsis have two; burning thorny plant, and bastard rocket, three; *glinus*, five; *illicium*, eight; and horse-leek, twelve.

DODO, in ornithology. See DIDUS.

DODONIAN, *Dodoneus*, in antiquity, an epithet given to Jupiter, because he was worshipped in a temple built in the forest of Dodona, where was the most famous and (it is said) the most ancient oracle of all Greece. It is reported that the pigeons and the very oaks of the forest of Dodona spoke and delivered oracles. In the temple was a fountain, which the ancient naturalists assure us had a property of rekindling torches when newly extinguished.

Dodecagon
Dodonian.

Dodrans

Dogs.

DODRANS, in antiquity, three fourths of the as. See the article As.

DODSLEY (Robert), a late eminent bookseller, and ingenious writer, born at Mansfield in Nottinghamshire, in the year 1703. He was not indebted to education for his literary fame, being originally a livery servant; but his natural genius, and early passion for reading, soon elevated him to a superior station. He wrote an elegant little satirical farce called *The Toy-shop*, which was acted with applause in 1735, and which recommended him to the patronage of Mr Pope. The following year he produced the *King and Miller of Mansfield*. The profits of these two farces enabled him to commence bookseller, and his own merit procured him eminence in that profession. He wrote some other dramatic pieces, and published a collection of his works in one vol. 8vo. under the modest title of *Trifles*; which was followed by *Public Virtue*, a poem in 4to. Beside what he wrote himself, the public were obliged to him for exerting his judgment in the way of his business; he having collected several volumes of well chosen *Miscellaneous Poems* and *Fugitive Pieces*, whose brevity would else have endangered their being totally lost to posterity. He died in 1764.

DODWELL (Henry), a very learned controversial writer, born at Dublin, but of English extraction, in 1641. He wrote an incredible number of tracts: but his services were so little acknowledged, that bishop Burnet and others accuse him of doing more hurt than good to the cause of Christianity, by his indiscreet love of paradoxes and novelties, and thus exposing himself to the scoffs of unbelievers. His pamphlet on the immortality of the soul, gave rise to the well known controversy between Mr Collins and Dr Clark on that subject. He died in 1711.

DOESBURG, a town of the united provinces in the county of Zutphen, and province of Guelderland. It is small, but well peopled, and very strong, both by art and nature, having the river Yssel on one side, and a morass on the other, and is only to be approached by a narrow neck of land. E. Long. 5. 55. N. Lat. 52. 3.

DOG, in zoology: An animal remarkable for its natural docility, fidelity, and affection for its master; which qualities mankind are careful to improve for their own advantage. These useful creatures guard our houses, gardens, and cattle, with spirit and vigilance. By their help we are enabled to take not only beasts, but birds; and to pursue game both over land and through the waters. In some northern countries, they serve to draw sleds, and are also employed to carry burdens. In several parts of Africa, China, and by the West Indian negroes, dogs are eaten, and accounted excellent food. Nay, we have the testimony of Mr Forster, that dogs flesh, in taste, exactly resembles mutton*. They were also used as food by the Romans, and long before them by the Greeks, as we learn from several treatises of Hippocrates. In the present times, their skins, dressed with the hair on, are used in muffs, made into a kind of buskins for persons in the gout, and for other purposes. Prepared in another way, they are used for ladies gloves, and the linings of masks, being thought to make the skin peculiarly white and smooth. The French import many of these skins from Scotland, under a small duty. Here, when

tanned, they serve for upper leathers for neat pumps. Dogs skins dressed are exported under a small, and imported under a high, duty. The French import from Denmark large quantities of dogs hair, both white and black. The last is esteemed the best, and is worked up in the black list of a particular kind of woollen cloth; but is not used, as many have supposed, in making of hats, being entirely unfit for this purpose.

With regard to the qualities of dogs, which bred in the island of Britain are justly reckoned superior to the dogs bred in any other country. The swiftness of the greyhound is amazing: as are also the steadiness and perseverance of other hounds and beagles; the boldness of terriers in unearthing foxes, &c.; the sagacity of pointers and setting dogs, who are taught a language by signs as intelligible to sportsmen as speech; and the invincible spirit of a bull-dog, which can be quelled only by death.—All the nations in Europe not only do justice to the superior qualities of the British dogs, but adopt our terms and names, and thankfully receive the creatures as presents.—It is remarkable, however, that almost every kind of British dogs degenerate in foreign countries; nor is it possible to prevent this degeneracy by any art whatever.

For the natural history of the dog, see CANIS.

Chusing of Dogs. In order to chuse a dog and bitch for good whelps, take care that the bitch come of a generous kind, be well proportioned, having large ribs *Sportsman's* and flanks; and likewise that the dog be of a good *Dist.* breed and young, for a young dog and an old bitch breed excellent whelps.

The best time for hounds nitches, or bratchets, to be lined in, are the months of January, February, and March. The bitch should be used to a kennel, that she may like it after her whelping, and the ought to be kept warm. Let the whelps be weaned after two months old; and though it be some difficulty to chuse a whelp under the dam that will prove the best of the litter, yet some approve that which is last, and account him to be the best. Others remove the whelps from the kennel, and lay them severally and apart one from the other; then they watch which of them the bitch first takes and carries into her kennel again, and that they suppose to be the best. Others again imagine that which weighs least when it sucks to be the best: this is certain, that the lighter whelp will prove the swifter. As soon as the bitch has littered, it is proper to chuse them you intend to preserve, and drown the rest: keep the black, brown, or of one colour; for the spotted are not much to be esteemed, though of hounds the spotted are to be valued.

Hounds for chase are to be chosen by their colours. The white, with black ears, and a black spot at the setting on of the tail, are the most principal to compose a kennel of, and of good scent and condition. The black hound, or the black tanned, or the all liver-coloured, or all white: the true talbots are the best for the stronger line; the grizzled, whether mixed or unmixed, so they be shag-haired, are the best verminers, and a couple of these are proper for a kennel.—In short, take these marks of a good hound. That his head be of a middle proportion, rather long than round; his nostrils wide, his ears large, his back bowed; his fillet great, his haunches large, thighs well trussed, ham frait, tail big near the reins, the rest slender; the

* See America, n° 52.

Dog. the leg big, the sole of the foot dry, and in the form of that of a fox with large claws.

Keeping Dogs in health.—As pointers and spaniels, when good of their kinds and well broken, are very valuable to a sportsman, it is worth while to take some care to preserve them in health. This very much depends on their diet and lodging: frequent cleaning their kennels, and giving them fresh straw to lie on, is very necessary; or, in summer-time, deal-shavings, or sand, instead of straw, will check the breeding of fleas. If you rub your dog with chalk, and brush and comb him once or twice a-week, he will thrive much the better; the chalk will clear his skin from all greasiness, and he will be the less liable to be mangy. A dog is of a very hot nature: he should therefore never be without clean water by him, that he may drink when he is thirsty. In regard to their food, carion is by no means proper for them: it must hurt their sense of smelling, on which the excellence of these dogs greatly depends. Barley-meal, the dross of wheat flour, or both mixed together, with broth or skimmed milk, is very proper food. For change, a small quantity of greaves from which the tallow is pressed by the chandlers, mixed with their flour, or sheep's feet well baked or boiled, are a very good diet; and when you indulge them with flesh, it should always be boiled. In the season of hunting your dogs, it is proper to feed them in the evening before, and give them nothing in the morning you intend to take them out except a little milk. If you stop for your own refreshment in the day, you should also refresh your dogs with a little bread and milk. It has been already observed that dogs are of a hot constitution; the greatest relief to them in the summer, is twitch-grass, or dog-grass, which is the same thing. You should therefore plant some of it in a place where you can turn them into every morning: they will feed freely on it to be cured of the sickness they are subject to, and cured of any extraordinary heat of blood: but unless the grass be of this sort, it will have no effect.

Diseases of Dogs.—1. *Bites and Stings.* If dogs are bitten by any venomous creatures, as snakes, adders, &c. squeeze out the blood, and wash the place with salt and urine; then lay a plaster to it made of calaminet, pounded in a mortar, with turpentine and yellow wax, till it come to a scab. If you give your dog some of the juice of calaminet to drink in milk, it will be good; or an ounce of treacle dissolved in some sweet wine.

2. *Mange.* Dogs are subject to the mange from being fed too high, and allowed no exercise or an opportunity of refreshing themselves with dog-grass; or by being starved at home, which will cause them to eat the vilest stuff abroad, such as carrion, or even human excrement; or by want of water, and sometimes by not being kept clean in their kennel, or by foundering and melting in their grease. Either of these will heat the blood to a great degree, which will have a tendency to make them mangy. The cure may be effected by giving stone-brimstone powdered fine, either in milk or mixed up with butter, and rubbing them well every day for a week with an ointment made of some of the brimstone and pork-lard, to which add a small quantity of oil of turpentine.—Or, boil four ounces of quicksilver in two quarts of water to half the

quantity; bathe them every day with this water, and let them have some of it to lick till the cure is perfected. Or, a small quantity of trooper's ointment rubbed on the parts on its first appearance will cure it. It will also free lousy puppies from their lice. Or, take two ounces of euphorbium; flour of sulphur, Flanders oil of bays, and soft soap, each four ounces. Anoint and rub your dog with it every other day; give him warm milk, and no water. The cure will be performed in about a week. The following receipt is also said to be efficacious. Take two handfuls of wild cresses, and as much elecampane, and also of the leaves and roots of roerb and ferrel, and two pounds of the roots of fodels: boil all these well together in lee and vinegar; strain the decoction, and put into it two pounds of grey soap and when it is melted, rub the dog with it four or five days successively, and it will cure him.

3. *Poison.* If you suspect your dog to be poisoned with nux vomica, (the poison usually employed by the warreners, which causes convulsive fits and soon kills); the most effectual remedy, if immediately applied, is to give him a good deal of common salt; to administer which, you may open his mouth, and put a stick across to prevent his shutting it, whilst you cram his throat full of salt, at the same time holding his mouth upwards; and it will dissolve so that a sufficient quantity will be swallowed to purge and vomit him. When his stomach is sufficiently cleared by a free passage obtained by stool, give him some warm broth frequently, to prevent his expiring from faintness; and he will recover.

4. *Worms.* Dogs are very frequently troubled with worms; but more particularly whilst they are young. Any thing bitter is so nauseous to these worms, that they are very often voided by taking two or three purges of aloes; or (which is the same thing) Scots pills, four or five being a dose for a large dog: this is to be repeated two or three times in a week. If this do not succeed, you may give him an ounce of powder of tin mixed up with butter, in three doses; which seldom fails to cure. Or of the herb savin, dried and rubbed to powder, give about as much as will lie on a shilling for a dose; which will entirely destroy worms and their feed.

6. *Sore Feet.* A pointer ought not to be hunted oftener than two or three days in a week: and unless you take care of his feet, and give him good lodging as well as proper food, he will not be able to perform that through the season. You should therefore, after a hard day's hunting, wash his feet with warm water and salt; and when dry, wash them with warm broth, or beer and butter, which will heal their soreness, and prevent a settled stiffness from fixing.

7. *Strains, Blows, or small Wounds.* If your dog has received any little wounds by forcing thro' hedges, or gets any lameness from a blow or strain; bathe the wound or grieved part with salt and cold vinegar (for warming it only evaporates the fine spirit); and when dry, if a wound, you may pour in it a little friar's balsam, which will perform the cure sooner than any method hitherto experienced.

8. *Coughs and Colds.* Dogs are very subject to a cough, with an extraordinary choking, which is thought to arise generally from a cold or some inward disorder; and probably it is often occasioned by their eating of fish-bones. To guard against it, order your servants

Dog.
Sportsman's
Dist.

Dog.

Sportsm.
Dish.

to throw all such fish-bones where the dog can't get at them. But if the disorder be from a cold, let bleeding be repeated in small quantities, if necessary; but if it be what is called the *distemper* in dogs, and they appear to be very low in spirits, the bleeding is better omitted. Let meat-broth, or milk-broth warmed, be the principal part of his diet, using at the same time the following medicine. Take flour of sulphur, cold drawn linseed oil, and salt-petre, of each an ounce; divide it into four doses, giving him one dose every other day, and let him have plenty of clean straw to lie on; or one spoonful of honey daily.

Dog-Madness. Of this there are no less than seven sorts common among dogs. The chief causes are, high-feeding, want of exercise, fullness of blood, and costiveness. As for the two first, you must observe when you hunt them, that they should be better fed than when they rest; and let them be neither too fat nor too lean; but, of the two, rather fat than lean; by which means they will not only be preserved from madness, but also from the mange and scab: which diseases they will be subject to for want of air, water, or exercise; but if you have but the knowledge to keep them in an even temper, they may live long, and continue sound. As for water, they should be left to their own pleasure; but for exercise and diet, it must be ordered according to discretion, observing a medium. Give them once a week, especially in the heat of the year, five or six spoonfuls of salad oil, which will cleanse them: at other times, the quantity of a hazle-nut of mithridate is an excellent thing to prevent diseases. It is also very good to bleed them under the tongue, and behind the ears.

The symptoms of madness are many and easily discerned. When any dog separates himself contrary to his former use, becomes melancholy or droops his head, forbears eating, and as he runs snatches at every thing; if he often looks upwards, and his stern at his setting on be a little erect, and the rest hanging down; if his eyes be red, his breath strong, his voice hoarse, and he drivels and foams at the mouth; you may be assured he has this distemper.

The seven sorts of madness are as follow; of which the two first are incurable. 1. The hot burning madness. 2. The running madness. The animals labouring under these are peculiarly dangerous: for all things they bite and draw blood from, will have the same distemper; and they generally seize on all they meet with, but chiefly on dogs: their pain is so great, it soon kills them.—The five curable madnesses are,

3. *Sleeping madness*, so called from the dog's great drowsiness, and almost continual sleeping. This is caused by the little worms that breed in the mouth of the stomach, from corrupt humours, vapours, and fumes which ascend to the head: for cure of which, take six ounces of the juice of wormwood, two ounces of the powder of hartshorn burnt, and two drams of agaric; mix all these together in a little white-wine, and give it the dog to drink in a drenching horn.

4. *Dumb madness*, lies also in the blood, and causes the dog not to feed, but to hold his mouth always wide open, frequently putting his feet to his mouth, as if he had a bone in his throat: to cure this, take the juice of black hellebore, the juice of *spatula putrida*, and of rue, of each four ounces; strain them well, and put thereto two drams of unprepared scammony; and being

mixed well together, put it down the dog's throat with a drenching horn, keeping his head up for some time, lest he cast it out again; then bleed him in the mouth, by cutting two or three veins in his gums.

It is said that about eight drams of the juice of an herb called *hartshorn*, or *dog's-tooth*, being given to the dog, cures all sorts of madness.

5. *Lank madness*, is so called by reason of the dog's leanness and pining away. For cure give them a purge as before directed, and also bleed them: but some say there is no cure for it.

6. *Rheumatic or flavering madness*, occasions the dog's head to swell, his eyes to look yellow, and he will be always flavering and driveling at the mouth. To cure which, take four ounces of the powder of the roots of polipody of the oak, six ounces of the juice of fennel-roots, with the like quantity of the roots of mistletoe, and four ounces of the juice of ivy: boil all these together in white-wine, and give it to the dog as hot as he can take it, in a drenching horn.

7. *Falling madness*, is so termed because it lies in the dog's head, and makes him reel as he goes, and to fall down. For the cure, take four ounces of the juice of briony, and the same quantity of the juice of peony, with four drams of flavelace pulverized; mix these together, and give it the dog in a drenching horn; also let him bleed in the ears, and in the two veins that come down his shoulders; and indeed bleeding is necessary for all sorts of madness in dogs.

When a dog happens to be bit by a mad one, there is nothing better than their licking the place with their own tongues, if they can reach it; if not, then let it be washed with butter and vinegar made luke-warm, and let it afterwards be anointed with Venice turpentine; it is also good to piss often on the wound; but, above all, take the juice of the stalks of strong tobacco boiled in water, and bathe the place therewith; also wash him in sea-water, or water artificially made salt: give him likewise a little mithridate inwardly in two or three spoonfuls of sack, and so keep him apart; and if you find him after some time still to droop, the best way is to hang him.

Some have asserted their having cured several creatures that have been bit by mad dogs, with only giving them the middle yellow bark of buckthorn; which must be boiled in ale for a horse or cow, and in milk for a dog; but that it must be boiled till it is as bitter as you can take it.

As to the preventive of worming dogs, see WORMING.

Dog-Days. See CANICULA.

Dog-Fish, in ichthyology. See SQUALUS.

Dogs-Bane. See APOCYNUM.

Dog-Wood Tree. See PISCIDIA.

DOGE, the chief magistrate in the republic of Venice and Genoa.—The word properly signifies duke, being formed from the Latin *dux*; as *dogate*, and *dogato*, from *ducatus*, duchy.

This dignity is elective in both Venice and Genoa. In the first, it continues for life; at Genoa, it is only for two years. His title is Serenity; he is chief of the council, and mouth of the republic, he being to answer for her. The Venetians do not go into mourning at his death, he being only the phantom of majesty, as all the authority is vested in the republic; the doge only lends

Dog.

Sportsm.
Dish.

Dogger

Dols.

his name to the senate; the power is diffused through the whole body; though answers to foreign ambassadors, &c. are made in the name of the doge. The money is struck in his name, but does not bear his arms. All the magistrates rise and salute him when he comes into the council: but he rises to none but foreign ambassadors. He must not stir out of Venice, without leave of the counsellors, &c.

DOGGER, a Dutch fishing-vessel navigated in the German ocean. It is generally employed in the herring fishery, being equipped with two masts, viz. a main-mast and a mizen-mast, and somewhat resembling a *ketch*. See the Plates at the article *SHIP*.

DOGGER, in the English alum works, a name given by the workmen to a sort of stone found in the same mines with the true alum rock, and containing some alum, though not near so much as the right kind. The county of York, which abounds greatly with the true alum-rock, affords also a very considerable quantity of these doggers; and, in some places, they approach so much to the nature of the true rock, that they are wrought to advantage.

DOGMA, a principle, maxim, tenet, or settled opinion, particularly with regard to matters of faith and philosophy.

DOGMATICAL, something belonging to a doctrine or opinion. A dogmatical philosopher is one who asserts things positively; in opposition to a sceptic, who doubts of every thing.

DOGMATISTS, a sect of ancient physicians, of which Hippocrates was the first author. They are also called *logici*, logicians, from their using the rules of logic in subjects of their profession. They laid down definitions and divisions; reducing diseases to certain genera, and those genera to species, and furnishing remedies for them all; supposing principles, drawing conclusions, and applying those principles and conclusions to particular diseases under consideration: in which sense the dogmatists stand contradictorily from empirics and methodists. They reject all medicinal virtues that they think not reducible to manifest qualities: but Galen hath long ago observed of such men, that they must either deny plain matter of fact, or assign but very poor reasons and causes of many effects they pretend to explain.

DOLCE (Carlo, or Carlinio), a celebrated history and portrait painter, was born at Florence in 1616, and was the disciple of Vignali. This great master was particularly fond of representing pious subjects, though he sometimes painted portraits; and his works are easily distinguished by the peculiar delicacy with which he perfected all his compositions, by a pleasing tint of colour, and by a judicious management of the chiaro scuro. His performance was remarkably slow: and it is reported that his brain was fatally affected by seeing Luca Jordano dispatch more business in four or five hours, than he could have done in as many months. He died in 1686.

DOLE, in our ancient customs, signified a part or portion, most commonly of a meadow, where several persons have shares. It also still signifies a distribution or dealing of alms, or a liberal gift made by a great man to the people.

DOLE, in Scots law, signifies a malevolent intention. It is essential in every crime, that it be committed in-

tentionally, or by an act of the will; hence the rule, *Dolus crimis dolo contrahitur*.

DOLICHOS, KIDNEY-BEAN; a genus of the decandria order, belonging to the diadelphia class of plants. There are 25 species, the most remarkable of which are the following.

1. The lablab with a winding stalk, is a native of warm climates, where it is frequently cultivated for the table. Mr Hasselquist informs us, that it is cultivated in the Egyptian gardens, but is not a native of that country. The Egyptians make pleasant arbour with it in their houses and gardens, by supporting the stem and leading it where they think proper. They not only support it with sticks and wood, but tie it with cords; by which means the leaves form an excellent covering, and an agreeable shade.

2. The soja is a native of Japan, where it is termed *daidsu*; and, from its excellence, *mame*; that is, "the legumen or pod," by way of eminence. It grows with an erect, slender, and hairy stalk, to our height of about four feet. The leaves are like those of the garden kidney-bean*. The flowers are of a bluish white, and produced from the bosom of the leaves, and succeeded by * See Pha-
scelus.
brilliant hanging pods resembling those of the yellow lupine, which commonly contain two, sometimes three, large white seeds. There is a variety of this kind, with a small black fruit, which is used in medicine. Kempter affirms that the seeds of this when pounded, and taken inwardly, give relief in the asthma. This legumen is doubly useful in the Japanese kitchens. It serves for the preparation of a substance named *misso*, that is used as butter; and likewise a pickle celebrated among them under the name of *soju*, or *soy*. To make the first, they take a measure of mame, or the beans produced by the plant: after boiling them for a considerable time in water, and to a proper degree of softness, they beat or bray them into a soft pulp; incorporating with it, by means of repeated bruising, a large quantity of common salt, four measures in summer, in winter three. The less salt that is added, the substance is more palatable; but what it gains in point of taste, it loses in durability. They then add to this mixture a certain preparation of rice, to which they give the name of *koos*; and, having formed the whole into a compost, remove it into a wooden vessel which had lately contained their common ale or beverage named *sacki*. In about two months it is fit for use. The *koos* give it a grateful taste; and the preparing of it, like the polenta of the Germans, requires the skilful hand of an experienced master. For this reason there are certain people who make it their sole business to prepare the *koos*, and who sell it ready made for the purpose of making *misso*: a substance which cannot fail to be greatly valued in those countries, where butter from the milk of animals is unknown. To make *soju*, or *soy*, they take equal quantities of the same beans boiled to a certain degree of softness; of muggi, that is corn, whether barley or wheat, roughly ground; and of common salt. Having properly mixed the beans with the pounded corn, they cover up the mixture, and keep it for a day and a night in a warm place, in order to ferment; then, putting the mass into a pot, they cover it with the salt, pouring over the whole two measures and a half of water. This compound substance they carefully stir at least once a-day, if twice or thrice

the better, for two or three months: at the end of which time, they filtrate and expels the mafs, preferring the liquor in wooden veffels. The older it is, the better and the clearer; and if made of wheat inftead of barley, greatly blacker. The firft liquor being removed, they again pour water upon the remaining mafs; which, after ftirring for fome days, as before, they expels a fecond time, and thus obtain an inferior fort of foy.

3. The urens, or cow-itch, is alfo a native of warm climates. It hath a fibrous root, and an herbaceous climbing ftalk, which is naked, dividing into a great number of branches; and rifes to a great height when properly fupported. The leaves are alternate and trilobate, rifing from the ftem and branches about 12 inches diftant from each other. The footftalk is cylindrical, from 6 to 14 inches long. From the axilla of the leaf defends a pendulous folitary fpike, from 6 to 14 inches long, covered with long blood-coloured papilionaceous flowers, rifing by threes in a double alternate manner from fmall flefhy protuberances, each of which is a fhort pendunculus of three flowers. Thefe are fucceeded by leguminous, coriaceous pods, four or five inches long, crooked like an *Italic*; denfely covered with fharp hairs, which penetrate the fkin, and caufe great itching. This will grow in any foil, in thofe countries where it is a native: but is generally eradicated from all cultivated grounds; becaufe the hairs from the pods fly with the winds, and torment every animal they happen to touch. If it was not for this mifchievous quality, the beauty of its flowers would entitle it to a place in the beft gardens. It flowers in the cool months, from September to March, according to the fituation.

This plant has lately acquired a confiderable reputation as an anthelmintic. As fuch it is mentioned by Dr Macbride, in his “ Introduction to the theory and practice of Phyfic,” and by fome other authors. From the teftimonies of Mr Cochrane furgeon at Nevis, and Mr Bancroft author of a “ Natural hiftory of Guiana,” we are affured that it is ufed in thefe countries with the greateft fafety and efficacy. Mr Bancroft, after mentioning the frequency of diforders arifing from worms in that part of the world, and affigning fome reafons for them, proceeds as follows. “ But from whatever caufe thefe worms are produced, their number is fo great, that the ufual remedies are very infufficient for their deftruction; for which reafon the planters in general have recourfe to the cow-itch for that purpofe. From whence its ufe was firft fuggelted, I am uncertain; but its efficacy is indifputable. The part ufed is the fetaceous hairy fubftance growing on the outside of the pod, which is fcraped off, and mixed with common fyrup or molaffes, to the confiftence of a thin elecfuary; of which a tea-foonful to a child of two or three years old, and double the quantity to an adult, is given in the morning fafting, and repeated the two fucceeding mornings; after which a dofe of rhubarb is ufually fubjoined. This is the empirical practice of the planters, who ufually once in three or four months exhibit the cow-itch in this manner to their flaves in general, but efpecially to all their children without diftinction; and in this manner I have feen it given to hundreds, from one year old and upwards, with the moft happy fuccels. The patients, after

the fecond dofe, ufually difcharged an incredible number of worms, even to the amount of more than 20 at a time; fo that the ftools confifted of little elfe than thefe animals. But though thefe were indifputable proofs of its efficacy, I was far from being convinced of its fafety. I obferved that the fubftance given confifted of an afsemblage of fpiculae exquisitely fine, and fo acutely pointed, that, when applied to the fkin, they excited an intolerable itching, and even inflammation; from whence I apprehended dangerous confequences from their contact with the coats of the ftomach and inteftines. Indeed, when mixed with an elecfuary in the manner in which they are given, their elafticity is impaired, that they do not produce the fame fenfible irritation: but yet I could conceive no other quality on which their efficacy depended; efpecially after I had prepared both a tincture and decoction from the cow-itch, and given them to worm-patients without any fenfible advantage. Influenced by thefe fuggeltions, I particularly examined the ftate and condition of all fuch patients as I knew had taken the cow-itch; and yet can with the greateft truth declare, that, though prejudiced to its difadvantage, I was never able, either by my own obfervation or a diligent inquiry, to difcover a fingle inflance of any ill confequence refulting from its ufe; which has been fo extenfive, that feveral thoufands muft have taken it: and as no ill effects have been obferved, I think not only its efficacy, but fafety, are fufficiently evinced, to entitle it to general ufe; efpecially when we reflect on the uncertainty, and even danger, which attends other vermifuges. It is to be obferved, that this remedy is particularly defigned againft the long round worm. Whether it is equally deleterious to the afcarides, or whether it has ever been ufed againft them, is uncertain.

DOLLAR, a filver coin current in feveral parts of Germany and Holland. There are various fpecies of dollars; as the rix-dollar, the femi-dollar, the quarter-dollar, &c. See *MONEY-Table*.

DOLPHIN, in ichthyology. See *DELPHINUS*.

DOLPHIN of the *Maft*, a peculiar kind of wreath, formed of plaited cordage, to be faftened occasionally round the masts, as a fupport to the puddening, whofe ufe is to fustain the weight of the fore and main yards, in cafe the rigging, or chains, by which thofe yards are fufpended, fhould be fhut away in the time of battle; a circumftance which might render their faila ufelefs at a feafon when their affiftance is extremely neceffary. See the article *PUDDENING*.

DOM, or DON, a title of honour, invented and chiefly ufed by the Spaniards, fignifying *fir*, or *lord*.

This title, it feems, was firft given to Pelayo, in the beginning of the VIIth century. In Portugal no perfon can affume the title of *don*, without the permiffion of the king, fince it is looked upon as a mark of honour and nobility. In France it is fometimes ufed among the religious. It is an abridgment of *dominus*, from *dominus*.

DOM and *Son*, in old charters, fignifies full property and juriidiction.

DOMAIN, the inheritance, eftate, or poffeffion of any one. See *DEMESNE*.

DOMAT (John), a celebrated French lawyer born in 1625, who obferving the confufed ftate of the laws, digefted them in 4 vols 4to, under the title of “ The civil

Dome civil laws in their natural order: for which undertaking, Lewis XIV. settled on him a pension of 2000 **Domesday.** livres. Domat was intimate with the famous Pascal, who left him his private papers at his death: he himself died in 1696.

DOME, in architecture, a spherical roof, or a roof of a spherical form, raised over the middle of a building, as a church, hall, pavilion, vestibule, stair-case, &c. by way of crowning.

DOME, in chemistry, the upper part of furnaces, particularly portable ones. It has the figure of a hollow hemisphere or small dome. Its use is to form a space in the upper part of the furnace, the air of which is continually expelled by the fire: hence the current of air is considerably increased, which is obliged to enter by the ash-hole, and to pass through the fire, to supply the place of the air driven from the dome. The form of this piece renders it proper to reflect or reverberate a part of the flame upon the matters which are in the furnace, which has occasioned this kind of furnace to be called a *reverberating* one. See **FURNACE**.

DOME, or *Doon*, signifies judgment, sentence, or decree. The homagers oath in the black book of Hereford ends thus: "So help me God at his holy *dome*, and by my trowthe."

DOMENICHINO, a famous Italian painter, born of a good family at Bologna in 1581. He was at first a disciple of Calvart the Fleming; but soon quitted his school for that of the Caracci. He always applied himself to his work with much study and thoughtfulness; and never offered to touch his pencil but when he found a proper kind of enthusiasm upon him. His great skill in architecture also procured him the appointment of chief architect of the apostolical palace from Pope Gregory XV.; nor was he without a theoretical knowledge in music. He died in 1641.

DOMESDAY, or **DOOMSDAY**, **BOOK**, a most ancient record, made in the time of William I. surnamed the *Conqueror*, and containing a survey of all the lands of England. It consists of two volumes, a greater and a less. The first is a large folio, written on 382 double pages of vellum, in a small but plain character; each page having a double column. Some of the capital letters and principal passages are touched with red ink; and some have strokes of red ink run cross them, as if scratched out. This volume contains the description of 31 counties. The other volume is in quarto, written upon 450 double pages of vellum, but in a single column, and in a large but very fair character. It contains the counties of Essex, Norfolk, Suffolk, part of the county of Rutland included in that of Northampton, and part of Lancashire in the counties of York and Chester.

This work, according to the red book in the exchequer, was begun by order of William the Conqueror, with the advice of his parliament, in the year of our Lord 1080, and completed in the year 1086. The reason given for taking this survey, as assigned by several ancient records and historians, was, that every man should be satisfied with his own right, and not usurp with impunity what belonged to another. But, besides this, it is said by others, that now all those who possessed landed estates became vassals to the king, and paid him so much money by way of fee or homage in proportion to the lands they held. This ap-

pears very probable, as there was at that time extant a general survey of the whole kingdom, made by order of king Alfred.

For the execution of the survey recorded in *domesday* book, commissioners were sent into every county and shire; and juries summoned in each hundred, out of all orders of freemen, from barons down to the lowest farmers. These commissioners were to be informed by the inhabitants, upon oath, of the name of each manor, and that of its owner; also by whom it was held in the time of Edward the Confessor; the number of hides, the quantity of wood, of pasture, and of meadow-land; how many ploughs were in the demesne, and how many in the tenanted part of it; how many mills, how many fish-ponds or fisheries belonged to it; with the value of the whole together in the time of king Edward, as well as when granted by king William, and at the time of this survey; also whether it was capable of improvement, or of being advanced in its value: they were likewise directed to return the tenants of every degree, the quantity of lands then and formerly held by each of them, what was the number of villains or slaves, and also the number and kinds of their cattle and live stock. These inquiries being first methodized in the county, were afterwards sent up to the king's exchequer.

This survey, at the time it was made, gave great offence to the people; and occasioned a jealousy that it was intended for some new imposition. But notwithstanding all the precaution taken by the conqueror to have this survey faithfully and impartially executed, it appears from indubitable authority, that a false return was given in by some of the commissioners; and that, as it is said, out of a pious motive. This was particularly the case with the abbey of Croiland in Lincolnshire, the possessions of which were greatly underrated both with regard to quantity and value. Perhaps more of these pious frauds were discovered, as it is said Ralph Flambard, minister to William Rufus, proposed the making a fresh and more rigorous inquiry; but this was never executed.

Notwithstanding this proof of its falseness in some instances, which must throw a suspicion on all others, the authority of *domesday*-book was never permitted to be called in question; and always, when it hath been necessary to distinguish whether lands were held in ancient demesne, or in any other manner, recourse was had to *domesday*-book, and to that only, to determine the doubt. From this definitive authority, from which, as from the sentence pronounced at *domesday*, or the day of judgment, there could be no appeal, the name of the book is said to have been derived. But Stowe assigns another reason for this appellation; namely, that *domesday*-book is a corruption of *domus Dei* book; a title given it because heretofore deposited in the king's treasury, in a place of the church of Westminster or Winchester, called *domus Dei*. From the great care formerly taken for the preservation of this survey, we may learn the estimation in which its importance was held. The dialogue of Scaccarius says, "*Liber ille (domesday) sigilli regis comes est individuum in thesauro.*" Until lately it has been kept under three different locks and keys; one in the custody of the treasurer, and the others in that of the two chamberlains of the exchequer. It is now deposited in the chapter-house at Westminster.

Domestic
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Dominant.Domina-
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minster, where it may be consulted on paying to the proper officers a fee of 6 s. 8 d. for a search, and fourpence per line for a transcript.

Besides the two volumes abovementioned, there is also a third made by order of the same king; and which differs from the others in form more than matter. There is also a fourth called *domefday*, which is kept in the exchequer; which, though a very large volume, is only an abridgement of the others. In the remembrancer's office in the exchequer, is kept a fifth book, likewise called *domefday*, which is the same with the fourth book already mentioned. King Alfred had a roll which he called *domefday*; and the *domefday*-book made by William the Conqueror referred to the time of Edward the Confessor, as that of king Alfred did to the time of Ethelred. The fourth book of *domefday* having many pictures and gilt letters in the beginning relating to the time of king Edward the Confessor, this had led some into a false opinion that *domefday*-book was composed in the reign of king Edward.

DOMESTIC, any man who acts under another, serving to compose his family; in which he lives, or is supposed to live, as a chaplain, secretary, &c. Sometimes domestic is applied to the wife and children; but very seldom to servants, such as footmen, lacques, porters, &c.

DOMICILE, in Scots law, is the dwelling-place where a person lives with an intention to remain.

DOMIFYING, in astrology, the dividing or distributing the heavens into 12 houses, in order to erect a theme, or horoscope, by means of six great circles, called *circles of position*.

There are various ways of domifying: that of Regiomontanus, which is the most common, makes the circles of position pass thro' the intersections of the meridian and the horizon: others make them pass through the poles of the zodiac.

DOMINANT, (from the Latin word *dominari*, to rule or govern), among musicians, is used either as an adjective or a substantive; but these different acceptations are far from being indiscriminate. In both senses it is explained by Rousseau as follows.

The *dominant* or sensible chord is that which is practised upon the dominant of the tone, and which introduces a perfect cadence. Every perfect major chord becomes a *dominant* chord, as soon as the seventh minor is added to it.

Dominant, (subst.) Of the three notes essential to the tone, it is that which is a fifth from the tonic. The tonic and the *dominant* fix the tone: in it they are each of them the fundamental found of a particular chord; whereas the mediant, which constitutes the mode, has no chord peculiar to itself, and only makes a part of the chord of the tonic.

M. Rameau gives the name of *dominant* in general to every note which carries a chord of the seventh; and distinguishes that which carries the sensible chord, by the name of a *tonic dominant*: but, on account of the length of the word, this addition to the name has not been adopted by artists: they continue simply to call that note a *dominant*, which is a fifth from the tonic; and they do not call the other notes which carry a chord of the seventh *dominants*, but *fundamentals*; which is sufficient to render their meaning plain, and prevents confusion.

A *dominant*, in that species of church-music which is called *plain-chant*, is that note which is most frequently repeated or beaten, in whatever degree it may be from the tonic. In this species of music there are *dominants* and *tonicks*, but no mediant.

DOMINATION, or **DOMINION**, in theology, the fourth order of angels, or blessed spirits, in the hierarchy, reckoning from the seraphim. See **ANGEL**.

DOMINGO, or **St DOMINGO**, the capital of the island of Hispaniola in the West Indies, is seated in that part belonging to the Spaniards on the south side of the island, and has a commodious harbour. The town is built in the Spanish manner, with a great square in the middle of it; about which are the cathedral, and other public buildings. From this square run the principal streets, in a direct line, they being crossed by others at right angles, so that the form of the town is almost square. The country on the north and east side is pleasant and fruitful; and there is a large navigable river on the west, with the ocean on the south. It is the fee of an archbishop, an ancient royal audience, and the seat of the governor. It has several fine churches and monasteries; and is so well fortified, that a fleet and army sent by Oliver Cromwel, in 1654, could not take it. The inhabitants are Spaniards, Negroes, Mulattoes, Mellices, and Albatares; of whom about a sixth part may be Spaniards. It had formerly about 2000 houses, but it is much declined of late years. The river on which it is seated is called *Ozama*. W. Long. 69. 30. N. Lat. 18. 25.

DOMINIC (de Gusman), founder of the Dominican order of monks, was born at Calahorra in Aragon, 1170. He preached with great fury against the Albigenses, when Pope Innocent III. made a croisade against that unhappy people; and was inquisitor in Languedoc, where he founded his order, and got it confirmed by the Lateran council in 1215. He died at Bologna in 1221, and was afterwards canonized. The dominican order has produced many illustrious men. See **DOMINICANS**.

DOMINICA, one of the Caribbee islands in the West Indies, about 39 miles long and 13 broad, situated between 61° and 62° W. Long. and between 15° and 16° of N. Lat. This island formerly belonged to the French, but was ceded to Britain by the treaty in 1763. It is very advantageous to the latter, as being situated between the French islands of Guadaloupe and Martinico, so that it is equally alarming to both; and its safe and commodious roads enable the British privateers to intercept, without risque, the navigation of France in her colonies, whenever a war happens between the two nations.

La DOMINICA, one of the **MARQUESAS** Islands in the South Sea.

DOMINICAL LETTER, popularly called *Sunday-Letter*, one of the seven letters A B C D E F G, used in almanacks, ephemerides, &c. to denote the Sundays throughout the year. See **ASTRONOMY**, n° 310. The word is formed from *dominica* or *dominicus dies*, Lord's-day, Sunday.

The dominical letters were introduced into the calendar by the primitive Christians, in lieu of the **NUNDINAL** letters in the Roman calendar.

DOMINICANS, an order of religious, called in France *Jacobins*, and in England *Black-friars* or *Preaching*

Dominion *Preaching-fratres*. This order, founded by St Dominic, was approved of by Innocent III. in 1215, and confirmed by a bull of Honorius III. in 1216. The design of their institution was to preach the gospel, convert heretics, defend the faith, and propagate Christianity. They embraced the rule of St Augustine, to which they added statutes and constitutions which had formerly been observed either by the Carthusians or Premontrean monks. The principal articles enjoined perpetual silence, abstinence from flesh at all times, wearing of woollen, rigorous poverty, and several other austerities. This order has spread into all the parts of the world. It produced a great number of martyrs, confessors, bishops; and they reckon three popes, 60 cardinals, 150 archbishops, and 800 bishops, of their order; besides the masters of the sacred palace, who have always been Dominicans. They are inquisitors in many places.

DOMINION, **DOMINIUM**, in the civil law, signifies the power to use or dispose of a thing as we please.

DOMINION, or *Domination*. See **DOMINATION**.

DOMINIS (Mark Anthony de), archbishop of Spalatro in Dalmatia at the close of the 15th and beginning of 16th centuries, was a man whose fickleness in religion proved his ruin. His preference, instead of attaching him to the church of Rome, rendered him disaffected to it. Becoming acquainted with our bishop Bedell, while chaplain to Sir Henry Wotton ambassador from James I. at Venice, he communicated his books *de republica ecclesiastica* to him; which were afterwards published at London, with Bedell's corrections. He came to England with Bedell; where he was received with great respect, and preached and wrote against the Romish religion. He is said to have had a principal hand in publishing father Paul's *History of the council of Trent*, at London, which was inscribed to James in 1619. But on the promotion of Pope Gregory XIV. who had been his school-fellow and old acquaintance, he was deluded by Gondomar the Spanish ambassador into the hopes of procuring a cardinal's hat, by which he fancied he should prove an instrument of great reformation in the church. Accordingly he returned to Rome in 1622, recanted his errors, and was at first well received: but he afterwards wrote letters to England, repenting his recantation; which being intercepted, he was imprisoned by Pope Urban VIII. and died in 1625. He was also the author of the first philosophical explanation of the rainbow, which before his time was accounted a prodigy.

DOMINIUM EMINENS, in Scots law, that power which the state or sovereign has over private property, by which the proprietor may be compelled to sell it for an adequate price where public utility requires *.

DOMINIUM DIRECTUM, in Scots law, the right which a superior retains in his lands, notwithstanding the feudal grant to his vassal. See **LAW**, N° clxvi. 1.

DOMINIUM UTILE, in Scots law, the right which the vassal acquires in the lands by the feudal grant from his superior. See **LAW**, N° clxvi. 1.

DOMITIAN, the Roman emperor, son to Vespasian, was the last of the 12 Cæsars. See (*History of*) **ROME**.

DONATION, an act whereby a person transfers to another either the property or the use of something as a free gift. In order to be valid, it supposes a capa-

city both in the donor and the donee; and requires consent, acceptance, and delivery, and by the French also registry.

DONATISTS, Christian schismatics in Africa, who took their name from their leader Donatus. A secret hatred against Cæcilian, elected bishop of Carthage about the year 311, excited Donatus to form this sect. He accused Cæcilian of having delivered up the sacred books to the Pagans; and pretended that his election was void, and all his adherents heretics. He taught that baptism administered by heretics was null, that every church but the African was become prostituted, and that he was to be the restorer of religion. Some accuse the Donatists of Arianism. Constantius and Honorius made laws for their banishment, and Theodosius condemned them to heavy mulcts.

DONATIVE, a gratuity, or present made to any person.

Donative among the Romans was properly a gift made to the soldiers, as *congiarium* was that made to the people.

DONATORY, in Scots law, that person to whom the king bestows his right to any forfeiture that has fallen to the crown.

DONATUS, a schismatic bishop of Carthage, founder of the sect of **DONATISTS**. His followers swore by him, and honoured him like a god. He died about 368.

DONATUS (*Ælius*), a famous grammarian, lived at Rome in 354. He was one of St Jerome's masters; and composed commentaries on Terence and Virgil, which are esteemed.

DONAWERT, a strong town of Germany, in the circle of Bavaria on the frontiers of Suabia. It has been taken and retaken several times in the wars of Germany; and was formerly an imperial city, but at present is subject to the duke of Bavaria. E. Long. 10. 32. N. Lat. 48. 32.

DONAX, a genus of insects belonging to the order of vermes testacea. It is an animal of the oyster kind; and the shell has two valves, with a very obtuse margin in the fore-part. There are 10 species, principally distinguished by the figure of their shells *.

DONCASTER, a market-town of Yorkshire, 30 miles south of York. E. Long. 1. 0. N. Lat. 53. 30. * Plate LXXXVII. fig. 6.

DONNE (Dr John), an excellent poet and divine of the 17th century. His parents were of the Romish religion, and used their utmost efforts to keep him firm to it; but his early examination of the controversy between the church of Rome and the Protestants, at last determined him to chuse the latter. He travelled into Italy and Spain; where he made many useful observations, and learned their languages to perfection. Soon after his return to England, Sir Thomas Egerton, keeper of the great seal, appointed him his secretary; in which post he continued five years. He marrying privately Anne the daughter of Sir George Moore then chancellor of the garter, and niece to the lord keeper's lady, was dismissed from his place, and thrown into prison. But he was reconciled to Sir George by the good offices of Sir Francis Wolley. In 1612, he accompanied Sir Robert Drury to Paris. During this time, many of the nobility solicited the king for some secular employment for him. But his majesty, who took pleasure in his conversation, had engaged him in writing

Donatists
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Donne.

* See **LAW**,
N° clxii. 1.

Donne
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Doria

Doric
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Doring.

writing his *Pseudo Martyr*, printed at London in 1610; and was so highly pleased with that work, that in 1614 he prevailed with him to enter into holy orders; appointed him one of his chaplains, and procured him the degree of Doctor of Divinity from the university of Oxford. In 1619, he attended the earl of Doncaster in his embassy into Germany. In 1621, he was made dean of St Paul's: and the vicarage of St Dunstan in the west, in London, soon after fell to him; the avowal of it having been given to him long before by Richard earl of Dorset. By these and other preferments, he was enabled to be charitable to the poor, kind to his friends, and to make good provision for his children. He wrote, besides the above, 1. Devotions upon emergent occasions. 2. The ancient history of the Septuagint, translated from the Greek of Aristeus, quarto. 3. Three volumes of sermons, folio. 4. A considerable number of poems; and other works. He died in 1631; and was interred in St Paul's cathedral, where a monument was erected to his memory. His writings shew him to be a man of incomparable wit and learning; but his greatest excellence was satire. He had a prodigious richness of fancy, but his thoughts were much debased by his versification. He was, however, highly celebrated by all the great men of that age.

DONOR, in law, the person who gives lands or tenements to another in tail, &c.; as he to whom such lands, &c. are given, is the *donee*.

DOOMSDAY BOOK. See DOMESDAY BOOK.

DOOR, in architecture. See ARCHITECTURE, n° 81.

DORCHESTER, the capital of Dorsetshire, situated on the river Frome, six miles north of Weymouth: W. Long. 2. 35. N. Lat. 50. 40. It gives the title of marquis to the noble family of Pierpoint, dukes of Kingston; and sends two members to parliament.

DOR, the English name of the common black beetle. Some apply it also to the dusky beetle, that flies about hedges in the evening. See SCARABÆUS.

DOREE, or JOHN DOREE, in ichthyology. See ZEUS.

DORIA (Andrew), a gallant Genoese sea-officer, born in 1466. He entered into the service of Francis I. of France; but preserved that spirit of independence so natural to a sailor and a republican. When the French attempted to render Savona, long the object of jealousy to Genoa, its rival in trade, Doria remonstrated against the measure in a high tone; which bold action, represented by the malice of his courtiers in the most odious light, irritated Francis to that degree, that he ordered his admiral Barbezieux to fail to Genoa then in the hands of the French troops, to arrest Doria, and to seize his galleys. This rash order Doria got timely hints of; retired with all his galleys to a place of safety; and, while his resentment was thus raised, he closed with the offers of the emperor Charles V. returned his commission with the collar of St Michael to Francis, and hoisted the Imperial colours. To deliver his country, weary alike of the French and Imperial yoke, from the dominion of foreigners, was now Doria's highest ambition; and the favourable moment offered. Genoa was afflicted with the pestilence, the French garrison was greatly reduced and ill-paid, and the inhabitants were sufficiently disposed to second his views. He sailed to the harbour with 13 galleys, landed 500 men, and made himself master of the gates

and the palace with very little resistance. The French governor with his feeble garrison retired to the citadel, but was quickly forced to capitulate; when the people ran together, and levelled the citadel with the ground. It was now in Doria's power to have rendered himself the sovereign of his country; but, with a magnanimity of which there are few examples, he assembled the people in the court before the palace, disclaimed all pre-eminence, and recommended to them to settle that form of government they chose to establish. The people, animated by his spirit, forgot their factions, and fixed that form of government which has subsisted ever since with little variation. This event happened in 1528. Doria lived to a great age, respected and beloved as a private citizen; and is still celebrated in Genoa by the most honourable of all appellations, "The father of his country, and the restorer of its liberty."

DORIC, in general, any thing belonging to the Dorians, an ancient people of Greece, inhabiting near mount Parnassus.

DORIC Order. See ARCHITECTURE, n° 48.

DORIC *Dialect*, one of the five dialects or manners of speaking which were principally in use among the ancient Greeks.—It was first used by the Lacedaemonians, particularly those of Argos; afterwards it passed into Epirus, Libya, Sicily, and the islands of Rhodes, Crete, &c.

DORIC *Mode*, in music, the first of the authentic modes of the ancients. Its character is to be severe, tempered with gravity and joy; and is proper upon religious occasions, as also to be used in war. It begins *D, la, sol, re*. Plato admires the music of the Doric mode, and judges it proper to preserve good manners as being masculine; and on this account allows it in his commonwealth. The ancients had likewise their subdoric or hypodoric mode, which was one of the plagal modes. Its character was to be very grave and solemn; it began with *re*, a fourth lower than the doric.

DORING, or DARING, among sportsmen, a term used to express a method of taking larks, by means of a clap-net and a looking-glass. For this sport there must be provided four sticks very straight and light, about the bigness of a pike; two of these are to be four feet nine inches long, and all notched at the edges or the ends. At one end of each of these sticks there is to be fastened another of about a foot long on one side; and on the other side a small wooden peg about three inches long. Then four or more sticks are to be prepared, each of one foot length; and each of these must have a cord of nine feet long fastened to it at the end. Every one should have a buckle for the commodious fastening on to the respective sticks when the net is to be spread.—A cord must also be provided, which must have two branches. The one must have nine feet and a half, and the other ten feet long, with a buckle at the end of each; the rest, or body of the cord, must be 24 yards long. All these cords, as well the long ones as those about the sticks, must be well twisted and of the bigness of one's little finger. The next thing to be provided is a staff of four feet long, pointed at one end, and with a ball of wood at the other, for the carrying these conveniences in a sack or wallet.—There should also be carried, on this occasion, a spade to

DORIS Dorsal
Doronicum Dorsifolia.
 to level the ground where there may be any little irregularities; and two small rods, each 18 inches long, and having a small rod fixed with a pack-thread at the larger end of the other. To these are to be tied some pack-thread loops, which are to fasten in the legs of some larks; and there are to be reels to these, that the birds may fly a little way up and down. When all this is done, the looking-glass is to be prepared in the following manner. Take a piece of wood about an inch and an half thick, and cut it in form of a bow, so that there may be about nine inches space between the two ends; and let it have its full thickness at the bottom, that it may receive into it a false piece; in the five corners of which there are to be let in five pieces of looking-glasses. These are to be fixed, that they may dart their light upwards; and the whole machine is to be supported on a moveable pin, with the end of a long line fixed to it, and made in the manner of the children's play-thing of an apple and a plum-stone; so that the other end of the cord being carried through a hedge, the barely pulling it may set the whole machine of the glasses a-turning. This and the other contrivances are to be placed in the middle between the two nets. The larks fixed to the place, and termed *calls*, and the glittering of the looking-glasses as they whirl round in the sun, invite the other larks down; and the cord that communicates with the nets, and goes through the hedge, gives the person behind an opportunity of pulling up the nets, so as to meet over the whole, and take every thing that is between them. The places where this sort of sporting succeeds best are open fields remote from any trees and hedges, except one by way of shelter for the sportsman: and the wind should always be either in the front or back; for if it blows sideways, it prevents the playing of the net.

DORIS, a genus of insects, belonging to the order of vermes testacea. The body is oblong, flat beneath; creeping: mouth placed below; vent behind, surrounded with a fringe: two feelers, retractile. There are several species.—The argo, or lemon doris, has an oval body, convex, marked with numerous punctures, of a lemon colour, the vent beset with elegant ramifications. It inhabits different parts of our seas, called about Brightelmstone the *sea-lemon*. See Plate XCII.

DORMANT, in heraldry, is used for the posture of a lion, or any other beast, lying along in a sleeping attitude with the head on the fore-paws; by which it is distinguished from the *couchant*, where tho' the beast is lying, yet he holds up his head.

DORMER, in architecture, signifies a window made in the roof of an house, or above the entablature, being raised upon the rafters.

DORMITORY, a gallery in convents or religious houses, divided into several cells, in which the religious sleep or lodge.

DORONICUM, *LEOPARD'S BANE*; a genus of the polygamia superflua order, belonging to the syngenesia class of plants. There are three species, of which the only one worthy of notice is the pardalianches with obtuse heart-shaped leaves. It grows naturally in Hungary, and on the Helvetian mountains; but is frequently preferred in the English gardens. It hath thick fleshy roots, which divide into many knobs or knees, sending out strong fleshy fibres, which penetrate deep into the ground; from these arise, in the spring,

a cluster of heart-shaped leaves, which are hairy, and stand upon footstalks: between these arise the flower-stalks, which are channeled and hairy, near three feet high, putting out one or two smaller stalks from the side. Each stalk is terminated by one large yellow flower.—The plant multiplies very fast by its spreading roots; and the seeds, if permitted to scatter, will produce plants wherever they happen to fall; so that it very soon becomes a weed in the places where it is once established. It loves a moist soil, and shady situation. The roots were formerly used in medicines alexipharmics and purifiers of the blood; but their operation was so violent, that they are now entirely laid aside.

DORSAL, an appellation given to whatever belongs to the back. See **DORSUM**.

DORSET, (Thomas Sackville), Lord Buckhurst. See **SACKVILLE**.

DORSET (Charles Sackville), earl of. See **SACKVILLE**.

DORSETSHIRE, a county of England, bounded on the south by the English channel, on the north by Somersetshire and Wiltshire, on the east by Hampshire, and on the west by Devonshire and some part of Somersetshire. It is between 40 and 50 miles long from east to west, and 34 broad from south to north, and contains 34 hundreds, 22 market-towns, and 248 parishes. This county enjoys a mild, pleasant, and wholesome air, and a deep, rich, and fertile soil, finely diversified. Towards the north it is level, under the high lands that divide it from Somersetshire, where there are fine arable grounds that will yield large crops of different kinds of grain. But on the south, from the borders of Hampshire by the sea-coast, for an extent of almost 20 miles in length, and in some places four or five in breadth, is a heathy common, which renders this country less populous than it otherwise would be. From east to west run a ridge of hills called the *Dorset Downs*, abounding with sweet and short herbage, which nourishes a vast number of sheep equally esteemed for their flesh and fleece. The country is also very plentifully watered; and in all respects so well suited both for pleasure and profit, that it was distinguished by the Romans above all others. They had more stations and summer-camps in Dorsetshire, than in any other county. That the Saxons had the same regard for it, is evident from the number of palaces they had in it, the stately minsters they built, and the express directions they gave that their bodies should be interred in those monuments of their piety. This county yields many, and very valuable, commodities. The quarries in Purbeck and Portland supply stones of different qualities, suited to various uses, and in prodigious quantities, together with some very rich and beautiful marble. The best tobacco-pipe clay in England is also found in this county. Madder, hemp, and flax, also thrive in many places, grain of all sorts, &c.

DORSIFEROUS PLANTS, among botanists, such as are of the capillary kind, without stalks, and which bear their seeds on the back-side of their leaves.

DORSTENIA, *CONTRAYERVA*; a genus of the monogynia order, belonging to the tetrandria class of plants. There are four species, all of them low herbaceous plants, growing in the warm countries of America. The root is used in medicine. It is full of knots; an inch or two in length, about half an inch

Dorsum
||
Dose.

thick; externally of a reddish brown colour, and pale within: long, tough, slender fibres shoot out from all sides of it, which are generally loaded with small round knots. The root has a peculiar kind of aromatic smell, and a somewhat astringent, warm, bitterish taste, with a light and sweetish kind of acrimony when chewed. The fibres have little taste or smell; the tuberous part therefore should only be chosen.—*Contrayerva* is one of the mildest of those substances called *alexipharmics*: it is indisputably a good and useful diaphoretic. Its virtues are extracted both by water and rectified spirit, and do not arise by evaporation with either.—The plants cannot be propagated in this country without the greatest difficulty.

DORSUM, the **BACK**, in anatomy, comprehends all the posterior part of the trunk of the body from the neck to the buttocks. See **ANATOMY**, n° 28, &c.

DORT, or **DORDRECHT**, a city of Holland, which holds the first rank in the assembly of the States. It is seated in a small island formed by the rivers Meuse, Merue, Rhine, and Linghe. The Meuse, on which it stands, gives it a good harbour, and separates it from the islands of IJselmonde and Abblas. It is divided from Beyerland by a canal. The harbour is very commodious for the merchandizes which come down the Rhine and the Meuse, which keep it in a flourishing condition. Its strength consists in being surrounded with water. Its walls are old, and defended by round towers. It is very rich, and well built with brick, and had formerly the exclusive right of coining money. It is at present the staple town for wines, particularly Rhenish. It was detached from the main-land, in 1421, on the 17th of November, by a flood occasioned by the breaking down of the dyke, which overwhelmed 70 villages, and about 100,000 persons. However, by time and the industry of the inhabitants, a great part of the land is recovered. It has two principal canals, namely, the New and Old Haven, by which heavy-loaded vessels may enter into the city. Over the Old Haven is a large bridge well built with brick.

Dort was almost reduced to ashes in the year 1457; there being then consumed 2000 houses, with the halls, hospital, and church of Notre Dame: but they are now well provided with fire-engines and watchmen to prevent the like disaster. This city is famous for the meeting of the clergy called the Synod of Dort, in which the Calvinists obtained a sentence against the Arminians, who were called the *Remonstrants*. The dispute between the contending parties occasioned strange disorders, skirmishes, and murders, in most of the principal cities. Those ministers who would not subscribe to the decree of the synod were banished, of whom there were above 100. E. Long. 4. 36. N. Lat. 51. 39.

DORTMUND, a rich, populous, and imperial city of Germany, in the circle of Westphalia. It is pretty large, but not well built. Formerly it was one of the Hanse towns. Its territory also was formerly a county, and had lords of its own; but since 1504, it hath been possessed entirely by the city.

DORYPHORI, in antiquity, an appellation given to the lifeguardmen of the Roman emperors.

DOSE, in pharmacy, &c. the quantity of a medicine to be taken at one time. The word is formed from the Greek *dosis*, which signifies *gift*, or a thing

given; from *do*, *dos*, “I give.”

DOSITHEANS, in church-history, a sect among the Hebrews, being one of the branches of the Samaritans. See **SAMARITANS**.

They abstained from eating any creature that had life; and were so superstitious in keeping the sabbath, that they remained in the same place and posture wherein that day surprised them, without stirring till the next day. They married but once, and a great number never married. Dositheus, their founder, being disaffected among the Jews, retired to the Samaritans, who were reputed heretics, and invented another sect; and to make it more authentic, he went into a cave, where, by too long abstinence, he killed himself.—The name of *Dositheans* was also given to some of the disciples of Simon Magus.

DOTTRELE, in ornithology. See **CHARADRIUS**. **DOU**, or **DOW**, (Gerard), of Leyden, an excellent painter in the 17th century, was the disciple of Rembrandt; but his manner of working was very different from that of his master. He painted little figures in oil, which he finished as highly as if they had been as big as the life. He always drew after nature, and viewed his originals in a convex mirror; and, as he took a great deal of pains, his works seem almost as perfect as nature herself, without losing any thing of the freshness, union, or force of colouring, or of the *claro oscuro*. The common height of his pictures did not exceed a foot; yet his price was sometimes six hundred, sometimes eight hundred, and sometimes a thousand livres each picture, according to the time he spent about it, though he only reckoned after the rate of a live an hour.

DOUAY, a large and strong city of the French Netherlands, situated in E. Long. 3. 0. N. Lat. 50. 25. It was taken by the French in 1667; by the allies in 1710; and retaken by the French in 1712.

DOUBLE; two of a sort, one corresponding to the other.

DOUBLE Children, **DOUBLE Cats**, **DOUBLE Pearls**, &c. Instances of these are frequent in the *Philosoph. Transact.* and elsewhere. See **MONSTER**.

Sir John Floyer, in the same *Transactions*, giving an account of a *double turkey*, furnishes some reflections on the production of *double animals* in general. Two turkeys, he relates, were taken out of an egg of the common size, when the rest were well hatched, which grew together by the flesh of the breast-bone, but in all other parts were distinct. They seemed less than the ordinary size, as wanting bulk, nutriment, and room for their growth; which latter, too, was apparently the occasion of their cohesion. For, having two distinct cavities in their bodies, and two hearts, they must have arisen from two cicatriculas; and, consequently, the egg had two yolks; which is no uncommon accident. He mentions a dried *double chicken* in his possession, which, though it had four legs, four wings, &c. had but one cavity in the body, one heart, and one head; and, consequently, was produced from one cicatrícula.

So, *Paræus* mentions a *double infant*, with only one heart: in which case, the original or flamen of the infant was one, and the vessels regular; only, the nerves and arteries towards the extremities dividing into more branches than ordinary, produced *double parts*.

The

Dositheans
||
Doule.

Double.

The same is the case in the *double flowers* of plants, occasioned by the richness of the soil. So it is in the eggs of quadrupeds, &c.

There are, therefore, two reasons of duplicity in embryo's: 1. The conjoining or connexion of two perfect animals; and, 2. An extraordinary division and ramification of the original vessels, nerves, arteries, &c.

DOUBLE Employment, in music, a name given by M. Rameau to the two different manners in which the chord of the sub-dominant may be regarded and treated, viz. as the fundamental chord of the sixth super-added, or as the chord of the great sixth, inverted from a fundamental chord of the seventh. In reality, the chords carry exactly the same notes, are figured in the same manner, are employed upon the same chord of the tone, in such a manner, that frequently we cannot discern which of the two chords the author employs, but by the assistance of the subsequent chord, which resolves it, and which is different in these different cases.

To make this distinction, we must consider the diatonic progress of the two notes which form the fifth and the sixth, and which, constituting between them the interval of a second, must one or the other constitute the dissonance of the chord. Now, this progress is determined by the motion of the bass. Of these two notes, then, if the superior be the dissonance, it will rise by one gradation into the subsequent chord, the lower note will keep its place, and the higher note will be a super-added sixth. If the lower be the dissonance, it will descend into the subsequent chord, the higher will remain in its place, and the chord will be that of the great sixth. See the two cases of the *double employment* in Rousseau's Musical Dictionary, Plate D, fig. 12.

With respect to the composer, the use which he may make of the double-employment, is to consider the chord in its different points of view, that from thence he may know how to make his entrance to it, and his exit from it; so that having arrived, for instance, at the chord of the super-added sixth, he may resolve it as a chord of the great sixth, and reciprocally.

M. D'Alembert has shewn, that one of the chief uses of the double-employment is, that we be able to carry the diatonic succession of the gamut even to an octave, without changing the mode, at least whilst we rise; for in descending we must change it. Of this gamut and its fundamental bass, an example will be found in Rousseau's Musical Dictionary, Plate D, fig. 13. It is evident, according to the system of M. Rameau, that all the harmonic successions which result from it, are in the same tone: for, in strictness, no other chords are there employed but three, that of the tonic, that of the dominant, and that of the sub-dominant; as this last, in the double-employment, constitutes the seventh from the second note, which is employed upon the sixth.

With respect to what M. D'Alembert adds in his Elements of Music, p. 80. and which he repeats in the Encyclopédie, article *Double-emploi*, viz. that the chord of the seventh *re fa la ut*, though we should even regard it only as an inversion of *fa la ut re*, cannot be followed by the chord *ut mi sol ut*; "I cannot (says Rousseau) be of his opinion in this point.

"The proof which he gives for it is, that the dissonance *ut* of the first chord cannot be resolved in the second; and this is true, since it remains in its place: but in this chord of the seventh *re fa la ut*, inverted

Double.

from this chord of the super-added sixth *fa la ut re*, it is not the *ut*, but the *re*, which is the dissonance; which, of consequence, ought to be resolved in ascending upon *mi*, as it really does in the subsequent chord; so that this procedure in the bass itself is forced, which, from *re*, cannot without an error return to *ut*, but ought to ascend to *mi*, in order to resolve the dissonance.

"M. D'Alembert afterwards shews, that this chord *re fa la ut*, when preceded and followed by that of the tonic, cannot be authorized by the double-employment; and this is likewise very true; because this chord, tho' figured with a 7, is not treated as a chord of the seventh, neither when we make our entrance to it, nor our exit from it; or at least that it is not necessary to treat it as such, but simply as an inversion of the super-added sixth, of which the dissonance is the bass: in which case we ought by no means to forget, that this dissonance is never prepared. Thus, though in such a transition the double-employment is not in question, though the chord of the seventh be no more than apparent, and impossible to be resolved by the rules, this does not hinder the transition from being proper and regular, as I have just proved to theorists, and as I shall immediately prove to practical artists, by an instance of this transition; which certainly will not be condemned by any one of them, nor justified by any other fundamental bass except my own. (See the Musical Dictionary, Plate D, fig. 14.)

"I acknowledge, that this inversion of the chord of the sixth super-added, which transfers the dissonance to the bass, has been censured by M. Rameau. This author, taking for a fundamental chord the chord of the seventh, which results from it, rather chose to make the fundamental bass descend diatonically, and resolve one seventh by another, than to unfold this seventh by an inversion. I had dissipated this error, and many others, in some papers which long ago had passed into the hands of M. D'Alembert, when he was composing his Elements of Music; so that it is not his sentiment which I attack, but my own opinion which I defend."

For what remains, the double-employment cannot be used with too much reserve, and the greatest matters are the most temperate in putting it in practice.

DOUBLE Fichy, or *Fiché*, in heraldry, the denomination of a cross, when the extremity has two points; in contradistinction to *fiché*, where the extremity is sharpened away to one point.

DOUBLE Octave, in music, an interval composed of fifteen notes in diatonic progression; and which, for that reason, is called a *fifteenth*. "It is (says Rousseau) an interval composed of two octaves, called by the Greeks *disdiapason*.

It deserves however to be remarked, that in intervals less distant and compounded, as in the *third*, the *fifth*, the *simple octave*, &c. the lowest and highest extremes are included in the number from whence the interval takes its name. But, in the *double octave*, when termed a *fifteenth*, the simple number of which it is composed gives the name. This is by no means analogical, and may occasion some confusion. We should rather choose, therefore, to run any hazard which might occur from uniformly including all the terms of which the component intervals consist, and call the *double octave* a *fifteenth*, according to the general analogy. See **INTERVAL**.

Doublet.

DOUBLET, among lapidaries, implies a counterfeit stone composed of two pieces of crystal, and sometimes glass softened, together with proper colours between them; so that they make the same appearance to the eye, as if the whole substance of the crystal had been tinged with these colours.

The impracticability of imparting tinges to the body of crystals, while in their proper and natural state, and the softness of glass, which renders ornaments made of it greatly inferior in wear to crystal, gave inducements to the introduction of colouring the surface of crystal wrought in a proper form, in such a manner, that the surfaces of two pieces so coloured being laid together, the effect might appear the same as if the whole substance of the crystal had been coloured. The crystals, and sometimes white transparent glass so treated, were called *doublets*; and at one time prevailed greatly in use, on account of the advantages with respect to wear, such doublets had, when made of crystal, over glass, and the brightness of the colours which could with certainty be given to counterfeit stones this way, when coloured glass could not be procured, or at least not without a much greater expence. Doublets have not indeed the property which the others have, of bearing to be set transparent, as is frequently required in drops of ear-rings and other ornaments: but when mounted in rings, or used in such manner that the sides of the pieces, where the joint is made, cannot be inspected, they have, when formed of crystal, the title to a preference to the coloured glass; and the art of managing them is therefore, in some degree, of the same importance with that of preparing glass for the counterfeiting gems; and is therefore properly an appendage to it, as being entirely subservient to the same intention. The manner of making doublets is as follows:

Let the crystal or glass be first cut by the lapidaries in the manner of a brilliant, except that, in this case, the figure must be composed from two separate stones, or parts of stones, formed in the manner of the upper and under parts of a brilliant, if it was divided in an horizontal direction, a little lower than the middle. After the two plates of the intended stone are thus cut, and fitted so exactly that no division can appear when they are laid together, the upper part must be polished ready for setting; and then the colour must be put betwixt the two plates by this method. "Take of Venice or Cyprus turpentine two scruples; and add to it one scruple of the grains of mastich chosen perfectly pure, free from foulness, and previously powdered. Melt them together in a small silver or brass spoon ladle, or other vessel, and put to them gradually any of the coloured substances below mentioned, being first well powdered; stirring them together as the colour is put in, that they may be thoroughly commixed. Warm then the doublets to the same degree of heat as the melted mixture; and paint the upper surface of the lower part, and put the upper one instantly upon it, pressing them to each other, but taking care that they may be conjoined in the most perfectly even manner. When the cement or paint is quite cold and set, the redundant part of it, which has been pressed out of the joint of the two pieces, should be gently scraped off the side, till there be no appearance of any colour on the outside of the doublets; and they should then be

skillfully set; observing to carry the mounting over the joint, that the upper piece may be well secured from separating from the under one."

The colour of the ruby may be best imitated, by mixing a fourth part of carmine with some of the finest crimson lake that can be procured.

The sapphire may be counterfeited by very bright Prussian blue, mixed with a little of the abovementioned crimson lake, to give it a cast of the purple. The Prussian blue should not be very deep-coloured, or but little of it should be used: for otherwise, it will give a black shade that will be injurious to the lustre of the doublets.

The emerald may be well counterfeited by distilled verdigrease, with a little powdered aloes. But the mixture should not be strongly heated, nor kept long over the fire after the verdigrease is added: for the colour is to be soon impaired by it.

The resemblance of the garnet may be made by dragon's blood; which, if it cannot be procured of sufficient brightness, may be helped by a very small quantity of carmine.

The amethyst may be imitated by the mixture of some Prussian blue with the crimson lake; but the proportions can only be regulated by direction, as different parcels of the lake and Prussian blue vary extremely in the degree of strength of the colour.

The yellow topazes may be counterfeited by mixing the powdered aloes with a little dragon's blood, or by good Spanish anatto: but the colour must be very sparingly used, or the tinge will be too strong for the appearance of that stone.

The chrysolite, hyacinth, vinegar garnet, eagle marine, and other such weaker or more diluted colours, may be formed in the same manner, by lessening the proportions of the colours, or by compounding them together correspondently to the hue of the stone to be imitated; to which end it is proper to have an original stone, or an exact imitation of one, at hand when the mixture is made, in order to the more certain adapting the colours to the effect desired: and when these precautions are taken, and the operation well conducted, it is practicable to bring the doublets to so near a resemblance of the true stones, that even the best judges cannot distinguish them, when well set, without a peculiar manner of inspection.

There is, however, an easy method of distinguishing doublets, which is only to behold them betwixt the eye and light, in such position, that the light may pass through the upper part and corners of the stone; when it will easily be perceived that there is no colour in the body of the stone.

DOUBLETS, a game on dice within tables; the men, which are only 15, being placed thus: Upon the six, cinque, and quatre points, there stand three men a-piece; and upon the trey, duce, and ace, only two. He that throws highest hath the benefit of throwing first, and what he throws he lays down, and so doth the other: what the one throws, and hath not, the other lays down for him, but on his own account; and thus they do till all the men are down, and then they bear. He that is down first, bears first; and will doubtless win the game, if the other throws not doublets to overtake him: which he is sure to do, since he advances or bears as many as the doublets make, *viz.* eight for

two

Doublet,
Doublets.

Doubleing two fours.

||
Dover.

DOUBLING, in the military art, is the putting two ranks or files of soldiers into one. Thus, when the word of command is, *double your ranks*, the second, fourth, and sixth ranks march into the first, third, and fifth, so that the six ranks are reduced to three, and the intervals between the ranks become double what they were before.

DOUBLING, among hunters, who say that a hare doubles, when the keeps in plain fields, and winds about to deceive the hounds.

DOUBLING, in the menage, a term used of a horse, who is said to double his reins, when he leaps several times together, to throw his rider: thus we say, *the ramingue doubles his reins, and makes poutlevis*.

DOUBLING, in navigation, the act of sailing round, or passing beyond, a cape or promontory, so as that the cape or point of land separates the ship from her former situation, or lies between her and any distant observer.

DOUBLING-UPON, in naval tactics, the act of inelosing any part of a hostile fleet between two fires, or of cannonading it on both sides.

It is usually performed by the van or rear of that fleet which is superior in number, taking the advantage of the wind, or of its situation and circumstances, and tacking or veering round the van or rear of the enemy, who will thereby be exposed to great danger, and can scarcely avoid being thrown into a general confusion.

DOUBLON, or **DUBLON**, a Spanish and Portuguese coin, being the double of a **PISTOLE**.

DOUBTING, the act of with-holding our assent from any proposition, on suspicion that we are not thoroughly apprised of the merits thereof, or from not being able peremptorily to decide between the reasons for and against it.

Doubting is distinguished by the schoolmen into two kinds, *dubitatio sterilis*, and *dubitatio efficax*. The former is that where no determination ensues: in this manner the Sceptics and Academics doubt, who withhold their assent from every thing. See **SCPTICS**, &c.

The latter is followed by judgment, which distinguishes truth from falsehood: such is the doubting of the Peripatetics and Cartesianes. The last in particular are perpetually inculcating the deceitfulness of our senses, and tell us that we are to doubt of every one of their reports, till they have been examined and confirmed by reason. On the other hand, the Epicureans teach, that our senses always tell truth; and that, if you go ever so little from them, you come within the province of doubting. See **CARTESIANS**, **EPICUREANS**, &c.

DOUCINE, in architecture, a moulding concave above, and convex below, serving commonly as a cymation to a delicate corniche. It is likewise called **GULA**.

DOVE, in ornithology. See **COLUMBA**.

Dove-Tailing, in carpentry, is the manner of fastening boards together by letting one piece into another, in the form of the tail of a dove. The dove-tail is the strongest of the assemblages or jointings; because the tenon, or piece of wood which is put into the other, goes widening to the extreme, so that it cannot be drawn out again, by reason the extreme or tip is bigger than the hole.

DOVER, a borough and port town of England,

in the county of Kent, situated in E. Long. o. 25. N. Lat. 51. 10. It gives the title of *duke* to the dukes of Queensbury, a branch of the noble family of Douglas; and sends two members to parliament, styled *barons of the Cinque-ports*, whereof Dover is the chief.

By the Romans this town was named *Dubris*, and by the Saxons *Desfra*, probably from the British word *Dour*, which signifies water. The convenience of its situation drew the attention of the Roman governors, who ruled here while they possessed this part of the island; and there still remain indubitable testimonies of their care and respect for this important place. For the defence of the town, the Romans, or, according to some, Arviragus, a British king, their confederate, by cutting out walls with infinite labour in the solid rock, constructed a stony fortrefs; and, as its venerable remains still prove, erected also a light-house for the benefit of navigation. The Saxons, Danes, and Normans, had a very high opinion of this place; and when the barons invited over the young prince afterwards Lewis VIII. of France, his father Philip Augustus conceived a bad opinion of the expedition, because the castle and port of Dover were held for king John, though a great part of the kingdom had submitted to Lewis. In its most flourishing state, the fortrefs was impregnable, and the town a very opulent emporium. It had 21 wards, each of which furnished a ship for the public service, 10 gates, 7 parish-churches, many religious houses, hospitals, and other public edifices. The decay of the town was brought on by that of the harbour. To recover this, Henry VIII. spent no less than 63,000l. in constructing piers, and 5000l. in building a castle between this and Folkestone, called *Sandgate*; where the shore was flat, and the landing easy. Notwithstanding all this expence, however, it was again choaked up in the reign of Queen Elizabeth, by whom it was again cleared at a vast expence, so that ships of some hundred tons could enter it. Since that time it has again declined, notwithstanding of many efforts for its relief, and great assistance from time to time given by parliament for this purpose. As the haven, however, is still capable of receiving vessels of small-burden, and as the packets to France and Flanders are stationed here in time of peace, it is still a place of some consequence, and the people are active and industrious.

DOUGLAS (lord). See (*Hilory of*) **SCOTLAND**.

DOUGLAS (Gavin), bishop of Dunkeld in Scotland, was the third son of Archibald earl of Angus, and was born in the year 1474. Where he was educated, is not known; but it is certain that he studied theology: a study, however, which did not estrange him from the mules; for he employed himself at intervals in translating into beautiful verse the poem of Ovid *de Remedio Amoris*. The advantages of foreign travel, and the conversation of the most learned men in France and Germany to whom his merit procured the readiest access, completed his education. With his superior recommendations and worth it was impossible he could remain unnoticed. His first preferment was to be provost of the collegiate church of St Giles in Edinburgh; a place, at that time, of great dignity and revenue. In the year 1514, the queen mother, then regent of Scotland, appointed Douglas abbot of Aberbrothock, and soon after archbishop of St Andrews; but, the queen's power

Dover,
Douglas.

Douglas.

power not being sufficient to establish him in the possession of that dignity, he relinquished his claim in favour of his competitor Foreman, who was supported by the pope. In 1515, he was by the queen appointed bishop of Dunkeld; and that appointment was soon after confirmed by his holiness Leo X. Nevertheless it was some time before he could obtain peaceable possession of his see. The duke of Albany, who in this year was declared regent, opposed him because he was supported by the queen; and, in order to deprive him of his bishopric, accused him of acting contrary to law in receiving bulls from Rome. On this accusation he was committed to the castle of Edinburgh, where he continued in confinement above a year; but the regent and the queen being at last reconciled, he obtained his liberty, and was consecrated bishop of Dunkeld. In 1517, he attended the duke of Albany to France; but returned soon after to Scotland. In 1521, the disputes between the earls of Arran and Angus having thrown the kingdom into violent commotion, our prelate retired to England, where he became intimately acquainted with Polydore Virgil the historian. He died in London, of the plague, in 1522; and was buried in the Savoy. He wrote "The palace of Honour;" a most ingenious poem under the similitude of a vision; in which he paints the vanity and inconstancy of all worldly glory. It abounds with incidents, and a very rich vein of poetry. The palace of happiness, in the picture of Cebes, seems to be the ground-work of it.

"*Aurææ narraciones*:" A performance now lost; in which, it is said, he explained, in a most agreeable manner, the mythology of the poetical fictions of the ancients.

"*Comædiæ aliquot facræ*:" None of which are now to be found.

"Thirteen bukes of Eneades, of the famous poet Virgil, translated out of Latin verse into Scottish metre, every buke having its particular prologue. Imprinted at Lond. 1553, in 4to; and reprinted at Edinburgh 1710, in folio."

The last is the most esteemed of all his works. He undertook it at the desire of lord Henry Sinclair, a munificent patron of arts in those times; and he completed it in 18 months; a circumstance which his admirers are too fond of repeating to his advantage. David Hume of Godscroft, an author of uncommon merit, and an admirable judge of poetry, gives the following testimony in his favour. "He wrote, (says he), in his native tongue, divers things; but his chiefest work is his translation of Virgil, yet extant, in verse: in which he ties himself so strictly as is possible; and yet it is so well expressed, that whosoever will essay to do the like, will find it a hard piece of work to go through with it. In his prologues before every book where he hath his liberty, he sheweth a natural and ample vein of poetry, so pure, plentiful, and judicious, that I believe there is none that hath written before or since, but cometh short of him."

It has been said, that he compiled an historical treatise "*de rebus Scoticis*;" but no remain of it hath descended to the present times.

DOUGLAS, the principal town of the Isle of Man, and which has lately increased both in trade and buildings. The harbour, for ships of a tolerable burden, is

the safest in the island, and is much mended by a fine mole that has lately been built. It is seated on the eastern side. W. Long. 4. 25. N. Lat. 54. 7.

DOWAGER, a widow endowed, is a title applied to the widows of princes, dukes, earls, and persons of high rank only.

QUEEN DOWAGER, is the widow of the king, and as such enjoys most of the privileges belonging to her as queen consort: but it is not high treason to violate her chastity or conspire her death, because the succession is not endangered thereby; but no man can marry her without special license from the king, on pain of forfeiting his lands and goods. See QUEEN.

DOWN, a county of Ireland in the province of Ulster, bounded on the east and south by St George's channel; on the west by the county of Armagh; and on the north by the county of Antrim. It lies opposite to the Isle of Man, Cumberland, and Westmoreland; and the north part of it fronts the Mull of Galloway, in Scotland, and is about 44 miles from it. It is about 44 miles in length, and 30 in breadth. It sends 14 members to parliament, two for the county, and 12 for the following boroughs, Down-Patrick, Newry, Newtown, Killeleagh, Bangor, and Hillsborough.

This county is rough and full of hills, and yet the air is temperate and healthy. The soil naturally produces wood, unless constantly kept open and ploughed; and the low grounds degenerate into bogs and moss, where the drains are neglected. But by the industry of the inhabitants it produces good crops of corn, particularly oats; and, where marl is found, barley. This last is exported from Killogh to Dublin. The staple commodity of this county is the linen manufacture.

Downs, or *Down-Patrick*, a town of Ireland, in the county of Down, is one of the most ancient in that kingdom. It is a market-town and a bishoprick, said to be erected in the fifth century by St Patrick, but is now united to the see of Connor. Within 200 paces of the town, on the ascent of a hill, are the ruins of an old cathedral, remarkable for the tomb of St Patrick, the founder, in which they say the bodies of St Bridget and St Columb are also laid. The town which is seated on the fourth corner of Lough Coin, now called the *lake of Strangford*, is adorned with several handsome public buildings. Among the hills, and in many islands, are flights of swans and other water-fowl; and the Lough abounds with salmon, mullets, and other sea-fish. About a mile from this town is St Patrick's Well, which many people frequent to drink at some seasons of the year, and others to perform a penance enjoined them by the popish priests. The linen manufacture is carried on here, as it is in several places in this country. W. Long. 5. 50. N. Lat. 54. 23.

DOWNETON, or DUNKTON, a borough-town of Wiltshire, five miles south of Salisbury. It sends two members to parliament.

DOWNHAM, a market-town of Norfolk, 10 miles south of Lynn, famous for its good butter; there being 1000, and sometimes 2000, firkins bought here every Monday, and sent up the river Ouse to Cambridge, from whence it is conveyed to London in the Cambridge-waggons.

DOWNS, a famous road near Deal in Kent, where both the outward and homeward-bound ships frequent-

Dowager

DOWNS.

Dowry
||
Drabs.

ly make some stay; and squadrons of men of war rendezvous in time of war.

It affords excellent anchorage; and is defended by the castles of Deal, Dover, and Sandwich.

DOWRY, the money or fortune which the wife brings her husband in marriage: it is otherwise called *maritagium*, marriage-goods, and differs from dower.

DOXOLOGY, an hymn used in praise of the Almighty, distinguished by the title of *greater and lesser*.

The lesser doxology was anciently only a single sentence, without response, running in these words, *Glory be to the Father, and to the Son, and to the Holy Ghost, world without end, Amen.* Part of the latter clause, *As it was in the beginning, is now, and ever shall be*, was inserted some time after the first composition. Some read this ancient hymn, *Glory be to the Father, and to the Son with the Holy Ghost.* Others, *Glory be to the Father in or by the Son, and by the Holy Ghost.* This difference of expression occasioned no disputes in the church, till the rise of the Arian heresy; but when the followers of Arius began to make use of the latter as a distinguishing character of their party, it was entirely laid aside by the Catholics, and the use of it was enough to bring any one under suspicion of heterodoxy.

The doxology was used at the close of every solemn office. The western church repeated it at the end of every psalm, and the eastern church at the end of the last psalm. Many of their prayers were also concluded with it, particularly the solemn thanksgiving or consecration prayer at the eucharist. It was also the ordinary conclusion of their sermons.

The greater doxology, or angelic hymn, was likewise of great vogue in the ancient church. It began with these words, which the angels sang at our Saviour's birth, *Glory be to God on high, &c.* It was chiefly used in communion service, and in mens private devotions. Both the doxologies have a place in the church of England, the former being repeated after every psalm, and the latter used in the communion service.

• **DRABA**, in botany; a genus of the filiculosa order, belonging to the tetradynamia class of plants. There are six species; of which the only one worthy of notice is the verna, or early whitlow-grass. It hath naked stalks, with leaves a little serrated. The blossoms are white, and at night the flowers hang down. It grows on old walls and dry banks. It is one of the earliest flowering plants we have, and is good to eat as a salad. Goats, sheep, and horses eat it; cows are not fond of it; swine refuse it.

DRAWLING, in angling, is a method of catching barbels. Take a strong line of six yards; which, before you fasten it to your rod, must be put through a piece of lead, that if the fish bite, it may slip to and fro, and that the water may something move it on the ground; bait with a lobe worm well secured, and so by its motion the barbel will be enticed into the danger without suspicion. The best places are in running water near piles, or under wooden bridges, supported with oaks floated and slimy.

DRABS, in the salt-works, a kind of wooden boxes for holding the salt when taken out of the boiling pan; the bottoms of which are made shelving or inclining forwards, that the briny moisture of the salt may drain off.

Drac
||
Dracontium.

DRAC, an imaginary being, much dreaded by the country people in many parts of France. The dracs are supposed to be malicious, or at least tricksome, demons; but, which is very rare, if one of them happens to take a fancy to a man or woman, they are sure to be the better for it. They are still said to lay gold cups and rings on the surface over pits and rivers, as baits to draw women and children in; though their usual dwelling is some old empty house, whence they make excursions in human form, visible or invisible as best suits their purpose. The country-folks shudder at the very name of the drac. Some are positive that they have seen him; for happy indeed is that village in which there is not a house execrated as the lurking-place of this tremendous drac.

DRACHM, a Grecian coin, of the value of sevenpence three farthings. Drachm is also a weight used by our physicians; containing just 60 grains three scruples, or the eighth part of an ounce.

DRACO, an Athenian lawgiver, prior to Solon, so extremely severe, that he punished all faults, small or great, with death: hence his laws were proverbially said to have been written with blood. He flourished 624 B. C.

DRACO, the *Dragon*, in zoology, a genus belonging to the order of amphibia reptilia. The characters of which are these: it has four legs, a cylindrical tail, and two membranaceous wings, radiated like the fins of a fish, by which he is enabled to fly, but not to any great distance at a time. There are two species, 1. The volans, or flying dragon, with the wings entirely distinct from the fore-legs; it is found in Africa and the East Indies. 2. The præpox, with the wings fixed to the fore-legs; it is a native of America. They are both harmless creatures, and feed upon flies, ants, and small insects.

DRACO Volans, in meteorology, a fiery exhalation, frequent in marshy and cold countries.

It is most common in summer; and though principally seen playing near the banks of rivers, or in boggy places, yet sometimes mounts up to a considerable height in the air, to the no small terror of the amazed beholders; its appearance being that of an oblong, sometimes roundish, fiery body, with a long tail. It is entirely harmless, frequently sticking to the hands and cloaths of people, without injuring them in the least.

DRACO, in astronomy, a constellation of the northern hemisphere. See ASTRONOMY, n° 206.

DRACOCYPHALUM, **DRAGON'S HEAD**; a genus of the gymnospermia order, belonging to the didynamia class of plants. There are 13 species, most of them herbaceous, annual, or perennial, plants, from 18 inches to three feet high, garnished mostly with entire leaves, and whorled spikes of small monopetalous and ringent flowers of a blue, white, or purple colour. They are all easily propagated by seeds, which may be sown either in the spring or autumn, and after the plants are come up they will require no other culture but to be kept clear from weeds.

DRACONTIC MONTH, the time of one revolution of the moon from her ascending node, called *caput draconis*, to her return thither.

DRACONTIUM, **DRAGONS**; a genus of the polyandria order, belonging to the gynandria class of plants. There are five species, all natives of the Indies. The

only

Plate
lxxxviii.
fig. 5.

Dracunculi
||
Dragon.

Drags,
Drains.

only one which makes any appearance is the pertusum, with leaves having holes, and a climbing stalk. This is a native of most of the West India islands. It hath trailing stalks which put out roots at every joint, that fasten to the trunks of trees, walls, or any support which is near them, and thereby rise to the height of 25 or 30 feet. The leaves are placed alternately upon long footstalks: they are four or five inches long, two and an half broad; and have several oblong holes in each, which at first sight appear as if eaten by insects, but they are natural to the leaves. The flowers are produced at the top of the stalk, which always swells to a much larger size in that part immediately under the stalk, than in any other: these are covered with an oblong spatula or hood of a whitish green colour, which opens longitudinally on one side, and shews the pistil, which is closely covered with flowers of a pale yellow, inclining to white. This plant is easily propagated by cuttings; which if planted in pots filled with poor sandy earth, and plunged into an hot-bed, will soon put out roots; but the plants are so tender, that they must be preserved in a stove.

DRACUNCULI, in medicine, small long worms which breed in the muscular parts of the arms and legs, called *Guinea worms*. The common way of getting out these worms is by the point of a needle; and to prevent their forming there again, the usual custom is to wash the parts with wine or vinegar, with alum, nitre, or common salt, or with a strong lixivium of oak-aloes, and afterwards anointing them with an ointment of the common kind used for scorbutic eruptions, with a small mixture of quicksilver.

DRACUNCULUS, in botany. See **ARUM**.

DRAGOMAN, **DROGMAN**, or *Druggerman*, a name given in the Levant to the interpreters kept by the ambassadors of Christian nations, residing at the Porte, to assist them in treating of their master's affairs.

DRAGON, in zoology. See **DRACO**.

DRAGON's-Blood, a red coloured, inodorous, and insipid resin, insoluble in water, but soluble in spirit of wine and in oils, to both which liquors it communicates a red colour. By fire it is fusible, inflammable, and emits an acid vapour like gum Benzoin. A solution of dragon's blood in spirit of wine is used for staining marble, to which it gives a red tinge, which penetrates more or less deeply according to the heat of the marble during the time of application. But, as it spreads at the same time that it sinks deep, for fine designs the marble should be cold. Mr du Fay says, that, by adding pitch to this solution, the colour may be rendered deeper.

DRAGON-Fish, or *Dragonet*, in ichthyology. See **CALLIONYMUS**.

DRAGON-Fls. See **LIBELLULA**.

DRAGONS, in botany. See **DRACONTIUM**.

DRAGONET, or *DRAGON-Fish*, in ichthyology. See **CALLIONYMUS**.

DRAGONNEE, in heraldry. A lion dragonée is where the upper half resembles a lion, the other half going off like the hinder part of a dragon. The same may be said of any other beast as well as a lion.

DRAGOON, in military affairs, a musqueteer, mounted on horseback, who sometimes fights or marches on foot, as occasion requires.

Menage derives the word *dragoon* from the Latin

draconarius, which in Vegetius is used to signify *soldier*. But it is more probably derived from the German *tragen*, or *dragen*, which signifies *to carry*; as being infantry carried on horseback.

Dragoons are divided into brigades, as the cavalry, and each regiment into troops; each troop having a captain, lieutenant, cornet, quarter-master, two sergeants, three corporals, and two drums. Some regiments have hautboys. They are very useful on any expedition that requires dispatch; for they can keep pace with the cavalry, and do the duty of infantry: they encamp generally on the wings of the army, or at the passes leading to the camp; and sometimes they are brought to cover the general's quarters: they march in the front and rear of the army.

DRAGS, in the sea-language, are whatever hangs over the ship in the sea, as shirts, coats, or the like; and boats, when towed, or whatever else that after this manner may hinder the ship's way when she sails, are called *drags*.

DRAINS, a name given, in the fen countries, to certain large cuts or ditches of 20, 30, nay sometimes 40 foot wide, carried through the marshy ground to some river or other place capable of discharging the water they carry out of the fen-lands.

An effectual method of drawing off the water from such grounds as are hurt by springs oozing out upon them, (usually distinguished by the name of *wet* or *spouting* ground, or *bogs*), has been a desideratum in agriculture. Mr Anderson is almost the only person who hath treated this matter scientifically, and his observations seem to be very rational and well founded.

"Springs (says he) are formed in the bowels of the earth, by water percolating through the upper strata where that is of a porous texture, which continues to descend downwards till it meets with a stratum of clay that intercepts it in its course; where, being collected in considerable quantities, it is forced to seek a passage through the porous strata of sand, gravel, or rock, that may be above the clay, following the course of these strata till they approach the surface of the earth, or are interrupted by any obstacle which occasions the water to rise upwards, forming springs, bogs, and the other phenomena of this nature; which being variously diversified in different circumstances, produce that variety of appearances in this respect that we often meet with.

"This being the case, we may naturally conclude, that an abundant spring need never be expected in any country that is covered to a great depth with sand without any stratum of clay to force it upwards, as is the case in the sandy deserts of Arabia, and the immeasurable plains of Libya: neither are we to expect abundant springs in any soil that consists of an uniform bed of clay from the surface to a great depth; for, it must always be in some porous stratum, that the water flows in abundance; and it can be made to flow horizontally in that, only when it is supported by a stratum of clay, or other substance that is equally impermeable by water. Hence the *rationale* of that rule so universally established in digging for wells, that if you begin with sand or gravel, &c. you need seldom hope to find water till you come to clay; and if you begin with clay, you can hope for none in abundance, till you reach to sand, gravel, or rock.

*Essays on
Agriculture,
Vol. I.
p. 119, &c.*

" It is necessary that the farmer should attend to this process of nature with care, as his success in draining bogs, and every species of damp and spouting ground, will in a great measure depend upon his thorough knowledge of this,—his acuteness in perceiving in every case the variations that may be occasioned by particular circumstances, and his skill in varying the plan of his operations according to these. As the variety of cases that may occur in this respect is very great, it would be a very tedious task to enumerate the whole, and describe the particular method of treating each; I shall, therefore, content myself with enumerating a few particular cases, to show in what manner the principles above established may be applied to practice.

Plate XCV. " Let fig. 5. represent a perpendicular section of a part of the earth, in which AB is the surface of the ground, beneath which are several strata of porous substances which allow the water to sink through them till it reaches the line CD, that is supposed to represent the upper surface of a solid bed of clay; above which lies a stratum of rock, sand, or gravel. In this case, it is plain, that when the water reaches the bed of clay, and can sink no farther, it must be there accumulated into a body; and seeking for itself a passage, it flows along the surface of the clay, among the sand or gravel, from D towards C; till at last it issues forth, at the opening A, a spring of pure water.

If the quantity of water that is accumulated between D and C is not very considerable, and the stratum of clay approaches near the surface; in that case, the whole of it will issue by the opening at A, and the ground will remain dry both above and below it. But, if the quantity of water is so great as to raise it to a considerable height in the bed of sand or gravel, and if that stratum of sand is not discontinued before it reaches the surface of the ground, the water, in this case, would not only issue at A, but would likewise ooze out in small streams thro' every part of the ground between A and a; forming a barren patch of wet sandy or gravelly ground upon the side of a declivity, which every attentive observer must have frequently met with.

To drain a piece of ground in this situation is, perhaps, the most unprofitable task that a farmer can engage in; not only because it is difficult to execute, but also because the soil that is gained is but of very little value. However, it is lucky, that patches of this kind are seldom of great breadth, although they sometimes run along the side of a declivity in a horizontal direction for a great length. The only effectual method of draining this kind of ground, is to open a ditch as high up as the highest of the springs at a, which should be of such a depth as not only to penetrate through the whole bed of sand or gravel, but also to sink so far into the bed of clay below, as to make a canal therein sufficiently large to contain and carry off the whole of the water. Such a ditch is represented by the dotted lines *aez*: but, as the expence of making a ditch of such a depth as this would suppose, and of keeping it afterwards in repair, is very great, it is but in very few cases that this mode of draining would be advisable; and never, unless where the declivity happens to be so small, as that a great surface is lost for little depth, as would have been the case here if

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the surface had extended in the direction of the dotted line *a d*.

But, supposing that the stratum of clay, after approaching toward the surface at A, continued to keep at a little depth below ground; and that the soil which lay above it was of a sandy or spongy nature, so as to allow the water to penetrate it easily; even supposing the quantity of water that flowed from D to C was but very inconsiderable, instead of rising out at the spring A, it would flow forward along the surface of the clay among the porous earth that forms the soil, so as to keep it constantly drenched with water, and of consequence render it of very little value.

Wetness arising from this cause, is usually of much greater extent than the former: and, as it admits of an easy cure, it ought not to be one moment delayed; as a ditch of a very moderate depth opened at A, and carried through a part of the stratum of clay, (as represented by the dotted lines *A k f*), would intercept and carry off the whole of the water, and render the field as dry as could be desired. It is, therefore, of very great consequence to the farmer, accurately to distinguish between these two cases, so nearly allied to each other in appearance; and, as this can be easiest done by boring, every one who has much ground of this kind ought to provide himself with a set of boring-irons, which he will likewise find use for on other occasions.

" I might here enumerate a great variety of cases which might be reduced to the same head with the foregoing: but, as any attentive reader may, after what has been said, be able easily to distinguish these, I shall only in general observe, that every soil of a soft and porous texture, that lies upon a bed of hard clay, whatever its situation in other respects may be, will in some measure be subjected to this disease. And, if it is upon a declivity of any considerable length, the undermost parts of the field will be much damaged by it, unless ditches are thrown up across the declivity at proper distances from one another, to intercept the water in its descent.

It may not likewise be improper here to observe, that in cases of this nature, unless where the soil is of a very great depth, the malady will always be increased, by raising the ridges to a considerable height; as will appear evident by examining fig. 6. in which the line AB represents the surface of the field of this nature, and CD the surface of the bed of clay. Now, if this field were raised into high ridges, as at FFF, so that the furrows EEE descended below the surface of the clay, it is plain, that all the water that should sink through the middle of the ridge, would run along the surface of the clay, till it came to the sides of the ridge L L L L L L, which would thus be kept continually soaked with water. Whereas, if the ground had been kept level, as in the part of the field from G to H, with open furrows H, at moderate distances from each other, the water would immediately sink to the clay, and be carried off by the furrows, so as to damage the soil far less than when the ridges are high. If the soil is so thin as that the plough can always touch the clay, the ridges ought to be made narrow and quite flat, as from G to H: but, if there is a little greater depth of soil, then it ought to be raised into ridges of a moderate height, as from H to K, so

as to allow the bottom of the furrow to reach the clay: but neither is this necessary where the soil is of any considerable depth.

"I have seen some industrious farmers who, having ground in this situation, have been at the very great expence of making a covered drain in each furrow. But, had they rightly understood the nature of the discale, they never would have thought of applying such a remedy; as must appear evident at first sight to those who examine the figure. The success was what might be expected from such a foolish undertaking.

"These observations, it is hoped, will be sufficient as to the manner of treating wet, sandy, or porous soils. I now proceed to take notice of such as are of a stiff clayey nature, which are often very different in appearance, and require a different treatment from these.

Plate XCX.

"Suppose that (in fig. 7.) the stratum of sand or gravel DC should be discontinued, as at E, and that the stratum above it should be of a coherent clayey nature. In this case, the water that flowed towards E, being there pent in on every side, and being accumulated there in great quantities, it must at length force a passage for itself in some way; and pressing strongly upon the upper surface, if any one part is weaker than the rest, it there would burst forth and form a spring, (as suppose at A). But if the texture of every part of this stratum were equally strong, the water would squeeze thro' many small crannies, and would ooze out in numberless places, as between A and F, so as to occasion that kind of wetness that is known by the name of a *spouting clayey soil*.

"The cure, in this case, is much more easily effected than in any of the former; for, if a ditch of a considerable size is opened, as at A, towards the lowermost side of the spouting ground, so deep as to penetrate through the upper stratum of clay, and reach to the gravel, the water will rise up through it at first with very great violence, which will gradually decrease as the pressure from the water behind is diminished; and when the whole of the water, accumulated in this subterraneous reservoir, is run off, there being no longer any pressure upon the clay above it, the whole soon becomes as dry as could be desired, and continues so ever afterwards, if the ditch is always kept open. This I speak from experience, I having rendered some fields of this kind that were very wet, quite dry by this method of treating them.

"It will hardly be necessary for me here to put the farmer upon his guard, to be particularly careful in his observations, that he may distinguish between the wetness that is produced from this cause, and that which proceeds from the cause before-mentioned; because the treatment that would cure the one, would be of no use at all to the other. The attentive observer likewise will readily perceive, that if any field that is wet from this cause admits of being ploughed, it will be in equal danger of being hurt by being raised into high ridges, with the other kind of damp ground before-mentioned. For, as the depth of earth above the reservoir would be smaller in the deep furrows than any where else, there would, of consequence, be less resistance to the water in that place, so that it would arise there in greater abundance. And if, in this case, a farmer should dig a drain in each furrow, as a considerable quantity of water would rise into them, in some cases, the ground

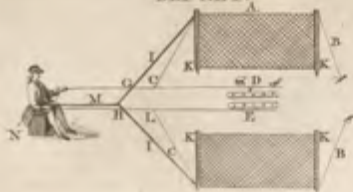
might be improved, or even quite drained thereby, especially if they should have accidentally reached the gravel in any one place; altho' at an expence much greater than was necessary. I take notice of this circumstance in some measure to prevent the prejudice that some inattentive observers might entertain against what was said before of this method of draining, from their having accidentally seen some fields that may have been bettered by it.

"Bogs are only a variety of this last-mentioned kind of wet ground; and, therefore, ought in general to be drained after the same manner with them. Clay is a substance that strongly resists the entrance of water into it: but when it is long drenched with it, it is, in process of time, in some measure dissolved thereby; loses its original firmness of texture and consistence; and becomes a sort of semi-fluid mass, which is called a *bog*; and as these are sometimes covered with a strong scurf of a particular kind of grass, with very matted roots, which is strong enough to bear a small weight without breaking, although it yields very much, it is in these circumstances called a *swaggle*. But, whatever be the nature of the bog, it is invariably occasioned by water being forced up through a bed of clay, as just now described, and dissolving or softening, if you will, a part thereof. I say only a part; because whatever may be the depth of the bog or swaggle, it generally has a partition of solid clay between it and the reservoir of water under it, from whence it originally proceeds: for, if this were not the case, and the quantity of water were considerable, it would meet with no sufficient resistance from the bog, and would issue thro' it with violence, and carry the whole semi-fluid mass along with it. But, this would more inevitably be the case, if there was a crust at the bottom of the bog, and if that crust should ever be broken, especially if the quantity of water under it were very considerable: and as it is probable, that, in many cases of this sort, the water slowly dissolves more and more of this under-crust, I make no doubt, but that, in the revolution of many ages, a great many eruptions of this kind may have happened, although they may not have been deemed of importance enough to have the history of them transmitted to posterity. Of this kind, although formed of a different substance, I consider the flow of the Solway-moors in Northumberland to have been; which, upon the 16th of November 1771, burst its former boundaries, and poured forth a prodigious stream of semi-fluid matter, which in a short time covered several hundred acres of very fine arable ground. Nor will any one, who is acquainted with the nature of moors,—who knows its resemblance to clay in its quality of absorbing and retaining water, and its very easy diffusibility therein; be surpris'd at this; as, from all these properties, it is much better adapted for forming an extensive bog, and therefore in greater danger of producing an extensive desolation by an eruption of the water into it, than those that are formed of any kind of clay whatever.

If the bog, or swampy ground, is upon a declivity, the ditch ought to be carried across the field about the place where the lowest springs arise. But, if the surface of the ground is level or nearly so, as between A and B, and the springs break out in several places, *q q q q q q*, so as to form soft quagmires interperfed
through

Fig. 8.

Fig. 1.
DAY NET.



DRAWING.



Veneration.



Anger.



Rapture.



Weeping.



Laughter.

DRAINS.

Fig. 5.



Fig. 7.



Fig. 8.



Fig. 9.



Fig. 6.





Drains.

through the whole of the field, it will be of little consequence in what part the drain is opened; for, if it is dug up so deep as to allow the water to rise in it with freedom, it will issue thro' that opening, and the field will be left perfectly dry.

"But, as it may frequently happen that the stratum of gravel shall be at a considerable depth beneath the surface of the earth, and as it may be sometimes even below the level of the place into which the drain must be emptied, it might sometimes be extremely difficult to make a ditch so deep as to reach the bed of sand or gravel. But, it is lucky for us, that this is not absolutely necessary in the present case; as a drain of two or three feet deep, as at D, will be equally effectual with one that should go to the gravel. All that is necessary in this case, is to sink pits (P) in the course of the drain, at a moderate distance from one another, which go so deep as to reach the gravel: for, as the water there meets with no resistance, it readily flows out at these openings, and is carried off by the drain without being forced up through the earth; so that the ground is left entirely dry ever after.

"I have likewise drained several fields in this way; and as I have generally found the appearances pretty much alike, I shall, for the information of the inexperienced reader, give a short account of them.

"If you attempt to make your pit in one of these soft quaggy places where the water is found in great abundance, you will meet with very great difficulty in forming it; for, as the substance of which it is composed is soft, it will always flow into the hole as fast as you dig it; on which account I would advise, not to attempt to make the pit in the swaggle, but as near it in the solid earth as you conveniently can. However, if it is pretty firm, and of no great extent, it is sometimes practicable to make a pit in the soft bog at the driest time of the year. This I have sometimes practised, which gave me an opportunity of observing the nature of these bogs more perfectly than I otherwise would have had. In the trials of this kind that I have made, this soft quaggy ground has seldom been above three or four feet deep, below which I have always found a stratum of hard tough clay usually mixed with stones; and so firm, that nothing but a mattock or pick-axe could penetrate it: and, as this is comparatively so much drier than the ground above it, an inexperienced operator is very apt to imagine that this is the bottom that he is in search of. In digging thro' this stratum, you will frequently meet with small springs oozing out in all directions; some of them that might fill the tube of a small quill, and others so small as to be scarce perceptible: but without regarding these, you must continue to dig on without intermission till you come to the main body of the reservoir, if I may so call it, that is contained in the rock, gravel, or sand; which you will generally find from two to four feet below the bottom of the swaggle, and which you will be in no danger of mistaking when you come to it: for, if there has been no opening made before that in the field, as soon as you break the crust immediately above the gravel or rock, the water bursts forth like a torrent, and on some occasions rises like a *jet d'eau*, to a considerable height above the bottom of the ditch; and continues to flow off with great impetuosity for some time, till the pent-up water being drained off, the

Drains.

violent boiling up begins to subside, and the strength of the current to abate; and, in a short time, it flows gently out like any ordinary spring:—allowing it to remain in this state, the quaggy earth begins to subside, and gradually becomes firmer and firmer every day; so that, in the space of a few months, those bogs which were formerly so soft as hardly to support the weight of a small dog, become so firm, that oxen and horses may tread upon them without any danger of sinking, at the very wettest season of the year. I have had a field of this nature, that, by having only one such pit as I have now described opened in it, was entirely drained to the distance of above a hundred yards around it in every direction. But, as it is possible that the stratum in which the water runs may be in some places interrupted, it will be in general expedient to make several of these pits, if the field is of great extent; always carrying the drain forward thro' the lowermost part of the field, or as near the quag as you conveniently can; and sinking a pit wherever you may judge it will be most necessary. But, if the stratum of gravel is not interrupted, there will be no violent burst of water at opening any of these after the first, as I have frequently experienced. To keep these wells from closing up after they are made, it is always expedient to fill them up with small stones immediately after they are made, which ought to rise to the height of the bottom of the drain.

"I have often imagined that the expence of digging these pits might be saved by boring a hole through this solid stratum of clay with a large wimble made on purpose; but, as I never experienced this, I cannot say whether or not it would answer the desired end exactly.

"If the whole field that is to be drained consists of one extensive bog, it will require a long time before the whole work can be entirely finished, as it will be impossible to open a drain through it till one part of it is first drained and becomes solid ground. In a situation of this kind, the undertaker, after having opened a drain to convey the water from the lowest part of the bog, must approach as near to the swampy ground as he can, and there make his first pit; which will drain off the water from the nearest parts of the bog. When this has continued open for some time, and that part of the bog is become so solid as to admit of being worked, let him continue the ditch as far forward thro' it as the situation it is in will admit of, and there sink another pit: and proceed gradually forward in the same manner; making cross cuts where necessary, till the whole be finished.

"In this manner may any bog, or track of spouting ground of this nature, be rendered dry at a very inconsiderable expence; and as there can be no other method of draining ground of this sort effectually, I recommend the study of it to the attention of every diligent farmer who may have occasion for it. Let him first be extremely cautious in examining all the circumstances of his particular fields, that he may be certain which of the classes above enumerated it may be ranked with; and, when he is perfectly sure of that, he may proceed without fear, being morally certain of success.

"There is, however, one kind of damp ground not yet particularly specified, that I have purposely omitted

Drains. ted taking notice of till this time, as I have never had any opportunity of examining particularly into the nature of it, nor of ascertaining by experience what is the most proper method of treating it.—The soil I have now particularly in my eye consists of a deep strong clay that does not vary its nature even on the surface, but in as far as manures may have rendered it more friable and tender: the colour usually inclines to a reddish cast, and, for the most part, it is situated upon the side of some declivity. This bed of clay reaches to a great depth, without any variation, and is intermixed with a considerable quantity of small round stones. Many soils of the sort now described, are apt to be continually moist and full of water during the winter season; but when the dry weather of summer sets in, the moisture is diminished, and the surface becomes hard, and it is rent into many large gaps which allow free admission to the sun and air, so as to scorch up almost every plant that is sowed upon it: and as these soils are usually in themselves naturally fertile when drained, it were to be wished that some method could be discovered that would be less expensive than what is usually practised with regard to some soils of this kind in Essex; where they make covered drains of two and a half feet deep, running diagonally through the whole field, at the distance of 20 feet from each other.”

Concerning the making of these drains we have the following directions in the *Georgical Essays*, by T. B. Bayley, Esq; of Hope near Manchester.—“First make the main drains down the slope or fall of the field. When the land is very wet, or has not much fall, there should, in general, be two of these to a statute acre; for the shorter the narrow drains are, the less liable they will be to accidents. The width of the trench for the main drains should be 30 inches at top, but the width at the bottom must be regulated by the nature and size of the materials intended to be used. If the drain is to be made of bricks 10 inches long, 3 inches thick, and 4 inches in breadth, then the bottom of the drain must be 12 inches; but if the common sale bricks are used, then the bottom must be proportionably contracted. In both cases there must be an interstice of one inch between the bottom brick and the sides of the trench, and the vacancy must be filled up with straw, rushes, or loose mould. For the purpose of making these drains, I order my bricks to be moulded 10 inches long, four broad, and three thick; which dimensions always make the best drain.

“The method I pursue in constructing my main drains is as follows.—When the ground is soft and spongy, the bottom of the drain is laid with bricks placed across. On these, on each side, two bricks are laid flat, one upon the other, forming a drain six inches high and four broad; which is covered with bricks, laid flat. When the bottom of the trench is found to be a firm and solid body, as clay or marle, the bottom of the drain does not then require being laid with bricks. In that case the sides are formed by placing one brick edgewise, instead of two laid flat.

“This latter method is much cheaper, and in such land equally durable with the other. When stones are used instead of bricks, the bottom of the drain should be about eight inches in width. And here it will be proper to remark, that, in all cases, the bottom of the main drains must be sunk four inches below the level of

the narrow ones, even at the point where the latter fall into them.

“The main drains should be kept open till the narrow ones are begun from them, after which they may be finished; but before the earth is returned upon the stones or bricks, it will be advisable to throw in straw, rushes, or brush-wood, to increase the freedom of the drain.

“The small narrow drains should be cut at the distance of 16 or 18 feet from each other; and should fall into the main drain at very acute angles, to prevent any stoppage. At the point where they fall in, and eight or ten inches above it, they should be made firm with brick or stone. These drains should be 18 inches wide at top, and 16 at bottom.”—Fig. 9. represents a field with drains laid out, according to Mr Bayley’s method. The black lines represent the main drains, and the dotted lines represent the narrow drains communicating with the former from all parts of the field.

Plate XCV.

DRAKE, in ornithology, the male of the duck kind. See **ANAS**.

DRAKE (Sir Francis), the renowned English admiral, was the son of Edmund Drake a sailor, and born near Tavistock in Devonshire, in the year 1545. He was brought up at the expense and under the care of Sir John Hawkins, who was his kinsman; and, at the age of 18, was purser of a ship trading to Biscay. At 20, he made a voyage to Guinea; and, at 22, had the honour to be made captain of the *Judith*. In that capacity he was in the harbour of St John de Ulloa, in the gulph of Mexico, where he behaved most gallantly in the glorious actions under Sir John Hawkins, and returned with him to England with great reputation, though not worth a groat. Upon this he projected a design against the Spaniards in the West Indies; which he no sooner published, than he had volunteers enough ready to accompany him. In 1570, he made his first expedition with two ships; and the next year with one only, in which he returned safe, if not with such advantages as he expected. He made another expedition in 1572, wherein he did the Spaniards some mischief, and gained considerable booties. In these expeditions he was much assisted by a nation of Indians, who then were, and have been ever since, engaged in perpetual wars with the Spaniards. The prince of these people was named *Pedro*; to whom Drake presented a fine cutlass from his side, which he saw the Indian greatly admired. *Pedro*, in return, gave him four large wedges of gold; which Drake threw into the common stock, saying, That he thought it but just that such as bore the charge of so uncertain a voyage on his credit, should share the utmost advantage that voyage produced. Then, embarking his men with all the wealth he had obtained, which was very considerable, he bore away for England, where he arrived in August 1573.

His success in this expedition, joined to his honourable behaviour towards his owners, gained him a high reputation; and the use he made of his riches, a still greater. For, fitting out three stout frigates at his own expence, he sailed with them to Ireland; where, under Walter earl of Essex, the father of the famous unfortunate earl, he served as a volunteer, and did many glorious actions. After the death of his noble patron, he returned into England; where Sir Christopher Hat-

ton

Drake.

ton introduced him to her majesty, and procured him countenance and protection at court. By this means he acquired a capacity of undertaking that grand expedition which will render his name immortal. The first thing he proposed was a voyage into the South Seas through the Straits of Magellan; which was what hitherto no Englishman had ever attempted. The project was well received at court: the queen furnished him with means; and his own fame quickly drew together a sufficient force. The fleet with which he sailed on this extraordinary undertaking, consisted only of five vessels, small when compared with modern ships, and no more than 164 able men. He sailed on the 13th of December 1577; and on the 25th fell in with the coast of Barbary, and on the 29th with cape Verd. On the 13th of March he passed the equinoctial, made the coast of Brazil on the 5th of April, and entered the River de la Plata, where he lost the company of two of his ships; but meeting them again, and taking out their provisions, he turned them adrift. On the 29th of May he entered the port of St Julian's, where he continued two months for the sake of laying in provisions: on the 20th of August he entered the Straits of Magellan, and on the 25th of September passed them, having then only his own ship. On the 25th of November he came to Machao, which he had appointed for a place of rendezvous in case his ships separated; but captain Winter, his vice admiral, having repassed the Straits, was returned to England. Thence he continued his voyage along the coasts of Chili and Peru, taking all opportunities of seizing Spanish ships, and attacking them on shore, till his men were fatigued with plunder; and then, coasting America to the height of 48 degrees, he endeavoured to find a passage that way back into our seas, but could not. However, he landed, and called the country *New Albion*, taking possession of it in the name and for the use of queen Elizabeth; and, having careened his ship, set sail from thence, on the 29th of September 1579, for the Moluccas. He is supposed to have chosen this passage round, partly to avoid being attacked by the Spaniards at a disadvantage, and partly from the latencies of the season, whence dangerous storms and hurricanes were apprehended. On the 13th of October he fell in with certain islands inhabited by the most barbarous people he had met with in all his voyage: on the 4th of November he had sight of the Moluccas; and, coming to Ternate, was extremely well received by the king thereof, who appears, from the most authentic relations of this voyage, to have been a wise and polite prince. On the 10th of December he made Celebes; where his ship unfortunately ran upon a rock, the 9th of January following; from which, beyond all expectation, and in a manner miraculously, they got off, and continued their course. On the 16th of March he arrived at Java Major; and from thence he intended to have directed his course to Malacca; but found himself obliged to alter his purpose; and to think of returning home. On the 25th of March 1580, he put this design in execution; and on the 15th of June he doubled the Cape of Good Hope, having then on board 57 men, and but three casks of water. On the 12th of July he passed the line, reached the coast of Guiney on the 16th, and there watered. On the 11th of September he made the island of Tercera; and on the 3d of November

entered the harbour of Plymouth. This voyage round the world was performed in two years and about ten months. Shortly after his arrival, the queen going to Deptford, went on board his ship; where, after dinner, she conferred on him the order of knighthood, and declared her absolute approbation of all he had done. She likewise gave directions for the preservation of his ship, that it might remain a monument of his own and his country's glory. This celebrated ship, which had been contemplated many years at Deptford, at length decaying, it was broke up, and a chair, made out of the planks, was presented to the university of Oxford; upon which the famous Abraham Cowley made the following verses:

"To this great ship, which round the world has run,
 "And match'd in race the chariot of the sun;
 "This Pythagorean ship (for it may claim,
 "Without presumption, to deserve a name,
 "By knowledge once, and transformation now).
 "In her new shape this sacred port allow,
 "Drake and his ship could not have wish'd, from fate,
 "An happier station, or more blest'st estate:
 "For, lo! a seat of endless rest is given,
 "To her in Oxford, and to him in heaven.

WORKS, Vol. II.

In the year 1585, he sailed with a fleet to the West Indies; and took the cities of St Jago, St Domingo, Carthagena, and St Augustin. In 1587, he went to Lisbon with a fleet of 30 sail; and, having intelligence of a great fleet assembled in the bay of Cadiz, which was to have made part of the armada, he with great courage entered that port, and burnt there upwards of 10,000 tons of shipping: which he afterwards merrily called *burning the king of Spain's beard*. In 1588, when the armada from Spain was approaching our coasts, Sir Francis Drake was appointed vice-admiral under Charles lord Howard of Effingham, high admiral of England, where fortune favoured him as remarkably as ever: for he made prize of a very large galleon, commanded by Don Pedro de Valdez, who was reputed the projector of this invasion. This affair happened in the following manner: On the 22d of July, Sir Francis observing a great Spanish ship floating at a distance from both fleets, sent his pinnace to summon the commander to yield. Valdez replied, with much Spanish solemnity, that they were 450 strong; that he himself was Don Pedro, and stood much upon his honour; and thereupon propounded several conditions, upon which he was willing to yield. But the vice-admiral replied, that he had no leisure to parley: but if he thought fit instantly to yield, he might; if not, he should soon find that Drake was no coward. Pedro, hearing the name of Drake, immediately yielded, and with 46 of his attendants came on board Drake's ship. This Don Pedro remained about two years Sir Francis Drake's prisoner in England; and, when he was released, paid him for his own and his captains liberties, a ransom of 3500l. Drake's soldiers were well recompensed with the plunder of this ship: for they found in it 55000 ducats of gold, which was divided among them.

A little before this formidable Spanish armament put to sea, the ambassador of his Catholic majesty had the confidence to propound to queen Elizabeth, in Latin verse, the terms upon which the might hope for peace; which, with an English translation by Dr Ful-

Drake.

lers.

Drake
||
Drasma.

ler, we will infer in this place, because Drake's expedition to the West Indies makes a part of this message. The verses are these:

*Te victo ne pergas bello defendere Belgas:
Quæ Dracus crispit nunc resistuntur oportet:
Quas pater evertit jubet te condere cellas:
Religio Papæ fac resistatur ad uaguem.*

"These to you are our commands,
"Send no help to th' Netherlands:
"Of the treasure took by Drake,
"Restitution you must make;
"And those abbeyes build anew,
"Which your father overthrow:
"If for any peace you hope,
"In all points restore the pope."

The queen's extempore return,

Ad Græcæ, bone rex, fient mandata calendar.

"Worthy king, know, this your will
"At Later-Lammas we'll fulfil.

In the year 1589, Sir Francis Drake commanded as admiral the fleet sent to restore Don Antonio king of Portugal, the command of the land-forces being given to Sir John Norris: but they were hardly got to sea, before the commanders differed, and so the attempt proved abortive. The war with Spain continuing, a more effectual expedition was undertaken by Sir John Hawkins and Sir Francis Drake, against their settlements in the West Indies, than had hitherto been made during the whole course of it: but the commanders here again not agreeing about the plan, this also did not turn out so successfully as was expected. All difficulties, before these two last expeditions, had given way to the skill and fortune of Sir Francis Drake; which probably was the reason, why he did not bear these disappointments so well as he otherwise would have done. A strong sense of them is supposed to have thrown him into a melancholy, which occasioned a bloody flux; and of this he died on board his own ship, near the town of Nombre de Dios in the West Indies, on the 28th of January 1595-6. His death was lamented by the whole nation, and particularly by his countrymen; who had great reason to love him from the circumstances of his private life, as well as to esteem him in his public character. He was elected burgess for the town of Boscine, alias Tintagal, in the county of Cornwall, in the 27th parliament of queen Elizabeth; and for Plymouth in Devonshire, in the 35th of the same reign. This town had very particular obligations to him: for, in the year 1587, he undertook to bring water into it, through the want of which, till then, it had been grievously distressed; and he performed it by conducting thither a stream from springs at eight miles distance, that is to say, in a straight line: for in the manner he brought it, the course of it runs upwards of 20 miles.

DRAKENBORCH (Arnold), professor of eloquence and history at Utrecht, made himself known by several works, and particularly by his Notes on Titus Livius and Silius Italicus; his fine editions of which are highly esteemed.

DRAMA, a poem containing some certain action, and representing a true picture of human life, for the delight and improvement of mankind.

The principal species of the drama are two, comedy and tragedy. Some others there are of less note, as pastoral, satire, tragi-comedy, opera, &c.*

* See the article Poetry.

DRAMATIC, an epithet given to pieces written for the stage. See **POETRY**, chap. ii.

DRANK, among farmers, a term used to denote wild oats, which never fail to infect worn-out lands; so that, when ploughed lands run to these weeds and thistles, the farmer knows it is high time to follow them, or else to sow them with hay-seed, and make pasture of them.

DRAPERY, in sculpture and painting, signifies the representation of the clothing of human figures, and also hangings, tapestry, curtains, and most other things that are not carnations or landscapes. See **PAINTING**, n° 10.; **CRAYON-Painting**, sect. ii.; and **DRAWING**, par. 8.

DRASTIC, in physic, an epithet bestowed on such medicines as are of present efficacy, and potent in operation; and is commonly applied to emetics and cathartics.

DRAVE, a large navigable river, which, taking its rise in the archbishopric of Saltzburg, in Germany, runs south-east through Stiria; and continuing its course, divides Hungary from Sclavonia, and falls into the Danube at Esseck.

DRAUGHT, in trade, called also *cloff* or *clouch*, is a small allowance on weighable goods, made by the king to the importer, or by the seller to the buyer, that the weight may hold out when the goods are weighed again.

The king allows 1 lb draught for goods weighing no less than 1 Cwt. 2 lb for goods weighing between 1 and 2 Cwt. 3 lb for goods weighing between 2 and 3 Cwt. 4 lb from 3 to 10 Cwt. 7 lb from 10 to 18 Cwt. 9 lb from 18 to 30 or upwards.

DRAUGHT-Hooks, are large hooks of iron, fixed on the cheeks of a cannon-carriage, two on each side, one near the trunnion hole, and the other at the train, distinguished by the name of *fore* and *hind draught-hooks*. Large guns have draught-hooks near the middle train; to which are fixed the chains that serve to keep the shafts of the limbers on a march. The fore and hind hooks are used for drawing a gun backwards or forwards, by men with strong ropes, called *draught-ropes*, fixed to these hooks.

DRAUGHT, the depth of a body of water necessary to float a ship; hence a ship is said to draw so many feet of water, when she is borne up by a column of water of that particular depth. Thus, if it requires a body of water whose depth is equal to 12 feet, to float or buoy up a ship on its surface, she is said to draw 12 feet water; and that this draught may be more readily known, the feet are marked on the stem and stern post, regularly from the keel upwards.

DRAUGHT-Horse, in farming, a sort of coarse-made horse, destined for the service of a cart or plough.

DRAWBACK, in commerce, certain duties, either of the customs or of the excise, allowed upon the exportation of some of our own manufactures; or upon certain foreign merchandize, that have paid duty on importation.

The oaths of the merchants importing and exporting are required to obtain the drawback on foreign goods, affirming the truth of the officers certificate on the entry, and the due payment of the duties: and these may be made by the agent or husband of any corporation or company; or by the known servant of any merchant,

Dramatic
||
Drawback.

merchant usually employed in making his entries, and paying his customs. In regard to foreign goods entered outward, if less quantity or value be fraudulently shipped out than what is expressed in the exporter's certificate, the goods therein mentioned, or their value, are forfeited, and no drawback to be allowed for the same. Foreign goods exported by certificate in order to obtain the draw-back, not shipped or exported, or re-landed in Great Britain, unless in case of distress to save them from perishing, are to lose the benefit of the draw-back, and are forfeited, or their value, with the vessels, horses, carriages, &c. employed in the re-landing thereof; and the persons employed in the re-landing them, or by whose privity they are re-landed, or into whose hands they shall knowingly come, are to forfeit double the amount of the drawback. Officers of the customs conniving at or assisting in any fraud relating to certificate goods, besides other penalties, are to forfeit their office, and suffer six months imprisonment without bail or mainprize; as are also masters, or persons belonging to the ships employed therein. Bonds given for the exportation of certificate-goods to Ireland must not be delivered up, nor drawback allowed for any goods, till a certificate under the hands and seals of the collector or comptroller, &c. of the customs be produced, testifying the landing.

DRAW-Bridge, a bridge made after the manner of a float, to draw up, or let down, as occasion serves, before the gate of a town or castle. See **BRIDGE**.

A draw-bridge may be made after several different ways; but the most common are made with plyers, twice the length of the gate, and a foot in diameter. The

inner square is traversed with a cross, which serves for a counterpoise; and the chains which hang from the extremities of the plyers to lift up or let down the bridge, are of iron or brass.

In navigable rivers it is sometimes necessary to make the middle arch of bridges with two moveable platforms, to be raised occasionally, in order to let the masts and rigging of ships pass through. This kind of draw-bridge is represented in Plate XCVI. where A B is the width of the middle arch; A L and B L, the two piers that support the draw-bridge NO, one of the platforms of which is raised, and the other let down, having the beam PQ for its piler. To NO are suspended two moveable braces EH, EH; which resting on the support E, press against the bracket M, and thereby strengthen the draw-bridge. These braces are conducted to the rest by means of the weight S, pulling the chain SLF.

DRAW-Net, a kind of net for taking the larger sort of wild-fowl, which ought to be made of the best sort of pack-thread, with wide meshes; they should be about two fathoms deep and six long, verged on each side with a very strong cord, and stretched at each end on long poles. It should be spread smooth and flat upon the ground; and strewed over with grass, sedge, or the like, to hide it from the fowl; and the sportsman is to place himself in some shelter of grass, fern, or some such thing.

DRAWING, in general, denotes the action of pulling out, or haling along; thus we read of tooth-drawing, wire-drawing, &c.

D R A W I N G,

THE art of representing the appearances of objects by imitation, or copying without the assistance of mathematical rules.

1. *Of the proper Materials for drawing, and the manner of using them.* The first thing necessary for a beginner is to furnish himself with proper materials, such as black-lead pencils, crayons * of black, white, or red chalk, crow-quill pens, a rule and compasses, camels-hair pencils, and Indian ink. He must accustom himself to hold the pencil farther from the point than one does a pen in writing; which will give him a better command of it, and contribute to render the strokes more free and bold. The use of the pencil is to draw the first sketches or outlines of the piece, as any stroke or line that is amiss may in this be more easily rubbed out than in any other thing; and when he has made the sketch as correct as he can with the pencil, he may then draw carefully the best outline he has got, with his crow-quill pen and (A) ink; after which he may discharge the pencil-lines, by rubbing the piece gently with the crumb of stale bread. Having thus got the outline clear, his next work is to shade the piece properly, either by drawing fine strokes with his pen where it requires to be shaded, or by washing it with his pencil and the Indian ink. As to his rule and

compasses, they are never or very rarely to be used, except in measuring the proportions of figures after he has drawn them, to prove whether they are right or not; or in houses, fortifications, and other pieces of architecture.

2. *Of drawing Lines, Squares, Circles, and other regular and irregular figures.* Having got all these implements in readiness, the first practice must be to draw straight and curve lines, with ease and freedom, upwards and downwards, sideways to the right or left, or in any direction whatsoever. He must also learn to draw, by command of hand, squares, circles, ovals, and other geometrical figures: for as the alphabet, or a knowledge of the letters, is an introduction to grammar; so is geometry to drawing. The practice of drawing these simple figures * till he is master of them, will enable him to imitate, with greater ease and accuracy, many things both in nature and art. And here it is proper to admonish him, never to be in a hurry; but to make himself perfectly master of one figure before he proceeds to another: the advantage, and even necessity, of this, will appear as he proceeds. Two observations more may be added: 1. That he accustom himself to draw all his figures very large, which is the only way of acquiring a free bold manner of design-
ing.

(A) The ink made use of for this purpose must not be common, but Indian ink; which is much softer than the other, and does not run: by mixing it with water, it may be made to any degree of strength, and used in a pen like common ink.

* See
Crayon-
Painting.

* See Plate
XCVI.

ing. 2. That he practise drawing till he has gained a tolerable mastery of his pencil, before he attempts to shadow any figure or object of any kind whatever.

3. *Of Light and Shade.* After the learner has made himself in some measure perfect in drawing outlines, his next endeavour must be to shade them properly. It is this which gives an appearance of substance, shape, distance, and distinction, to whatever bodies he endeavours to represent, whether animate or inanimate. The best rule for doing this is, to consider from what point, and in what direction, the light falls upon the objects which he is delineating, and to let all his lights and shades be placed according to that direction throughout the whole work. That part of the object must be lightest, which hath the light most directly opposite to it; if the light falls sideways on the picture, he must make that side which is opposite to it lightest, and that side which is farthest from it darkest. If he is drawing the figure of a man, and the light be placed above the head, then the top of the head must be made lightest, the shoulders next lightest, and the lower parts darker by degrees. That part of the object, whether in naked figures, or drapery, or buildings, that stands farthest out, must be made the lightest, because it comes nearest to the light; and the light loseth so much of its brightness, by how much any part of the body bends inward, because those parts that stick out hinder the lustre and full brightness of the light from striking on those parts that fall in. Titian used to say, that he knew no better rule for the distribution of lights and shadows, than his observations drawn from a bunch of grapes. Sattins and silks, and all other shining stuffs, have certain glancing reflections, exceeding bright, where the light falls strongest. The like is seen in armour, bras-pots, or any other glittering metal, where you see a sudden brightness in the middle or centre of the light, which discovers the shining nature of such things. Observe also, that a strong light requires a strong shade, a fainter light a fainter shade; and that an equal balance be preserved throughout the piece between the lights and shades. Those parts which must appear round, require but one stroke in shading, and that sometimes but very faint; such parts as should appear steep or hollow, require two strokes across each other, or sometimes three, which is sufficient for the deepest shade. Care must be also taken to make the outlines faint and small in such parts as receive the light; but where the shades fall, the outline must be strong and bold. The learner must begin his shadings from the top, and proceed downward, and use his utmost endeavours both by practice and observation to learn how to vary the shadings properly; for in this consists a great deal of the beauty and elegance of drawing. Another thing to be observed is, that as the human sight is weakened by distances, so objects must seem more or less confused or clear according to the places they hold in the piece: Those that are very distant,—weak, faint, and confused; those that are near and on the foremost ground,—clear, strong, and accurately finished.

4. *Of drawing Flowers, Fruits, Birds, Beasts, &c.* The learner may proceed now to make some attempts at drawing flowers, fruits, birds, beasts, and the like; not only as it will be a more pleasing employment, but as it is an easier task, than the drawing of hands and

feet, and other parts of the human body, which require not only more care, but greater exactness and nicer judgment. Very few rules or instructions are requisite upon this head; the best thing the learner can do is, to furnish himself with good prints or drawings by way of examples, and with great care and exactness to copy them. If it is the figure of a beast, begin with the forehead, and draw the nose, the upper and under jaw, and stop at the throat. Then go to the top of the head, and form the ears, neck, back, and continue the line till you have given the full shape of the buttock. Then form the breast, and mark out the legs and feet, and all the smaller parts. And, last of all, finish it with the proper shadows. It is not amiss, by way of ornament, to give a small sketch of landscape; and let it be suitable and natural to the place or country of the beast you draw. Much the same may be said with regard to birds. Of these, as well as beasts and other objects, the learner will find many examples among the plates given in this work.

5. *Of drawing Eyes, Ears, Legs, Arms, Hands, Feet, &c.* As to the drawing of eyes and ears, legs and arms, the learner will have very little more to do than to copy carefully the examples given in Plate XCVI. XCVII. But the actions and postures of the hands are so many and various, that no certain rules can be given for drawing them, that will universally hold good. Yet as the hands and feet are difficult members to draw, it is very necessary, and well worth while, to bestow some time and pains about them; carefully imitating their various postures and actions, so as not only to avoid all lameness and imperfection, but also to give them life and spirit. To arrive at this, great care, study, and practice, are requisite; particularly in imitating the best prints or drawings that can be got of hands and feet, (some good examples of which are given in Plate XCVII.); for, as to the mechanical rules of drawing them by lines and measures, they are not only perplexed and difficult, but also contrary to the practice of the best masters. One general rule, however, may be given, (which is universally to be observed in all subjects), and that is, Not to finish perfectly at first any single part, but to sketch out faintly, and with light strokes of the pencil, the shape and proportion of the whole hand, with the action and turn of it; and after considering carefully whether this first sketch be perfect, and altering it wherever it is amiss, you may then proceed to the bending of the joints, the knuckles, the veins, and other small particulars, which, when the learner has got the whole shape and proportion of the hand or foot, will not only be more easily but also more perfectly designed.

6. *Of drawing Faces.* The head is usually divided into four equal parts. (1.) From the crown of the head to the top of the forehead. (2.) From the top of the forehead to the eye-brows. (3.) From the eye-brows to the bottom of the nose. (4.) From thence to the bottom of the chin. But this proportion is not constant; those features in different men being often very different as to length and shape. In a well-proportioned face, however, they are nearly right. To direct the learner therefore in forming a perfect face, his first business is to draw a complete oval; in the middle of which, from the top to the bottom, draw a perpendicular line. Through the centre or middle of this

DRAW BRIDGE.

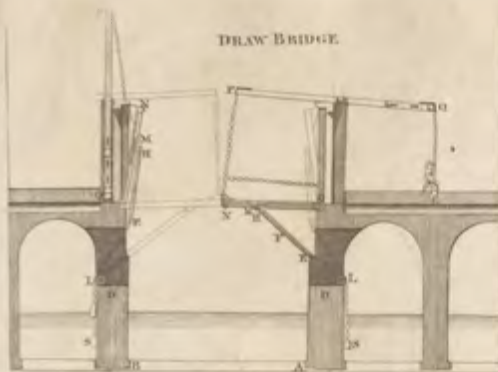
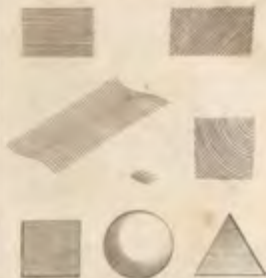


Plate XC VI

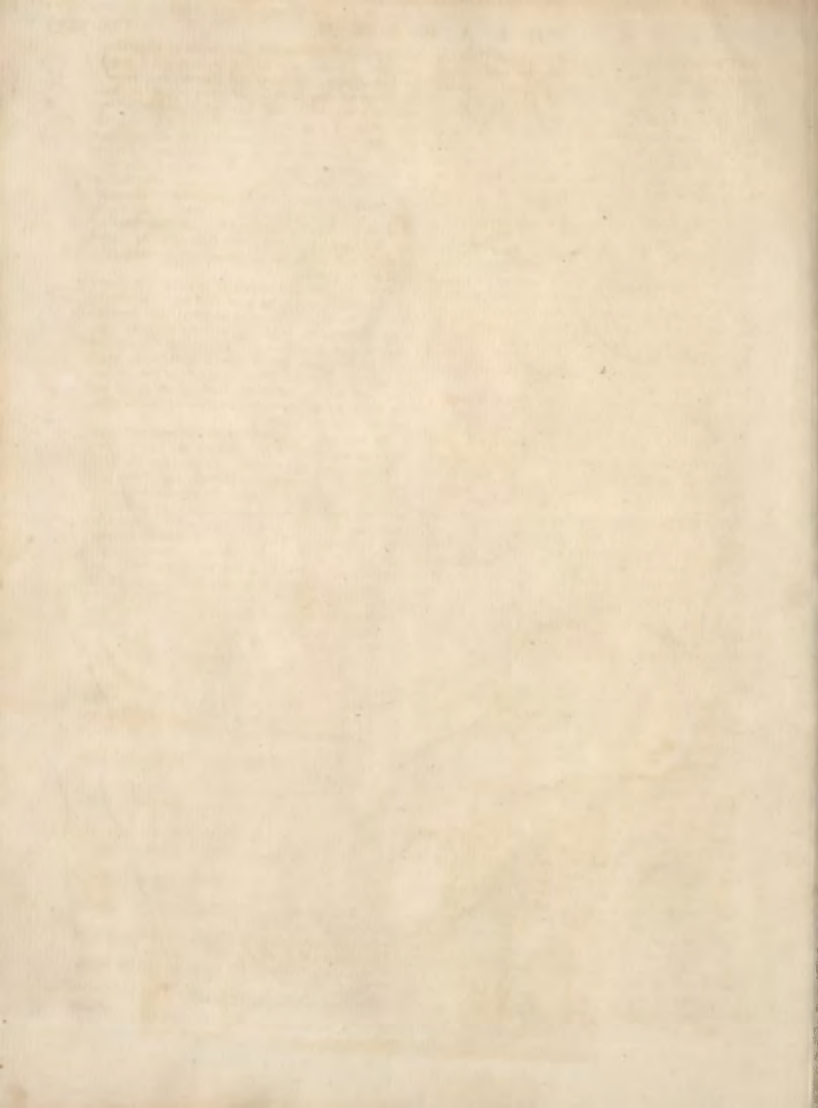
DRAWING.



J. Bell sculpt.







this line draw a diameter line, directly across from one side to the other of your oval. On these two lines all the features of your face are to be placed as follows. Divide your perpendicular line into four equal parts: the first must be allotted to the hair of the head; the second is from the top of the forehead to the top of the nose between the eye-brows; the third is from thence to the bottom of the nose; and the fourth includes the lips and chin. Your diameter line, or the breadth of the face, is always supposed to be the length of five eyes; you must therefore divide it into five equal parts, and place the eyes upon it so as to leave exactly the length of one eye betwixt them. This is to be understood only of a full front face; for if it turn to either side, then the distances are to be lessened on that side which turns from you, less or more in proportion to its turning. The top of the ear is to rise parallel to the eye-brows, at the end of the diameter line; and the bottom of it must be equal to the bottom of the nose. The nostrils ought not to come out further than the corner of the eye in any face; and the middle of the mouth must always be placed upon the perpendicular line. See Plate XCVI.

7. *Of drawing Human Figures.* When the learner is tolerably perfect in drawing hands, feet, heads, and faces, he may next attempt to draw the human figure at length. In order to which, let him first form his oval for the head; then draw a perpendicular line from the bottom of the head six times its length, (for the length of the head is one-seventh part of the length of the figure.)

The best proportioned figures of the ancients are 7 heads $\frac{1}{2}$ in height. If, therefore, the figure stands upright, draw a perpendicular line from the top of the head to the heel, which must be divided into two equal parts. The bottom of the belly is exactly the centre. Divide the lower part into two equal parts again, the middle of which is the middle of the knee. For the upper part of the figure, the method must be varied. Take off with your compasses the length of the face, (which is 3 parts in 4 of the length of the head); from the throat-pit to the pit of the stomach is one face, from thence to the navel is another, and from thence to the lower rim of the belly is a third. The line must be divided into seven equal parts. Against the end of the first division, place the breasts; the second comes down to the navel; the third, to the privities; the fourth to the middle of the thigh; the fifth, to the lower part of the knee; the sixth, to the lower part of the calf; and the seventh, to the bottom of the heel, the heel of the bearing leg being always exactly under the pit of the throat. But, as the essence of all drawing consists in making at first a good sketch, the learner must in this particular be very careful and accurate; he ought to draw no one part perfect or exact, till he see whether the whole draught be good; and when he has altered that to his mind, he may then finish one part after another as curiously as he can.

There are some who, having a statue to copy, begin with the head, which they finish, and then proceed in the same manner to the other parts of the body, finishing as they go: but this method generally succeeds ill; for if they make the head in the least too big, or too little, the consequence is a disproportion between all the parts, occasioned by their not having sketched the

whole proportionably at first. Let the learner remember, therefore, in whatever he intends to draw, first to sketch its several parts, measuring the distances and proportions between each with his finger or pencil, without using the compasses; and then judge of them by the eye, which by degrees will be able to judge of truth and proportion, and will become his best and principal guide. And let him observe, as a general rule, Always to begin with the right side of the piece he is copying: for by that means he will always have what he has done before his eyes; and the rest will follow more naturally, and with greater ease: whereas if he begin with the left side, his hand and arm will cover what he does first, and deprive him of the sight of it; by which means he will not be able to proceed with so much ease, pleasure, or certainty.

As to the order and manner of proceeding in drawing the human body, he must first sketch the head; then the shoulders in the exact breadth; then draw the trunk of the body, beginning with the arm-pits (leaving the arms till afterwards), and so draw down to the hips on both sides; and be sure he observe the exact breadth of the waist. When he has done this, let him then draw that leg which the body stands upon, and afterwards the other which stands loose; then the arms, and last of all the hands.

He must take notice also of the bowings and bendings that are in the body; making the part which is opposite to that which bends, correspond to it in bending with it. For instance: If one side of the body bend in, the other must stand out answerable to it; if the back bend in, the belly must stick out; if the knee bend out, the ham must fall in; and so of any other joint in the body. Finally, he must endeavour to form all the parts of the figure with truth, and in just proportion: not one arm or one leg bigger or less than the other; not broad Herculean shoulders, with a thin and slender waist; nor raw and bony arms, with thick and gouty legs: but let there be a kind of harmonious agreement amongst the members, and a beautiful symmetry throughout the whole figure.

We shall conclude this head by giving, from Frenoy, *The Measures of the Human Body.* The ancients have commonly allowed eight heads to their figures, though some of them have but seven: but we ordinarily divide the figures into ten faces; that is to say, from the crown of the head to the sole of the foot, in the following manner.

From the crown of the head to the forehead is the third part of a face.

The face begins at the root of the lowest hairs which are upon the forehead, and ends at the bottom of the chin.

The face is divided into three proportional parts; the first contains the forehead, the second the nose, and the third the mouth and chin.

From the chin to the pit betwixt the collar-bones, are two lengths of a nose.

From the pit betwixt the collar-bones to the bottom of the breast, one face.

From the bottom of the breast to the navel, one face.

From the navel to the genitals, one face.

From the genitals to the upper part of the knees, two faces.

The knee contains half a face.

From the lower part of the knee to the ankle, two faces.

From the ankle to the sole of the foot, half a face.

A man, when his arms are stretched out, is, from the longest finger of his right hand to the longest of his left, as broad as he is long.

From one side of the breasts to the other, two faces.

The bone of the arm called *humerus*, is the length of two faces, from the shoulder to the elbow.

From the end of the elbow to the root of the little finger, the bone called *cubitus*, with part of the hand, contains two faces.

From the box of the shoulder-blade to the pit betwixt the collar-bones, one face.

If you would be satisfied in the measures of breadth from the extremity of one finger to the other, so that this breadth should be equal to the length of the body, you must observe, that the boxes of the elbows with the *humerus*, and of the *humerus* with the shoulder-blade, bear the proportion of half a face, when the arms are stretched out.

The sole of the foot is the sixth part of the figure.

The hand is the length of the face.

The thumb contains a nose.

The inside of the arm, from the place where the muscle disappears, which makes the breast, called the *pectoral muscle*, to the middle of the arm, four noses.

From the middle of the arm to the beginning of the hand, five noses.

The longest toe is a nose long.

The two utmost parts of the teats and the pit betwixt the collar-bones of a woman, make an equilateral triangle.

For the breadth of the limbs, no precise measure can be given; because the measures themselves are changeable, according to the quality of the persons, and according to the movements of the muscles.

8. *Of Drapery.* In the art of cloathing the figures, or casting the drapery properly and elegantly upon them, many things are to be observed. 1. The eye must never be in doubt of its object; but the shape and proportion of the part or limb, which the drapery is supposed to cover, must appear; at least so far as art and probability will permit: and this is so material a consideration, that many artists draw first the naked figure, and afterwards put the draperies upon it. 2. The drapery must not fit too close to the parts of the body: but let it seem to flow round, and as it were to embrace them; yet so as that the figure may be easy, and have a free motion. 3. The draperies which cover those parts that are exposed to great light, must not be so deeply shaded as to seem to pierce them; nor should those members be crossed by folds that are too strong, lest by the too great darkness of their shades the members look as if they were broken. 4. The great folds must be drawn first, and then stroked into lesser ones: and great care must be taken that they do not cross one another improperly. 5. Folds in general should be large, and as few as possible. However, they must be greater or less according to the quantity and quality of the stuffs of which the drapery is supposed to be made. The quality of the persons is also to be considered in the drapery. If they are magistrates, their draperies ought to be large and ample; if country clowns or slaves, they ought to be coarse and short; if ladies or

nymphs, light and soft. 6. Suit the garments to the body, and make them bend with it, according as it stands in or out, straight or crooked; or as it bends one way or another; and the closer the garment fits to the body, the narrower and smaller must be the folds. 7. Folds well-imagined give much spirit to any kind of action; because their motion implies a motion in the acting member, which seems to draw them forcibly, and makes them more or less stirring as the action is more or less violent. 8. An artful complication of folds in a circular manner greatly helps the effect of fore-shortenings. 9. All folds consist of two shades, and no more; which you may turn with the garment at pleasure, shadowing the inner side deeper, and the outer more faintly. 10. The shades in silk and fine linen are very thick and small, requiring little folds and a light shadow. 11. Observe the motion of the air or wind, in order to draw the loose apparel all flying one way: and draw that part of the garment that adheres closest to the body, before you draw the looser part that flies off from it; lest, by drawing the looser part of the garment first, you should mistake the position of the figure, and place it awry. 12. Rich ornaments, when judiciously and sparingly used, may sometimes contribute to the beauty of draperies. But such ornaments are far below the dignity of angels or heavenly figures; the grandeur of whose draperies ought rather to consist in the boldness and nobleness of the folds, than in the quality of the stuff, or the glitter of ornaments. 13. Light and flying draperies are proper only to figures in great motion, or in the wind: but when in a calm place, and free from violent action, their draperies should be large and flowing; that, by their contrast and the fall of the folds, they may appear with grace and dignity. And thus much for drapery; an example or two of which are given in Plate XCVIII. But see farther the articles *CRAYON-PAINTING*, sect. ii.; and *PAINTING*, n^o 10.

9. *On the Passions.* The passions, says M. Le Brun, are motions of the soul, either upon her pursuing what she judges to be for her good, or shunning what she thinks hurtful to her; and commonly, whatever causes emotion of passion in the soul, creates also some action in the body. It is therefore necessary for a painter to know which are the different actions in the body that express the several passions of the soul, and how to delineate them.

M. Le Brun has been extremely happy in expressing many of the passions, and you cannot study any thing better than the examples which he has left us of them. A few of which are carefully copied in Plates XCV. and XCVIII. However, as M. De Piles justly observes, it is absurd as well as impossible to pretend to give such particular demonstrations of them as to fix their expression to certain strokes, which the painter should be obliged to make use of as essential and invariable rules. This, says he, would be depriving the art of that excellent variety of expression which has no other principle than diversity of imagination, the number of which is infinite. The same passion may be finely expressed several ways, each yielding more or less pleasure in proportion to the painter's understanding and the spectator's discernment.

Though every part of the face contributes towards expressing the sentiments of the heart, yet the eyebrow, according to M. Le Brun, is the principal seat



Placid or Fearless



Fear or Anger

A Well Deserve

of expression, and where the passions best make themselves known. It is certain, says he, that the pupil of the eye, by its fire and motion, very well shews the agitation of the soul, but then it does not express the kind or nature of such an agitation; whereas the motion of the eye-brow differs according as the passions change their nature. To express a simple passion, the motion is simple; to express a mixed passion, the motion is compound: if the passion be gentle, the motion is gentle; and if it be violent, the motion is too. We may observe farther, says he, that there are two kinds of elevation in the eye-brows. One, in which the eye-brows rise up in the middle; this elevation expresses agreeable sensations, and it is to be observed that then the mouth rises at the corners. Another, in which the eye-brows rise up at the ends, and fall in the middle; this motion denotes bodily pain, and then the mouth falls at the corners. In laughter, all the parts agree; for the eye-brows, which fall toward the middle of the forehead, make the nose, the mouth, and the eyes, follow the same motion. In weeping, the motions are compound and contrary; for the eye-brows fall toward the nose and over the eyes, and the mouth rises that way. It is to be observed also, that the mouth is the part of the face which more particularly expresses the emotions of the heart: for when the heart complains, the mouth falls at the corners; when it is at ease, the corners of the mouth are elevated; and when it has an aversion, the mouth shoots forward, and rises in the middle.

"The head, says M. De Piles, contributes more to the expression of the passions than all the other parts of the body put together. Those separately can only shew some few passions, but the head expresses them all. Some, however, are more peculiarly expressed by it than others: as humility, by hanging it down; arrogance, by lifting it up; languishment, by inclining it on one side; and obstinacy, when with a stiff and resolute air it stands upright, fixed, and stiff between the two shoulders. The head also best shews our supplications, threats, mildness, pride, love, hatred, joy, and grief. The whole face, and every feature, contributes something: especially the eyes; which, as Cicero says, are the windows of the soul. The passions they more particularly discover are, pleasure, languishing, scorn, severity, mildness, admiration, and anger; to which one might add joy and grief, if they did not proceed more particularly from the eye-brows and mouth; but when those two passions fall in also with the language of the eyes, the harmony will be wonderful. But though the passions of the soul are most visible in the lines and features of the face, they often require the assistance also of the other parts of the body. Without the hands, for instance, all action is weak and imperfect; their motions, which are almost infinite, create numberless expressions: it is by them that we desire, hope, promise, call, send back; they are the instruments of threatening, prayer, horror, and praise; by them we approve, condemn, refuse, admit, fear, ask; express our joy and grief, our doubts, regrets, pain, and admiration. In a word, it may be said, as they are the language of the dumb, that they contribute not a little to speak a language common to all nations, which is the language of painting. But to

say how these parts must be disposed for expressing the various passions, is impossible; nor can any exact rules be given for it, both because the task would be infinite, and because every one must be guided in this by his own genius and the particular turn of his own studies." See PAINTING, n° 15.

10. On drawing Landships, Buildings, &c. Of all the parts of drawing, this is the most useful and necessary, as it is what every man may have occasion for at one time or another. To be able, on the spot, to take the sketch of a fine building, or a beautiful prospect; of any curious production of art, or uncommon appearance in nature; is not only a very desirable accomplishment, but a very agreeable amusement. Rocks, mountains, fields, woods, rivers, cataracts, cities, towns, castles, houses, fortifications, ruins, or whatsoever else may present itself to view on our journeys or travels in our own or foreign countries, may be thus brought home, and preserved for our future use either in business or conversation. On this part, therefore, more than ordinary pains should be bestowed.

All drawing consists in nicely measuring the distances of each part of the piece by the eye. In order to facilitate this, let the learner imagine in his own mind, that the piece he copies is divided into squares. For example: Suppose or imagine a perpendicular and a horizontal line crossing each other in the centre of the picture you are drawing from; then suppose also two such lines crossing your own copy. Observe in the original, what parts of the design those lines intersect, and let them fall on the same parts of the supposed lines in the copy: We say, the supposed lines; because though engravers, and others who copy with great exactness, divide both the copy and original into many squares, as below: yet this is a method not to be



recommended, as it will be apt to deceive the learner, who will fancy himself a tolerable proficient, till he comes to draw after nature, where these helps are not to be had, when he will find himself miserably defective and utterly at a loss.

If he is to draw a landkip from nature, let him take his station on a rising ground, where he will have a large horizon; and mark his tablet into three divisions, downwards from the top to the bottom; and divide in his own mind the landkip he is to take, into three divisions also. Then let him turn his face directly opposite to the middle of the horizon, keeping his body fixed, and draw what is directly before his eyes upon the middle division of the tablet; then turn his head, but not his body, to the left hand, and delineate what he views there, joining it properly to what he had done before; and, lastly, do the same by what is to be seen upon his right hand, laying down every thing exactly both with respect to distance and proportion.

The best artists of late, in drawing their landships, make them shoot away one part lower than another. Those who make their landships mount up higher and

higher, as if they stood at the bottom of a hill to take the prospect, commit a great error: the best way is to get upon a rising ground, make the nearest objects in the piece the highest, and those that are farther off to shoot away lower and lower till they come almost level with the line of the horizon, lessening every thing proportionably to its distance, and observing also to make the objects fainter and less distinct the farther they are removed from the eye. He must make all his lights and shades fall one way; and let every thing have its proper motion: as, Trees shaken by the wind, the small boughs bending more, and the large ones less:

D R E

Dray
|
Dreams.

DRAY, a kind of cart used by brewers, for carrying barrels of beer, or ale; also a sledge drawn without wheels.

DRAY, among sportsmen, denotes squirrel-nests, built in the tops of trees.

DRAYTON (Michael), an eminent English poet, born of an ancient family in Warwickshire in 1563. His propensity to poetry was extremely strong, even from his infancy; and we find the most of his principal poems published, and himself highly distinguished as a poet, by the time he was about 30 years of age.—It appears from his poem of “Moses’s birth and miracles,” that he was a spectator at Dover of the famous Spanish armada, and it is not improbable that he was engaged in some military employment there. It is certain, that not only for his merit as a writer, but his valuable qualities as a man, he was held in high estimation, and strongly patronized by several personages of consequence; particularly by Sir Henry Goodere, Sir Walter Aston, and the Countess of Bedford; to the first of whom he owes himself indebted for great part of his education, and by the second he was for many years supported.

His poems are very numerous; and so elegant, that his manner has been copied by many modern writers of eminence since. Among these the most celebrated one is the *Poly-Albion*, a chorographical description of England, with its commodities, antiquities, and curiosities, in metre of 12 syllables; which he dedicated to prince Henry, by whose encouragement it was written: and whatever may be thought of the poetry, his descriptions are allowed to be exact. He was styled *poet laureat* in his time: which, as Ben Johnson was then in that office, is to be understood in a loose sense, of approbation as an excellent poet; and was bestowed on others as well as Drayton, without being confined strictly to the office known by that appellation. He died in 1631; and was buried in Westminster abbey, among the poets, where his bust is to be seen, with an epitaph penned by Ben Johnson.

DREAMS; those fancies or imaginations which occur to the minds of people when asleep.

The subject of dreaming hath been investigated by several philosophers, but hitherto with very little success.—Wolffius supposes that dreams take their rise entirely from the sensations; and that no dream arises in the human mind without a previous sensation, though perhaps such a slight one that it cannot easily be traced. This hypothesis is expressly adopted by Mr Forney, in an essay on dreaming, in the *Memoirs of the Academy of Sciences at Berlin*.—Mr Baxter, in his

water agitated by the wind, and dashing against ships or boats; or falling from a precipice upon rocks and stones, and spiring up again into the air, and sprinkling all about: clouds also in the air, now gathered with the winds; now violently condensed into hail, rain, and the like: Always remembering, that whatever motions are caused by the wind must be made all to move the same way, because the wind can blow but one way at once.

Finally, it must be observed, that in order to attain any considerable proficiency in drawing, a knowledge of **PERSPECTIVE** is absolutely necessary; see that article.

D R E

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treatise of the Immateriality of the human Soul, attributes dreams to the action of some immaterial beings upon our soul.—Lastly, some modern physiologists reckon dreaming to be a species of *delirium*. Their account of the matter is as follows. The brain and nervous system, which are the only organs of sensation, are generally in two states, exceedingly different from one another, which may be expressed by the words *excitement* and *collapse*. The first of these denotes that state in which the nervous system is easily made sensible of the impressions of external objects, and then we are said to be awake. The second is, when external objects do not easily make these impressions: and of this state there are various degrees; drowsiness, sleep, fainting, and death. These do not indeed proceed in the order in which we have placed them. Sleep is of a quite different nature from fainting, or from that stupor and insensibility produced by a compression of the brain. But, whatever be the nature of sleep, it is certain that this state is attended with what we call a *collapse* of the brain; as external objects do not make the same impressions on the organs of sense when people are asleep, that they do when awake. Between the two states of sleeping and waking, a state of delirium always occurs; and this is most probably occasioned by the excitement of one part of the brain, and the collapse of another.—That one part of the brain is capable of being excited, while the other suffers a collapse, will be evident from considering what happens when we are just falling asleep. Every one must be sensible, that at that time we do not lose our senses all at once. The hearing will continue after the sight is lost; and, even while we are yet conscious of the place we are in, false imaginations of a nature similar to that of dreaming will occur to our minds. But when the brain is perfectly collapsed, sensation or imagination of every kind totally vanishes, and we are altogether unconscious of existence.

On a subject so obscure, and so much out of the reach of investigation, as that of dreaming, it is difficult to advance any thing satisfactory. All the above-mentioned hypotheses, however, seem to be exceedingly imperfect.—It may be granted Wolffius and Forney, that dreams will arise from certain impressions made either on the external or internal parts of the body. But these impressions by no means produce any thing like the sensations we have from similar ones made upon us while we are awake. Thus, if a person whose digestion is not very good, goes soon to bed after eating a large supper, it is not improbable that he will dream of being oppressed with a great weight, by a monster, being suffocated, &c. These

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dreams undoubtedly arise from the uneasy sensations produced in the stomach from too great a quantity of food; but if the person was awake, such sensations would produce only a sickness and uneasiness at stomach. If dreams, therefore, in all cases, proceed from sensations, we must also say, that in sleep the laws of sensation itself are altered; that those connections which we look upon to be the most constant and invariable, are not so in reality; and thus we are led into a greater difficulty than before. For example, there is no sensation more invariable, than that, when a man's stomach is oppressed, he should feel what we call *sickness*. This sensation happening in the time of sleep, according to Wolfius, produces a dream. Very true, it will do so; but why does not the man dream that he is sick? What connection is there between *sickness*, the waking sensation, and being oppressed by a weight, suffocated by a monster, &c. the sleeping ones?—This difficulty seems insurmountable on the hypothesis of Wolfius and Forney.

Mr Baxter's supposition is, in its very nature, *incapable* of proof. We are by no means ascertained of the existence of any immaterial beings, created ones at least, that can have access to our souls: and though we were, the ridiculous fancies that sometimes occur in dreams are too absurd to be supposed the work of any rational being; much less of those who possess an higher rank in the creation than ourselves.—It must also be observed, that the method which this author takes to prove his hypothesis can never be conclusive, even though every thing he contends for should be granted. He insists that the phantasm, or what is properly called the *vision*, in dreams, is not the work of the soul itself, and cannot be the effect of mechanical causes; therefore, according to him, it must be the effect of *immechanical*, or *immaterial*, agents operating upon the soul.—That it is not the work of the soul itself, may readily be granted; and likewise that it is not the effect of such mechanical causes as we are acquainted with: but from thence it will not follow, that it must necessarily be the effect of immaterial causes, unless we were perfectly well acquainted with the extent of all mechanical powers whatever. Nay, in many instances, such as that above-mentioned, we are certain that dreams not only may be, but actually are, the effects of mechanical causes, though we should never be able to investigate them.

The third hypothesis seems also inadequate to solve the phenomena of dreaming. If this depended on a partial excitement of the brain, our ideas ought to be just, as far as that excitement could reach. Thus, supposing that part of the brain on which sight depends, to be quite collapsed; and that on which hearing depends, to be in some measure excited; the person, tho' deprived of sight, would hear sounds confusedly: but still they would only be such sounds as were actually produced by external objects; and no reason can be assigned why he should imagine he heard sounds which never existed.—Besides, in dreaming, it is very manifest, that the excitement of the brain is not *partial*, but *false*. No person in his dreams imagines himself deaf, dumb, or blind. He imagines that he sees, hears, walks, reasons; nay, sometimes that he sleeps and dreams; which a partial excitation of the brain can never account for.

Before any thing can be conjectured with probabi-

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lity concerning the phenomena of dreaming, it is necessary to investigate in some measure the nature of sleep.—On this subject it may be observed, that by whatever means sleep is produced, whether naturally by fatigue, artificially by compressing the brain, &c.; and however different these kinds of sleep may be from one another, one general effect still remains the same; namely, that the external senses are abolished, and the person becomes totally unconscious of whatever passes around him. From this general effect, which in all cases is constant and invariable, sleep may be defined, "a state in which all communication is cut off between our sentient principle and this visible world."—That the sentient and vital principle hath its residence in the brain, is an opinion which in all ages hath been esteemed very probable. If the comparison can be allowed, it might here be said, that the brain, with regard to sensation, hath the same relation to the nerves, that a pond or reservoir of water hath to a number of small streams that flow into it and out from it.—In the brain there seems to be a kind of general repository of some part of those sensations we have formerly felt; but in what manner this repository is formed, we know not. Certain it is, that there the ideas are treasured up in such a manner as to be at times, and indeed most commonly, imperceptible to ourselves. Thus, there are many things we have done, many people we have been acquainted with, and many places we have been in, of which we are just now quite insensible, and will remain so till some circumstance or other brings them to our remembrance. For example: Suppose a man has been intimately acquainted with two others who were companions, and lodged in the same house; he goes into another country, and being engaged in new pursuits, forgets both so completely, that for a considerable time he hath perhaps never thought of them at all. But if he should unexpectedly meet with one of these friends in the street, he will instantly remember the other who is at a distance; and this very circumstance will bring a train of thoughts into his mind, which produces the remembrance of many things that otherwise perhaps would never have been thought of. Now, if we consider what passes with regard to our own minds and intellectual faculties, we shall readily be convinced, that every thing we do remember, occurs only in consequence of some external circumstance. If a person gave us a slight offence yesterday, to-day perhaps we do not think of it, even though we see the person; but if he offends again, though in another manner, the offence of yesterday instantly occurs to our minds. A thousand other instances of the like kind might be added; so many indeed, that some have doubted whether we ever do forget any thing so completely that it could not be brought to our remembrance by a proper combination of external circumstances.

The only things we can think of, are the present and the past. When we think of what is to come, we must combine ideas from the present and the past. If, therefore, our memory depends on a certain combination of external circumstances immediately present to our view, it must necessarily follow, that the more a person is kept in perfect solitude, or removed from every thing that can affect his senses, the more he will be inclined to sleep. And, indeed, as far as this experiment can

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be tried, it will most commonly be found successful. For, let a person who has slept his usual time through the night be put to bed at noon-day, in a dark room, where there is nothing either to amuse or disturb him, and he will almost certainly fall asleep in a short time. Hence it would seem, that by whatever means our sensations of what is present, or our external senses, are suspended; by the same, our memory must also be extinguished, and we become absolutely unconscious of existence, or fall asleep.

This state of the body, therefore, may be produced in three different ways. 1. By a removal of all such objects as by their appearance make a strong impression on the nervous system. 2. By compressing or otherwise injuring the brain, so that the vital principle cannot receive the sensations from the nerves. 3. By injuring the extremities of the nerves in such a manner, that they cannot receive any sensation from the impression of external objects.

The first and the last of these are the common methods by which natural sleep is produced. But, before we can fully investigate our subject, another question remains to be discussed; namely, From whence are the sentient extremities of the nerves supplied with that fluid which is the immediate instrument of sensation?

Under the article *Blood*, it hath been shewn, that, in respiration, there is a certain quantity of a subtle fluid received from the air, which is absolutely necessary to life. Of this fluid there is undoubtedly a considerable waste somewhere or other; because respiration cannot be interrupted even for a very short time, without a total destruction of life. The arterial blood, which receives this subtle vivifying spirit, shews that it hath done so by its florid red colour, which distinguishes it from that of the veins. During the course of the circulation, that spirit, or whatever it is, which gives the arterial blood its florid colour, is dissipated, and the blood returned by the veins makes a quite different appearance. It would seem probable, therefore, that this very volatile part is absorbed by the nerves, which every where accompany the blood-vessels.—If this is the case, we must easily see the reason why a state of sleep so readily follows immoderate fatigue, watching, &c.; namely, because these things occasion a constant drain of the vital principle from the blood, which at last becoming greater than the supply afforded by respiration, the blood becomes deprived of a part of that principle which ought to be retained in it, and which consequently cannot be bestowed on the nerves without great uneasiness and inconvenience. In such cases, therefore, unless the external impressions are very strong, the absorption of the vital principle by the nervous system will not go on; and the consequence of this must be, that the person will very soon fall asleep, for the reasons already given.—Hence we see, why any thing that impedes the circulation also produces a tendency to sleep. Of this we have a remarkable instance in the effects of cold. The first symptom of death in those who are about to perish with cold, is a drowsiness, which soon increases to such a degree that it cannot be resisted. The person sits down, as he imagines, to take a short nap, but never awakes.—In the same way we may account for that kind of sleep called *fainting*, which usually follows excessive evacua-

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tions or fatigue of any kind. By these the circulation of the blood is disturbed, or perhaps its quantity lessened in such a manner, that the extreme parts of the nerves cannot receive a sufficient supply of vital fluid to enable them to perform their functions. The external senses therefore cease; and though former sensations remain in the memory, yet as no external circumstance can be perceived, which only can call the memory into action, a state of total insensibility generally ensues.

This hypothesis proceeds upon a principle somewhat different from those laid down by the generality of physiologists. Those who allow the nervous fluid to be secreted from the blood by the brain, generally suppose that it is sent out from thence to all parts of the body; but the idea that any quantity of the nervous or vital fluid is absorbed from the blood by the extremities of the nerves, seems not to have occurred. It is certain, however, that we have the same evidence of this absorption by the extremities of the nerves that there is of the secretion in the brain. The blood, on this supposition, contains the vital principle; but all the blood is not sent to the brain. The greater part of it is sent to other parts of the body. There doth not seem to be any essential difference between the blood brought back from the brain, and that returned by the veins from other parts of the body. Both of them have evidently suffered a loss of their most subtle part. In the first it is not disputed that the volatile part lost by the blood is received by the brain; but what becomes of that which is lost by the blood sent to all the other parts of the body? We can here give no other answer, than that in all probability it is taken up by the extremities of the nerves, and supplies them with the powers necessary for sensation, and the regulation of the body. Hence we see the reason why depriving any part of the body, of the blood it contained, deprives it also of sensation; namely, because there is then no source whence the extremities of the nerves can be supplied with the sentient principle.

If what is now advanced can be admitted with any degree of probability, the explication of the phenomena of dreaming, as far as an explanation can reasonably be expected, will not be difficult. According to this hypothesis, as long as a certain motion is communicated, by the impression of external objects, from the sentient extremities of the nerves to the brain, so long we continue sensible of the existence of the objects around us, or are said to be *awake*. When, from a deficiency of the vital fluid in the extremities of the nerves, from a compression of the brain, or from any other cause, the above-mentioned motion ceases, we are insensible of our existence, and are said to be *asleep*. In sleep therefore the nervous fluid, which lies between the extreme parts of the nerves and the brain, is either deficient in quantity, or remains at rest, or its influx into the brain is interrupted. When we are awake, the communication is free, the fluid in sufficient quantity, and liable to be set in motion by every slight impulse. Of these impulses therefore we are sensible, and our sensations are uniform and regular. When external objects cease to be perceived, still the nerves contain a quantity of the fluid we have mentioned, and which is very easily set in motion. If irregular motions hap-

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pen in it from any internal cause, the consequence must be a multitude of confused and irregular sensations, which we call *dreaming*.

This may be illustrated by the following examples. There is no sense we exercise so much as that of sight; and it is the one of which we can most easily deprive ourselves at pleasure. By means of this sense every person has it in his power to dream when he pleases; and to do so, he needs only to shut his eyes. No person can shut his eyes even for a few moments, but he will be sensible of a great number of faint confused images presenting themselves before him; and these he cannot possibly remove, till he opens his eyes, or falls asleep altogether. It can scarce be doubted, that these images are occasioned by the great mobility and subtilty of the fluid contained in the optic nerve. Though the regular motion produced in it by the impulse of the light ceases when the eye-lids are shut, yet an irregular one continues from some internal causes, and this motion occasions the confused sensation already mentioned. The appearance of such images we do not indeed in the present instance call *dreams*, because our other senses are awake; but if these individual sensations were to occur while we were asleep, undoubtedly they would be called by that name; and from what is already observed, they seem plainly to be of the same nature in both cases.

With regard to the other senses, it is not in our power to hinder the operation of external objects upon them, as we can do with our sight; but there is no reason to suppose that dreams might not be produced by them in the very same manner that they are by our faculty of vision, provided we could as easily suspend the operation of external objects upon them.—We have an evidence of the truth of this supposition in the case of fainting; which is generally preceded by a noise in the ears. In many diseases also, particularly nervous ones, the *tinnitus aurium*, or noise in the ears, is a very troublesome symptom.

The sense of feeling is less liable to deception while we are awake than any of the rest; nevertheless there is one case which may be referred to that of dreaming, and which has been very often taken notice of. It is an imagination common to people who have lost a limb, that they still feel a pain in it, though many years after it has been separated from their body. If this imagination occurred only in the time of sleep, we would have no hesitation in calling it a dream; but as it occurs while the persons are awake, it hath been explained without thinking of any connection between it and the phenomenon of dreaming. It is certain, however, that whatever explains the one, will explain the other also. In the case of the amputated limb, the sensation arises from some injury offered to the nerve which had formerly gone to that limb. This produces a certain motion in the nervous fluid, that is propagated along the nerves to the brain, upon which the imagination that the limb still remains immediately takes place. In like manner, if, during the time of sleep, a similar motion shall occur, a similar imagination or dream will be the consequence.—It must be observed, however, that, in dreaming, our sense of feeling is much more obscure than those of seeing and hearing. We dream that we see objects and hear sounds pretty distinctly; while we scarce *feel* any thing we imagine

ourselves to touch, or carry in our hands; and as for the senses of taste and smell, they are scarce ever exercised in dreaming.

Dreams have in all ages been reckoned by the vulgar to have something portentous in them, and to prefigure future events. Indeed, there are few things about which the superstition of mankind hath more exercised itself than the interpretation of dreams. If the abovementioned solution of this phenomenon is allowed, it may readily be granted, that dreams may prefigure diseases, or changes of the weather, because the nervous system is very apt to be influenced by alterations in our atmosphere; and no alteration in our health can possibly take place without producing some change in the nervous system. But how they can prefigure events entirely unconnected with our bodies, doth not appear; or rather it appears very plain that naturally they cannot; though the sacred writers give us many instances of the knowledge of future events being conveyed to mankind in dreams, by a supernatural influence. From the solution of this phenomenon we have just now given, it appears, how imaginations resembling dreams may occur as well when we are awake as when we are asleep; and that they actually do so, we have many melancholy instances in hypochondriac and mad people.

DRELCOURT (Charles), minister of the reformed church at Paris, was born at Sedan, in 1595, where his father enjoyed a considerable post. He had all the qualifications that compose a respectable clergyman; and though he defended the Protestant cause against the Romish religion, was much esteemed even among the Catholics. He is best known in England by his *Consolations against the fears of death*, which work was translated, and is often printed. He married the daughter of a rich merchant at Paris, by whom he had 16 children; his third son, professor of physic at Leyden, was physician to the prince and princess of Orange, before their accession to the crown of England: Bayle has given him a high character. Mr Drelcourt died in 1660.

DRENCH, among farriers, a physical potion for horses. The ingredients for this purpose are to be beat coarsely, and either mingled with a decoction, or with wine. Then let all infuse about a quarter of an hour; and give it to the horse with a horn, after he has been tied up two hours to the rack.

DRESDEN, the capital city of the electorate of Saxony, in Germany. It is seated on the river Elbe, which divides it into two parts. One part is called *Old Dresden*, and the other the *New Town*, in the German language, *New Stadt*. They are joined together by a stone bridge, supported by 19 piers, and 630 paces in length. As this bridge was too narrow for the crowds of people that were continually passing and repassing, king Augustus, in 1730, caused two walks for foot-passengers to be built, one on each side, in a very wonderful manner, the one for those that go into the city, and the other for those that return back. These are bordered with iron palisadoes, of curious workmanship. Upon this bridge a gilded crucifix is placed. Dresden is surrounded by strong and handsome fortifications; and might boast that it never had been taken, nor yet besieged: but this glory was put to an end on December 19. 1745, by the king of Prussia; who

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who then became master of it, and entered it in triumph the next day.

All the houses of this city are built with square free stone, and are almost all of the same height. They have stone from the neighbourhood of Pirna, about 10 miles from this city, which is readily brought down the Elbe. They have lately finished a large handsome church for the Roman Catholics, which is placed between the Elbe, the bridge, and the castle. In general the houses are high and strong; the streets wide, straight, well paved, clean, and well illuminated in the night; and there are large squares, disposed in such a manner, that Dresden may pass for one of the handsomest cities in the world.

Though this city lies in a low situation, yet it hath agreeable prospects. It is supplied with a prodigious quantity of provisions, not only out of the neighbourhood, but from Bohemia, which are brought every market-day, which is once a-week. The Dresden china-ware, or rather porcelain, has been noted some time for a curious manufacture. E. Long. 13. 34. N. Lat. 51. 12.

DRESSING of HEMP and Flax. See **FLAX-Dressing**.

DRESSING of Meats, the preparing them for food, by means of culinary fire.

The design of dressing, is to loosen the compages or texture of the flesh, and dispose it for dissolution and digestion in the stomach. Flesh not being a proper food without dressing, is alleged as an argument that man was not intended by nature for a carnivorous animal.

The usual operations are roasting, boiling, and stewing.—In roasting, it is observed, meat will bear a much greater and longer heat than either in boiling or stewing; and in boiling, greater and longer than in stewing. The reason is, that roasting being performed in the open air, as the parts being externally to warm, they extend and dilate, and so gradually let out part of the rarified included air, by which means the internal succussions, on which the dissolution depends, are much weakened and abated. Boiling being performed in water, the pressure is greater, and consequently the succussions to lift up the weight are proportionably strong; by which means the coction is hastened: and even in this way there are great differences; for the greater the weight of water, the sooner is the business done.

In stewing, though the heat be infinitely short of what is employed in the other ways, the operation is much more quick, because performed in a close vessel, and full; by which means the succussions are oftener repeated, and more strongly reverberated. Hence the force of Papin's digester; and hence an illustration of the operation of digestion.

Boiling, Dr Cheyne observes, draws more of the rank, strong juices from meat, and leaves it less nutritive, more diluted, lighter, and easier of digestion: roasting, on the other hand, leaves it fuller of the strong nutritive juices, harder to digest, and needing more dilution. Strong, grown, and adult animal food, therefore, should be boiled; and the younger, and tenderer, roasted.

DRESSING, in surgery, the treatment of a wound, or any disordered part. The apparatus of dressing con-

sists of drossils, tents, plasters, compresses, bandages, bands, ligatures, and strings. See **SURGERY**.

DREXELIUS (Jeremiah), a Jesuit celebrated for his piety and writings, was born at Ausburg, and became preacher in ordinary to the elector of Bavaria. He wrote several pious and practical pieces, which have been printed together in two volumes folio; and died in 1638.

DREVET (Peter), an eminent French engraver, was a member of the royal academy of painting and sculpture; and died at Paris in 1739, at 42 years of age. His portraits are neat and elegant; but laboured to the last degree. They are copied from Rigaud and other French masters; and abound in all that flatter and licentious drapery so opposite to the simple and chaste ideas of true taste. He chiefly excels in copying Rigaud's frippery, lace, silk, fur, velvet, and other ornamental parts of dress.—His father was excellent in the same art.

DREUX, a town in the Isle of France, remarkable for its antiquities; and for the battle which was fought in December 1562, between the Papists and the Protestants, wherein the former gained the victory. Some think it took its name from the priests of Gaul, called the *Druids*, in the times of Paganism. It consists of two parishes, St Stephen's and Notre Dame, called the *great church*, which is pretty well built. It is seated on the river Blaise, at the foot of a mountain, on which is a ruined castle. E. Long. 1. 27. N. Lat. 48. 44.

DRIFT, in navigation, the angle which the line of a ship's motion makes with the nearest meridian, when she drives with her side to the wind and waves, and is not governed by the power of the helm: it also implies the distance which the ship drives on that line.

A ship's way is only called *drift* in a storm; and then, when it blows so vehemently as to prevent her from carrying any sail, or at least restrains her to such a portion of sail as may be necessary to keep her sufficiently inclined to one side, that she may not be dismasted by her violent labouring produced by the turbulence of the sea.

DRIFT, in mining, a passage cut out under the earth betwixt shaft and shaft, or turn and turn; or a passage or way wrought under the earth to the end of a meer of ground, or part of a meer.

DRIFT-Sail, a sail used under water, veered out right a-head by sheets, as other sails are. It serves to keep the ship's head right upon the sea in a storm, and to hinder her driving too fast in a current.

DRILL, in mechanics, a small instrument for making such holes as punches will not conveniently serve for. Drills are of various sizes, and are chiefly used by smiths and turners.

DRILL, or *Drill-Box*, a name given to an instrument for sowing land in the new method of horse-hoeing husbandry. See **AGRICULTURE**.

DRILL-Sowing, a method of sowing grain or seed of any kind, so that it may all be at a proper depth in the earth, which is necessary to its producing healthful and vigorous plants. For this purpose a variety of drill-ploughs have been invented and recommended; but from the expence attending the purchase, and the extreme complication of their structure, there is not an instrument of that kind, as yet discovered, that is likely to

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to be brought into general use. This method, however, is greatly recommended in the Geographical Essays, where we have the following observations and experiments.—“ Grain sown by the hand, and covered by the harrows, is placed at unequal depths; the seeds consequently sprout at different times, and produce an unequal crop. When barley is sown late, and a drought succeeds, the grain that was buried in the moisture of the earth soon appears, while such as was left near the surface lies baking in the heat of the sun, and does not vegetate till plentiful rains have moistened the soil. Hence an inequality of the crop, an accident to which barley is particularly liable. The same observation, but in a more striking manner, may be made upon the sowing of turnips. It frequently happens that the husbandman is obliged to sow his seed in very dry weather, in hopes that rain will soon follow; and either rolls or covers it with a bush-harrow. We will suppose, that, contrary to his expectations, the dry weather continues. The seed, being near the surface, cannot sprout without rain. The husbandman is mortified at his disappointment, but is soon satisfied and made easy by a perfect acquiescence in what he thinks is the will of Providence. The scourge that he feels must not be placed to the dispensation of Providence, but has its source in the ignorance of the man himself. Had he judiciously buried the seed in the moist part of the soil with the drill-plough, or harrowed it well with the common harrow, his seed would have vegetated in due season, and bountifully repaid him for his toil.

“ In the year 1769, a 15 acre clove was prepared for turnips. The land was in fine condition as to lightness, and had been well manured. On the 24th of June, 14 acres were sown with turnip-seed broad-cast, and harrowed in with a bush-harrow. The remaining acre was sown the same day with the drill-plough, allowing 14 inches between the rows, and the flares being set near two inches deep. At the time of sowing, the land was extremely dry, and the drought continued from the time of sowing to the 5th of July; so that the broad-cast did not make its appearance till about the 8th of that month, at which time the drill turnips were in rough leaf, having appeared upon the surface the sixth day after sowing.

“ In the driest seasons, at the depth of two inches or less, we are sure of finding a sufficiency of moisture to make the seed germinate. When that is once accomplished, a small degree of moisture will carry on the work of vegetation, and bring the tender plants forward to the surface. When extreme dry weather obliges the broad-cast farmer to sow late, he has no opportunity of sowing a second time if the fly should get into the field. The drill secures him in some degree against that misfortune, by giving him a full command over the seasons.

“ The excellence of the drill-plough is not confined to turnip-seed; it is an useful instrument for sowing all kinds of grain. By burying the seed at an equal depth, it secures an equal crop in all circumstances of the weather. But this is not the only consideration to the cultivator. It saves near one half of his seed, which is an object of importance to the tillage farmer.

“ In the spring of the year 1769, an acre of barley was sown in equidistant rows with the drill-plough, in

a field which was sown with the same grain and upon the same day broad-cast.—The broad-cast took three bushels per acre; the drill required only six pecks. The drills were eight inches asunder, and the seed was lodged about two inches within the soil. The drill acre was finished within the hour, and the moist distilling eye could not discover a single grain upon the surface.

“ In the course of growing, the drill barley seemed greener and bore a broader leaf than the broad-cast. When the ears were formed throughout the field, the ear of the drill barley was plainly distinguished to be near half an inch longer than the broad-cast, and the grains seemed fuller and better fed.

“ Drill-sowing, however, though it may be recommended as a most rational and judicious practice, has many difficulties to overcome, and perhaps will never be brought into general use. A proper instrument is wanting that would come cheap to the farmer, and have the requisites of strength and simplicity to recommend it. The present instruments cannot by any means be put into the hands of common servants. Should we ever be so happy as to see this objection removed, it is probable that all kinds of grain will be cultivated in drills. Corn growing in that manner has a freer enjoyment of air, and the farmer has an opportunity of hand-hoeing and weeding without injury to the growing crop. This is an object of the utmost consequence in the cultivation of beans and winter corn.

“ The best instrument for drilling of grain is the invention of the ingenious Mr Crick, and made by Mr Crichton coach-maker in Edinburgh. It works with four coulters, and the price is 12 l. With it, one man, a horse and a boy, can easily sow four acres a-day.”

DRINK, a part of our ordinary food in a liquid form. See Food.

The general use of drink is, to supply fluid; facilitate solution; in consequence of that, to expedite the evacuation of the stomach, and promote the progress of the aliment through the intestines: for, by the contraction of the longitudinal fibres of the stomach, the pylorus is drawn up, and nothing but fluid can pass; which, by its bulk, makes a hurried progress through the intestines, and so determines a greater excretion by stool, as less then can be absorbed by the lacteals. Hence a large quantity of common water has been found purgative; and, *ceteris paribus*, that aliment which is accompanied with the largest proportion of drink, makes the largest evacuation by stool. Here a question has arisen, about where the feculent part of the aliment is first remarkably collected. It is commonly thought to be in the great guts: but undoubtedly it often begins in the lower part of the ileum, especially when the drink is in small proportion, and when the progress of the aliment is slow; for when the contents of the guts are very fluid, they are quickly pushed on, and reach the great guts before they deposit any feculency. Another effect of drink is, to facilitate the mixture of the lymph, resultant from every part of the system, with the chyle. In the blood-vessels, where all must be kept fluid in order to proper mixture, drink increases the fluidity, and gives tension, by its bulk, without concomitant acrimony or too much elasticity; and so strength and oscillatory motion: hence

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drink contributes to sanguification, as sometimes food gives too dense a nutriment to be acted upon by the solids; and hence also we can see how drink promotes the secretions. These are the effects of drink in general: but what has been said must be taken with some limitations; for the more liquid the food, it is sooner evacuated, and less nourishment is extracted. Hence drink is, in some degree, opposed to nourishment; and so, *ceteris paribus*, those who use least drink are most nourished.

All the effects of drink above mentioned are produced by simple water; and it may be said, that other liquors are fit for drink in proportion to the water they contain. Water, when used as drink, is often impregnated with vegetable and farinaceous substances; but, as drinks, these impregnations are of little consequence: they add, indeed, a little nourishment; but this is not to be regarded in a healthy state. Sometimes we impregnate water with the *fructus acido-dulces*; and then, indeed, it acquires other qualities, of considerable use in the animal economy. All drinks, however, may be reduced to two heads: first, pure water, or where the additional substance gives no additional virtue; secondly, the *fermentata*. Of the first we have already spoken; and the latter have not only the qualities of the first, but also qualities peculiar to themselves.

Fermented liquors are more or less poignant to the taste, and better calculated to quench thirst. Thirst may be owing to various causes: first, to defect of fluid in the system, which occasions a scanty secretion in the mouth, fauces, and stomach; the dryness of the mouth and fauces will also in this case be increased, by their continual exposure to the perpetual flux and reflux of the evaporating air. Secondly, thirst depends on a large proportion of solid viscid food: thirdly, on an alkalescent aliment, especially if it has attained any thing of the putrefactive taint: fourthly, on the heat of the system; but this seems to operate in the same manner as the first cause, giving a sense of dryness from its dissipation of the fluids. The fermented liquors are peculiarly adapted for obviating all these causes; stimulating the mouth, fauces, and stomach, to throw out the saliva and gastric liquor by their poignancy: by their acceffyency they are fitted to destroy alkalescent acrimony, to quench thirst from that cause: by their fluidity they dilute viscid food; though here, indeed, they answer no better than common water. In two ways they promote the evacuation by stool, and progress through the intestines: first, by their fluidity and bulk; secondly, by their acceffyency, which, uniting with the bile, forms the peculiar stimulus formerly mentioned. Carried into the blood-vessels, in so far as they retain any of the saline nature, they stimulate the excretories, and promote urine and sweat; correcting thus alkalescency, not only by mixture, but dissipation of the degenerated fluids.

Many physicians, in treating of fermented liquors, have only mentioned these qualities, rejecting their nutritious virtue, which certainly ought to be taken in; though by expediting the evacuation by stool they make less of the nutritious parts of the aliment to be taken up, and by stimulating the excretories make these nutritious parts to be for a shorter time in the system. All these, and many more effects, arise from fermented

liquors. Their acceffyency sometimes promotes the disease of acceffyency, by increasing that of vegetables, acting as a ferment, and so producing flatulency, purging, cholera, &c: so that, with vegetable aliment, as little drink is necessary, the most innocent is pure water; and it is only with animal food that fermented liquors are necessary. In warmer climates, *fermentata* would seem necessary to obviate alkalescency and heat. But it should be considered, that though fermented liquors contain an acid, yet they also contain alcohol; which, though it adds stimulus to the stomach, yet is extremely hurtful in the warmer climates, and wherever alkalescency prevails in the system. Nature, in these climates, has given men an appetite for water impregnated with acid fruits, *e.g.* sherbet; but the use of this needs caution, as in these countries they are apt to shun animal food, using too much of the vegetable, and often thus causing dangerous refrigerations, choleras, diarrheas, &c.

Of varieties of fermented liquors. We shall only mention here the chief heads on which these varieties depend. First, they are owing to the quality of the subject, as more or less viscid; and to its capacity also of undergoing an active fermentation, although perhaps the more viscid be more nutritious. Hence the difference between ales and wines; by the first meaning fermented liquors from *farinacea*, by the second from the fruits of plants. It depends, secondly, on the acerbity, acidity, nature, and maturation, of the fruit. Thirdly, the variety depends on the conduct of the fermentation. In general, fermentation is progressive, being at first active and rapid, detaching the fixed air or *gas sylvestre*, at the same time acquiring more acid than before. These qualities of flatulency and acidity remain for some time; but as the fermentation goes on, the liquor becomes more perfect, no air is detached, and alcohol is produced; so that fermented liquors differ according to the progress of the fermentation, and have different effects on the system. When fermentation is stopped before it comes to maturity, though naturally it proceeds in this way, yet by addition of new ferment it may again be renewed with a turbid intestine motion.

DRIVERS, among sportsmen, a machine for driving pheasant-powts, consisting of good strong ozier wands, such as the basket-makers use; these are to be set in a handle, and twisted or bound with small oziers in two or three places. With this instrument the sportsman drives whole eyes of young powts into his nets. See the next article.

DRIVING, among sportsmen, a method of taking pheasant powts. It is thus: The sportsman finds out the haunts of these birds; and having fixed his nets there, he calls upon them together by a pheasant-call, imitating the voice of the dam; after this he makes a noise with his driver, which will make them run a little way forward in a cluster; and this he is to repeat till he has made sure of them, which an expert sportsman never fails to do, by driving them into his nets.

DRIVING, in metallurgy, is said of silver, when, in the operation of refining, the lead being burnt away, the remaining copper rises upon its surface in red fiery bubbles.

DRIVING, in the sea-language, is said of a ship, when an anchor being let fall will not hold her fast, nor prevent

vent her failing away with the wind or tide. The best help in this case is to let fall more anchors, or to veer out more cable; for the more cable she has out, the safer the rides. When a ship is a-hull, or a-try, they say, she drives to leeward.

DROGHEDA, by the English called *Tredah*, a town of Ireland, in the province of Leinster and county of Louth, and situated on a bay of the same name, in W. Long. 6. 17. N. Lat. 53. 45. It was formerly very remarkable for its situation and strength. In consequence of this it was much distinguished by the old English monarchs. Edward II. granted it a market and fair; and to these were added other great privileges in succeeding ages, particularly the right of coinage. It was bravely defended against the rebels in 1641. After the cessation of arms it was taken by the duke of Ormond and the earl of Inchiquin; but was retaken by Cromwell in 1649. At this time it suffered so much, that for a long time after it remained almost in ruins. The buildings were exceedingly shattered; and the town being taken by storm, not only the garri-son, but the inhabitants, men, women, and children, were mostly put to the sword. By degrees, however, it recovered, and is at present a large and populous place. It is a town and county; and as such sends two representatives to parliament. It has a great share of inland trade, and an advantageous commerce with England: and tho' the port is but indifferent, and narrow at its entrance, with a bar, over which ships of burden cannot pass but at high water, yet a great deal of business is done; so that, from a low and declining port, it is now become rich and thriving.

Drogheda is perhaps one of the strongest instances that can be mentioned of the inestimable benefit of a river in any degree navigable: for though the Boyne is not capable of carrying vessels bigger than barges, or pretty large boats, yet the convenience that this affords of conveying coals by water-carriage through a great extent of country, introduced a correspondence between this place and Whitehaven in Cumberland, to which the revival of its commerce has been in a great measure owing.

DROITWITCH, a town of Worcestershire in England, noted for excellent white salt made from the salt springs in its neighbourhood. W. Long. 2. 16. N. Lat. 52. 20.

DROMEDARY. See CAMELUS.

DRONE, in the history of insects, a kind of male bee, larger than the common working or honey-bees: it is so called from its idleness, as never going abroad to collect either honey or wax. See APIS and BEE.

DRONE-FLY, a two-winged insect, extremely like the common drone-bee, whence also the name.

DROPS, in meteorology, small spherical bodies which the particles of fluids spontaneously form themselves into when let fall from any height. This spherical figure, the Newtonian philosophers demonstrate to be the effect of corporeal attraction; for considering that the attractive force of one single particle of a fluid is equally exerted to an equal distance, it must follow that other fluid particles are on every side drawn to it, and will therefore take their places at an equal distance from it, and consequently form a round superficies. See the articles ATTRACTION, FLUID, and RAIN.

DROPS, in medicine, a liquid remedy, the dose of

which is estimated by a certain number of drops.

English Drops, Gutta Anglicana, a name given to a chemical preparation esteemed of great virtue against vapours and lethargic affections, and purchased at 5000l. by king Charles II. from the inventor Dr Goldard. The medicine appeared to be only a spirit drawn by the retort from raw silk, and afterwards rectified with oil of cinnamon, or any other essential oil; and was in reality no better than the common sal volatile oleosum, or any of the volatile spirits impregnated with an essential oil, except that it was less disagreeable than any of them to the taste.

Palsy Drops. See PHARMACY, n° 443.

Drops of Life. Ibid, n° 575.

DROPSY, in medicine, an unnatural collection of water in any part of the body. See (the *Index* subjoined to) MEDICINE.

DROPWORT, in botany. See FILIPENDULA.

Water Dropwort, in botany. See OENANTHE.

DROSERA, *ROS SOLIS*, or *Sun-Dew*, in botany; a genus of the pentagynia order, belonging to the pentandria class of plants. There are three species, which grow naturally in boggy places in many parts of the kingdom. They seem to receive the name of *sun-dew* from a very striking circumstance in their appearance. The leaves, which are circular, are fringed with hairs supporting small drops or globules of a pellucid liquor like dew, which continue even in the hottest part of the day and in the fullest exposure to the sun. The whole plant is acrid, and sufficiently caustic to erode the skin: but some ladies know how to mix the juice with milk, so as to make it an innocent and safe application to remove freckles and sun-burn. The juice that exudes from it unmixed, will destroy warts and corns. The plant hath the same effect upon milk that the common butterwort hath; and like that too is supposed to occasion the rot in sheep.

DROWNING, signifies the extinction of life by a total immersion in water.

In some respects, there seems to be a great similarity between the death occasioned by immersion in water, and that by strangulation, suffocation by fixed air, apoplexies, epilepsies, sudden faintings, violent shocks of electricity, or even violent falls and bruises. Physicians, however, are not agreed with regard to the nature of the injury done to the animal system in any or all of these accidents. It is indeed certain, that in all the cases above-mentioned, particularly in drowning, there is very often such a suspension of the vital powers as to us hath the appearance of a total extinction of them; while yet they may be again set in motion, and the person restored to life, after a much longer submersion than hath been generally thought capable of producing absolute death. It were to be wished, however, that as it is now universally allowed, that drowning is only a *suspension* of the action of the vital powers, physicians could as unanimously determine the means by which these powers are suspended; because on a knowledge of these means, the methods to be used for recovering drowned persons must certainly depend.

Dr de Haen, who hath written a treatise on this subject, ascribes this diversity of opinion among the physicians to their being so ready to draw general conclusions from a few experiments. Some, having never found water in the lungs, have thought that it never

Drowning. was there; and others, from its presence, have drawn a contrary conclusion. Some have ascribed the death which happens in cases of drowning, to that species of apoplexy which arises from a great fullness of the stomach. But this opinion our author rejects, because in 13 dogs which he had drowned and afterwards dissected, no signs of such a fullness appeared. Another reason is drawn from the want of the common marks of apoplexy on the dissection of the brain; and from the actual presence of water in the lungs. He is of opinion, that the death of drowned persons happens in consequence of water getting into the lungs, and stopping the blood in the arteries. He then discusses the question how far the blowing of air into the lungs is useful in recovering drowned people. If their death is to be ascribed to the water entering the lungs, this practice, he observes, must be hurtful, as it will increase the pressure on the blood-vessels, or may even force the water into them; which, on the authority of Lewis's experiments, he alleges is possible. But, in spite of this reasoning, he asserts, that from experience it has been found useful. He allows, that the practice of suspending drowned people by the feet must be hurtful, by determining the blood too much to the head; but he observes, that remedies in some respects hurtful may be used when the advantages derived from them preponderate; and is of opinion, that the practice above-mentioned may be useful by agitating the viscera against each other, and thus renewing their motions. Cutting the larynx in order to admit air more freely to the lungs, he reckons to be of little or no use; but acknowledges, however, that it may sometimes prove beneficial on account of the irritation occasioned by the operation.

Dr Cullen, in his Letter to Lord Cathcart concerning the recovery of persons drowned and seemingly dead, tells us, that "From the dissection of drowned men, and other animals, it is known, that very often the water does not enter into the cavity of the lungs, nor even into the stomach, in any quantity to do hurt to the system; and, in general, it is known, that, in most cases, no hurt is done to the organisation of the vital parts. It is therefore probable, that the death which ensues, or seems to ensue, in drowned persons, is owing to the stoppage of respiration, and to the ceasing, in consequence, of the circulation of the blood, whereby the body loses its heat, and, with that, the activity of the vital principle."

In the Phil. Transf. Vol. LXVI. Mr Hunter gives the following theory. The loss of motion in drowning, seems to arise from the loss of respiration; and the immediate effect this has upon the other vital motions of the animal, at least this privation of breathing; appears to be the first cause of the heart's motion ceasing. It is most probable therefore, Mr Hunter observes, that the restoration of breathing is all that is necessary to restore the heart's motion; for if a sufficiency of life still remains to produce that effect, we may suppose every part equally ready to move the very instant in which the action of the heart takes place, their actions depending so much upon it. What makes it very probable, that the principal effect depends upon throwing air into the lungs, is, that children in the birth, when too much time has been spent after the loss of that life which is peculiar to the fetus, lose altogether the disposition for the new life. In such cases there is a to-

tal suspension of the actions of life; the child remains to all appearance dead; and would die, if air was not thrown into its lungs, and the first principle of action by that means restored. To put this in a clearer light, Mr Hunter gives the result of some experiments made on a dog in 1755.—A pair of double bellows were provided, which were so constructed, that, by one action, air was thrown into the lungs, and by the other the air was sucked out which had been thrown in by the former, without mixing them together. The muzzle of these bellows was fixed into the trachea of a dog, and by working them he was kept perfectly alive. While this artificial breathing was going on, the sternum was taken off, so that the heart and lungs were exposed to view. The heart then continued to act as before, only the frequency of its action was greatly increased. Mr Hunter then stopped the motion of the bellows; and observed that the contraction of the heart became gradually weaker and less frequent, till it left off moving altogether; but, by renewing the operation, the motion of the heart also revived, and soon became as strong and frequent as before. This process was repeated upon the same dog ten times; sometimes stopping for five, eight, or ten minutes. Mr Hunter observed, that, every time he left off working the bellows, the heart became extremely turgid with blood, and the blood in the left side became as dark as that in the right, which was not the case when the bellows were working. These situations of the animal, he observes, seem to be exactly similar to drowning.

From these different views of this matter, physicians have differed considerably in their account of the methods to be followed in attempting the recovery of drowned persons. De Haen recommends agitation of all kinds; every kind of stimulus applied to the mouth, nose, and rectum; bleeding; heat, both by warm cloths and warm water; blowing air into the trachea; stimulants, such as blisters, warm affusions, &c. applied to the head, ankles, thighs, pit of the stomach, and other parts.

Doctor Cullen's observations on this subject are as follow.—"With respect to the particular means to be employed for the recovery of drowned persons, it is to be observed, in the first place, That such as were recommended and practised, upon a supposition that the suffocation was occasioned by the quantity of water taken into the body, and therefore to be evacuated again, were very unhappily advised. The hanging up of persons by the heels, or setting them upon the crown of the head, or rolling the body upon a cask, were generally practised, upon a supposition altogether false; or upon the supposition of a case which, if real, is apprehended to be irrecoverable. At the same time, these practices were always attended with the danger of bursting some vessels in the brain or lungs, and of rendering thereby some cases incurable, that were not so from the drowning alone. All such practices, therefore, are now very properly disapproved of and forbid.

"In those cases in which the body has not been long in the water, and in which therefore the natural heat is not entirely extinguished, nor the irritability of the moving fibres very greatly impaired, it is possible that a good deal of agitation of the body may be the only means necessary to restore the action of the vital or-

Drowning. gans; but in other cases, where the heat and irritability have ceased to a greater degree, it is to me very doubtful, if much agitation can be safe, and if any degree of it can be useful, till the heat and irritability are in some measure restored. In all cases, any violent concussion cannot be safe, and, I believe, is never necessary. It may be proper here to observe also, that, in transporting the body from the place where it is taken out of the water, to the place where it may be necessary for applying the proper means of its recovery, all postures exposing to any improper compression, as that of the body's being carried over a man's shoulder, are to be avoided. The body is to be kept stretched out, with the head and upper parts a little raised; and care is to be taken to avoid the neck's being bent much forward. In this manner, laid upon one side, and upon some straw in a cart, it may be most properly conveyed; and the agitation which a pretty brisk motion of the cart may occasion, will, in most cases, do no harm.

"From the account I have given above of the causes, or of the appearances, of death, in drowned persons, it is evident, that the first step to be taken for their recovery is to restore the heat of the body, which is absolutely necessary to the activity of the moving fibres. For this purpose, the body, as soon as possible, is to be stripped of its wet clothes, to be well dried, and to be wrapped up in dry, and (if possible) warm, coverings: and it is to be wished, in all cases, as soon as the report of a person's being drowned is heard, that blankets should be immediately carried to the water-side; so that, as soon as the body is got out of the water, the change of covering just now mentioned may be instantly made; or, if the body has been naked when drowned, that it may be immediately dried, and defended against the cold of the air. Besides covering the body with blankets, it will be further of advantage, if it can be done without loss of time, to cover the drowned body with a warm shirt or waistcoat immediately taken from a living person.

"When, at the time of a person's being drowned, it happens that the sun shines out very hot, I think there can be no better means of recovering the heat, than by exposing the naked body, in every part, to the heat of the sun; while, at the same time, all other means necessary or useful for the recovery of life are also employed.

"When the heat of the sun cannot be employed, the body should be immediately transported to the nearest house that can be got convenient for the purpose: The fittest will be one that has a tolerably large chamber, in which a fire is ready, or can be made; and, if possible, the house should afford another chamber, in which also a fire can be provided.

"When the drowned body is brought into such house, and care is at the same time taken that no more people are admitted than are absolutely necessary to the service of the drowned person, every endeavour must be immediately employed for recovering the heat of the body, and that by different measures, as circumstances shall direct.

"If, in the neighbourhood of the place, there be any brewery, distillery, dyery, or fabric which gives an opportunity of immediately obtaining a quantity of warm water and a convenient vessel, there is nothing more

proper than immersing the body in a warm bath. Even where a sufficient quantity of warm water cannot be had at once, the bath may be still practised, if the accident has happened in or very near a town or village, when a great many fires may be at once employed in heating small quantities of water; for in this way the necessary quantity may be soon obtained. To encourage this practice, it is to be observed, That one part of boiling water is more than sufficient to give the necessary heat to two parts of spring or sea water, as it is not proper to apply the bath at first very warm, nor even of the ordinary heat of the human body, but somewhat under it; and, by the addition of warm water, to bring it gradually to a heat very little above it.

"If the drowned body be of no great bulk, it may be conveniently warmed by a person's lying down in bed with it, and taking it near to their naked body, changing the position of it frequently, and at the same time chaffing and rubbing with warm cloths the parts which are not immediately applied to their warm body.

"If none of these measures can be conveniently practised, the body is to be laid upon a bed before a moderate fire, and frequently turned, to expose the different parts of it; and thus, by the heat of the fire gradually applied, and by rubbing the body well with coarse towels, or other cloths well warmed, pains are to be taken for restoring its heat. This will be promoted by warm cloths applied and frequently renewed under the hands and arm-pits; and by hot bricks, or bottles of warm water, laid to the feet.

"In the practice of rubbing, it has been proposed to moisten the cloths applied with camphorated spirits, or other such stimulating substances: but I think this must prove an impediment to the rubbing; and I would not recommend any practice of this kind, except, perhaps, the application of the vinous spirit of sal ammoniac to the wrists and ankles only.

"For recovering the heat of the body, it has been proposed, to cover it all over with warm grains, ashes, sand, or salt; and where these, sufficiently warm, are ready at hand, they may be employed; but it is very seldom they can be obtained, and the application might often interfere with other measures that may be necessary. All therefore that I can propose, with respect to the use of these, is to observe, that bags of warm and dry salt may be amongst the most convenient applications to the feet and hands of drowned persons; and the quantity necessary for this purpose may be got pretty quickly by heating the salt in a frying-pan over a common fire.

"While these measures are taking for recovering the heat, means are at the same time to be employed for restoring the action of the moving fibres. It is well known, that the intestines are the parts of the body which, both from their internal situation and peculiar constitution, retain the longest their irritability; and therefore, that, in drowned persons, stimulants applied may have more effect upon the intestines than upon other parts. The action, therefore, of the intestines is to be supported or renewed as soon as possible; as the restoring and supporting the action of such a considerable portion of moving fibres as those of the intestines, must contribute greatly to restore the activity of the whole system.

"For exciting the action of the intestines, the most proper

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Drowning. proper mean is, the application of their ordinary stimulus of dilatation; and this is most effectually applied, by forcing a quantity of air into them by the fundement. Even the throwing in cold air has been found useful: but it will certainly be better if heated air can be employed; and further, if that air can be impregnated with something which, by its acrimony, also may be powerful in stimulating the intestines.

"From all these considerations, the smoke of burning tobacco has been most commonly applied, and has upon many occasions proved very effectual. This will be most properly thrown in by a particular apparatus, which, for other purposes as well as this, should be in the hands of every surgeon; or at least should, at the public expence, be at hand in every part of the country where drownings are likely to happen. With regard to the use of it, I have to observe, that till the tobacco is kindled in a considerable quantity, a great deal of cold air is blown through the box and tube; and as that, as hinted above, is not so proper, care should be taken to have the tobacco very well kindled, and to blow through it very gently, till the heated smoke only passes through. If, upon certain occasions, the apparatus referred to should not be at hand, the measure however may be executed by a common tobacco pipe, in the following manner: A common glyster-pipe that has a bag mounted upon it, is to be introduced into the fundement, and the mouth of the bag is to be applied round the small end of a tobacco-pipe. In the bowl of this, tobacco is to be kindled; and, either by a playing card made into a tube and applied round the mouth of the bowl, or by applying upon this the bowl of another pipe that is empty and blowing through it, the smoke may be thus forced into the intestines, and, in a little time, in a considerable quantity.

"If none of these means for throwing in the smoke can be employed, it may be useful to inject warm water to the quantity of three or four English pints. This may be done by a common glyster-bag and pipe, but better by a large syringe; and it may be useful to dissolve in the water some common salt, in the proportion of half an ounce to an English pint; and also, to add to it some wine or brandy.

"While these measures for recovering the heat of the body and the activity of the moving fibres are employed, and especially after they have been employed for some time, pains are to be taken to complete and finish the business, by restoring the action of the lungs and heart.

"On this subject, I am obliged to my learned and ingenious colleague, Doctor Monro, who has made some experiments for ascertaining the best manner of inflating the lungs of drowned persons. By these experiments he finds it may be more conveniently done by blowing into one of the nostrils, than by blowing into the mouth. For blowing into the nostril, it is necessary to be provided with a wooden pipe, fitted at one extremity for filling the nostril, and at the other for being blown into by a person's mouth, or for receiving the pipe of a pair of bellows, to be employed for the same purpose. Doctor Monro finds, That a person of ordinary strength can blow into such a pipe, with a sufficient force to inflate the lungs to a considerable degree; and thinks the warm air from the

lungs of a living person will be most conveniently employed at first; but when it is not soon effectual in restoring the respiration of the drowned person, and that a longer continuance of the inflation is necessary, it may be proper to employ a pair of bellows, large enough at once to contain the quantity of air necessary to inflate the lungs to a due degree.

"Whether the blowing-in is done by a person's mouth, or by bellows, Doctor Monro observes, that the air is ready to pass by the gullet into the stomach; but that this may be prevented, by pressing the lower part of the larynx backwards upon the gullet. To persons of a little knowledge in anatomy, it is to be observed, that the pressure should be only upon the cricoid cartilage, by which the gullet may be straitened, while the passage through the larynx is not interrupted.

When, by blowing thus into the nostril, it can be perceived, by the raising of the chest or belly, that the lungs are filled with air, the blowing in should cease; and, by pressing the breast and belly, the air received into the lungs should be again expelled; then the blowing and expulsion should be again repeated; and thus the practice is to be continued, so as to imitate, as exactly as possible, the alternate motions of natural respiration.

"It is hardly necessary to observe, that when the blowing into the nostril is practised, the other nostril and the mouth should be accurately closed.

"If it should happen, that, in this practice, the air does not seem to pass readily into the lungs, Doctor Monro informs me, it is very practicable to introduce directly into the glottis and trachea a crooked tube, such as the catheter used for a male adult. For this he offers the following directions: The surgeon should place himself on the right side of the patient; and, introducing the forefinger of his left hand at the right corner of the patient's mouth, he should push the point of it behind the epiglottis; and using this as a directory, he may enter the catheter, which he holds in his right hand, at the left corner of the patient's mouth, till the end of it is passed beyond the point of his forefinger; and it is then to be let fall, rather than pushed into the glottis; and through this tube, by a proper syringe applied to it, air may be with certainty blown into the lungs. I observe, that some such measure had been proposed by Mons. Le Cat in France; but I have not learned that it has ever been put in practice, and I am afraid it may be attended with several difficulties, and must be left to the discretion of surgeons, who may be properly provided and instructed for this purpose.

"For throwing air with more certainty into the lungs, it has been proposed to open the windpipe in the same manner as is done in the operation which the surgeons call *bronchotomy*, and by this opening to blow into the lungs; and when the blowing into the nostril does not seem to succeed, and a skilful operator is at hand, I allow that the measure may be tried; but I can hardly suppose, that it will be of any advantage when the blowing in by the nostril has entirely failed.

"It is to be hoped, that by blowing into the lungs one way or other, even a quantity of water which had been taken into the lungs may be again washed out; and the same seems to be the only effectual means of washing out that frothy matter which is found to fill the lungs of drowned persons, and which proves, if I

mistake

Drowning. mistake not, the most common cause of their mortal suffocation. This practice, therefore, is to be immediately entered upon, and very assiduously continued for an hour or two together.

"I have now mentioned the measures chiefly to be pursued and depended upon for the recovery of drowned persons; but must still mention some others that may prove considerable helps to it.

"One of these is, the opening the jugular veins to relieve the congestion, which almost constantly occurs in the veins of the head, and is probably a frequent cause of the death of drowned persons. For relieving this congestion, the drawing some blood from the jugulars, very early, may certainly be of service; and it will be particularly indicated by the livid and purple colour of the face. It may even be repeated, according to the effect it seems to have in taking off that suffusion; but when the drowned person is in some measure recovered, and some motion of the blood is restored, it will be proper to be very cautious in making this evacuation, and at least to take care not to push it so far as to weaken too much the recovering, but still weak, powers of life.

"Another measure for recovering the activity of the vital principle, is the application of certain stimulants to the more sensible parts of the body, such as holding the quick-lime spirit of sal ammoniac to the nose, or putting a little of it upon a rag into the nostrils. It has been usual to pour some liquids into the mouth; but it is dangerous to pour in any quantity of liquid, till it appear that the power of swallowing is in some measure restored.

"When a surgeon is at hand, and is provided with proper apparatus, a crooked pipe may be introduced into the gullet; and by this a gill or two of warm wine may be poured down into the stomach, and probably with advantage. But when no such apparatus is at hand, or surgeon to employ it, and the power of swallowing is still doubtful, the trial of pouring liquids into the mouth should be made by a small quantity of warm water alone; and when, from such trial, the power of swallowing shall appear to be recovered, it may then be allowable to favour the further recovery of the person, by pouring in some wine or brandy.—In short, till some marks of the recovery of swallowing and respiration appear, it will not be safe to apply any stimulants to the mouth, excepting that of a few drops of some acrid substance to the tongue, and which are not of bulk enough to slide back upon the glottis: I can think of no stimulant, more conveniently and safely to be applied to the mouth and nostrils, than a moderate quantity of tobacco-smoke blown into them.

"Though I do not imagine that drowned persons are ever hurt by the quantity of water taken into their stomach, yet, as a stimulus applied to the stomach, and particularly as the action of vomiting proves a stimulus to the whole system, I can have no objection to the French practice of throwing in an emetic as soon as any swallowing is restored. For this purpose, I would successively throw in some tea-spoonfuls of the ipecacuanha wine; and, when it does not interfere with other necessary measures, the fauces may be gently irritated by an oiled feather thrust into them.

"With regard to the stimulants, I must conclude with observing, That when a body has lain but for a

short time in the water, and that therefore its heat and irritability are but little impaired, the application of stimulants alone has been often found effectual for the recovery; but, on the contrary, when the body has lain long in the water, and the heat of it is very much extinguished, the application of any other stimulants than that of tobacco-smoke to the intestines can be of very little service; and the application of others ought never to interfere with the measures for recovering heat and the motion of respiration.

"With respect to the whole of these practices, I expect, from the principles upon which they are in general recommended, it will be understood, that they are not to be soon discontinued, though their effects do not immediately appear. It is obvious, that, in many cases, it may be long before the heat of the body, and the activity of the vital principle, can be restored, although, in a longer time, it may very possibly be accomplished. In fact, it has often happened, that those means, employed for one hour, have not succeeded, the same continued for two or more hours, have, at length, had the wished for effects. It should therefore be a constant rule, in this business, that the proper means should be employed for several hours together; unless it happen, that, while no symptoms of returning life appear, the symptoms of death shall, at the same time, go on constantly increasing.

"In the whole of the above I have kept in view chiefly the case of drowned persons: but it will be obvious, that many of the measures proposed will be equally proper and applicable in other cases of suffocation; as those from strangling, the damps of mines, the fumes of charcoal, &c.; and a little attention to the difference of circumstances will lead to the measures most proper to be employed."

Mr Hunter, in the before-mentioned paper, differs pretty considerably from De Haen and Dr Cullen. He observes, that when assistance is soon called in after immersion, blowing air into the lungs will in some cases effect a recovery; but when any considerable time has been lost, he advises stimulant medicines, such as the vapour of volatile alkali, to be mixed with the air; which may easily be done, by holding spirits of hartshorn in a cup under the receiver of the bellows. And, as applications of this kind to the olfactory nerves tend greatly to rouse the living principle, and put the muscles of respiration into action, it may probably, therefore, be most proper to have air impregnated in that manner thrown in by the nose. To prevent the stomach and intestines from being too much distended by the air so injected, the larynx is directed to be gently pressed against the œsophagus and spine.

While this business is going on, an assistant should prepare bed-cloaths, carefully brought to a proper degree of heat. Heat our author considers as congenial with the living principle; increasing the necessity of action, it increases action; cold, on the other hand, lessens the necessity, and of course the action is diminished; to a due degree of heat, therefore, the living principle, he thinks, owes its vigour. From experiments, he says, it appears to be a law in animal bodies, that the degree of heat should bear a proportion to the quantity of life; as life is weakened, this proportion requires great accuracy, while greater powers of life allow it greater latitudes.

After

Drowning.

After these and several other observations on the same subject, our author proceeds to more particular directions for the management of drowned people.

If bed-cloaths are put over the person, so as scarce to touch him, steams of volatile alkali, or of warm balsams, may be thrown in, so as to come in contact with many parts of the body. And it might probably be advantageous, Mr Hunter observes, to have steams of the same kind conveyed into the stomach. This, we are told, may be done by a hollow bougie, and a syringe; but the operation should be very speedily performed, as the instrument, by continuing long in the mouth, might produce sickness, which our author says he would always wish to avoid.

Some of the warm stimulating substances, such as juice of horse-radish, pepper-mint water, and spirits of harts-horn, are directed to be thrown into the stomach in a fluid state, as also to be injected by the anus. Motion possibly may be of service; it may at least be tried; but as it hath less effect than any other of the usually prescribed stimuli, it is directed to be the last part of the process.

The same care in the operator, in regulating the proportion of every one of these means, is here directed, as was formerly given for the application of heat. For every one of them, our author observes, may possibly have the same property of destroying entirely the feeble action which they have excited, if administered in too great a quantity: instead, therefore, of increasing and hastening the operations on the first signs of returning life being observed, as is usually done, he desires they may be lessened; and advises their increase to be afterwards proportioned, as nearly as possible, to the quantity of powers as they arise.

When the heart begins to move, the application of air to the lungs should be lessened, that, when the muscles of respiration begin to act, a good deal may be left for them to do.

Mr Hunter absolutely forbids blood-letting in all such cases; for, as it not only weakens the animal principle, but lessens life itself, it must consequently, he observes, lessen both the powers and dispositions to action. For the same reason, he is against introducing any thing into the stomach that might produce sickness or vomiting; and, on the same principle, he says, we should avoid throwing tobacco fumes, or any other such articles, up by the anus, as might tend to an evacuation that way.

The following is a description of instruments recommended for such operations by our author.

First, A pair of bellows, so contrived, with two separate cavities, that, by opening them when applied to the nostrils or mouth of a patient, one cavity will be filled with common air, and the other with air sucked out from the lungs, and by shutting them again, the common air will be thrown into the lungs, and that sucked out of the lungs discharged into the room. The pipe of these should be flexible; in length a foot, or a foot and an half; and, at least, three eighths of an inch in width. By this the artificial breathing may be continued, while the other operations, the application of the stimuli to the stomach excepted, are going on, which could not be conveniently done if the muzzle of the bellows were introduced into the nose. The end next the nose should be double, and applied to both

nostrils. *Secondly*, A syringe, with a hollow bougie, or flexible catheter, of sufficient length to go into the stomach, and convey any stimulating matter into it, without affecting the lungs. *Thirdly*, a pair of small bellows, such as are commonly used in throwing fumes of tobacco up by the anus.

Notwithstanding the differences in theory, however, between the physicians above-mentioned, it is certain, that within these few years great numbers of drowned people have been restored to life by a proper use of the remedies we have enumerated, and societies for the recovery of drowned persons have been instituted in different places. The first society of this kind was instituted in Holland, where, from the great abundance of canals and inland seas, the inhabitants are particularly exposed to accidents by water. In a very few years 150 persons were saved from death by this society; and many of these had continued upwards of an hour without any signs of life, after they had been taken out of the water. The society was instituted at Amsterdam in 1767: and, by an advertisement, informed the inhabitants of the United Provinces of the methods proper to be used on such occasions; offering rewards at the same time to those who should, with or without success, use those methods for recovering persons drowned and seemingly dead. The laudable and humane example of the Dutch was followed in the year 1768 by the magistrates of health in Milan and Venice; afterwards by the magistrates of Hamburg in the year 1771, by those of Paris in the year 1772, and by the magistrates of London in 1774.

DRUG, a general term for goods of the druggist and grocery kinds, especially those used in medicine and dyeing. See MATERIA MEDICA, PHARMACY, and DYEING.

DRUGGET, in commerce, a stuff sometimes all wool, and sometimes half wool half thread, sometimes corded, but usually plain. Those that have the wool of wool, and the warp of thread, are called *threaded druggets*; and those wrought with the shuttle on a loom of four marches, as the serges of Mouni, Beauvois, and other like stuffs corded, are called *corded druggets*. As to the plain, they are wrought on a loom of two marches, with the shuttle, in the same manner as cloth, camblets, and other like stuffs not corded.

DRUIDS, the priests among the ancient Britons and Gauls.—The word is formed from the Celtic, *deru*, an oak; because they held that tree in the highest veneration.

Their antiquity is esteemed equal to that of the Brachmans of India, the Magi of Persia, and the Chaldees of Babylon. And whoever considers the surprising conformity of their doctrine, will find sufficient reason to think that they all derived it from the same hand, we mean from Noah and his immediate descendants, who carried it with them at their dispersion; for it cannot be supposed that the British druids derived their doctrine from any foreign sect, to whom they were absolutely unknown.

But the druids were not contented with the power annexed to the priesthood: they introduced religion into every transaction both public and private, so that nothing could be done without their approbation; and by this means their authority was rendered almost absolute. They elected the annual magistrates of every district,

Drowning
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Druids.

district, who should have enjoyed during that term the supreme authority, and sometimes the title of *kings*: but they could not even call a council without their approbation and advice; so that, notwithstanding their pretended authority, they were in reality the creatures and slaves of the druids.

They exercised the same arbitrary power in their courts of justice; and whoever refused to submit to their decisions, were excluded from the public sacrifices, which was considered as the greatest punishment that could be inflicted. It must, however, be acknowledged, that their administration of justice has always been celebrated for its impartiality. The sole management and instruction of youth was also committed to them, except the training them up in the art of war; for both they and their disciples were not only exempted from going to war, but likewise from all kind of tribute.

Their garments were remarkably long; and, when employed in religious ceremonies, they always wore a white surplice. They generally carried a wand in their hands; and wore a kind of ornament enshased in gold about their necks, called the *druid's egg*. Their necks were likewise decorated with gold chains, and their hands and arms with bracelets: they wore their hair very short, and their beards remarkably long.

They were all subordinate to a chief or sovereign pontiff, styled the *arch-druid*, chosen from among their fraternity by a plurality of voices; but, in case of a competition too powerful to be decided by a majority, the contest was determined by the sword. He enjoyed his supremacy for life, had power to inspect the conduct of kings, and either to elect or depose whenever he pleased.

It was one of the maxims of their religion, not to commit any thing to writing; but deliver all their mysteries and learning in verses composed for that purpose; and these were in time multiplied to such a number, that it generally took up 20 years to learn them all by heart. By this means their doctrines appeared more mysterious by being unknown to all but themselves; and having no books to recur to, they were the more careful to fix them in their memory.

But what had still a more direct tendency to impose on the public, was their pretended familiar intercourse with the gods. And in order at once to conceal their own ignorance, and render the imposition less susceptible of detection, they boasted of their great skill in magic, and cultivated several branches of the mathematics, particularly astronomy. The latter they carried to some degree of perfection; for they were able to foretell the times, quantities, and durations, of eclipses: a circumstance which could not fail of attracting reverence from an ignorant multitude, who were persuaded that nothing less than a supernatural power was sufficient to make such astonishing predictions. They also studied natural philosophy, and practised physic.

They worshipped the Supreme Being under the name of *Efus*, or *Hesus*, and the symbol of the oak; and had no other temple than a wood or a grove, where all their religious rites were performed. Nor was any person admitted to enter that sacred recess, unless he carried with him a chain, in token of his absolute dependence on the Deity. Indeed, their whole religion originally consisted in acknowledging, that the Supreme

Being, who made his abode in these sacred groves, governed the universe; and that every creature ought to obey his laws, and pay him divine homage.

They considered the oak as the emblem, or rather the peculiar residence, of the Almighty; and accordingly chaplets of it were worn both by the druids and people in their religious ceremonies, the altars were strewed with its leaves and encircled with its branches. The fruit of it, especially the milletoe, was thought to contain a divine virtue, and to be the peculiar gift of heaven. It was therefore sought for on the sixth day of the moon with the greatest earnestness and anxiety; and when found was hailed with such raptures of joy, as almost exceeds imagination to conceive. As soon as the druids were informed of this fortunate discovery, they prepared every thing ready for the sacrifice under the oak, to which they fastened two white bulls by the horns; then the arch-druid, attended by a prodigious number of people, ascended the tree, dressed in white; and with a consecrated golden knife, or pruning hook, cropped the milletoe, which he received in his sagum or robe, amidst the rapturous exclamations of the people. Having secured this sacred plant, he descended the tree; the bulls were sacrificed; and the Deity invoked to bless his own gift, and render it efficacious in those distempers in which it should be administered.

The consecrated groves, in which they performed their religious rites, were fenced round with stones, to prevent any person's entering between the trees, except through the passages left open for that purpose, and which were guarded by some inferior druids, to prevent any stranger from intruding into their mysteries. These groves were of different forms; some quite circular, others oblong, and more or less capacious as the numbers of votaries in the districts to which they belonged were more or less numerous. The area in the centre of the grove was encompassed with several rows of large oaks set very close together. Within this large circle were several smaller ones surrounded with large stones; and near the centre of these smaller circles, were stones of a prodigious size, and convenient height, on which the victims were slain and offered. Each of these being a kind of altar, was surrounded with another row of stones, the use of which cannot now be known, unless they were intended as inclosures to keep the people at a convenient distance from the officiating priest. Nor is it unreasonable to suppose, that they had other groves appointed for secular purposes, and perhaps planted with oaks as the others were, that the sacred trees might strike the members of such courts and councils with awe, and prevent all quarrels and indecent expressions.

While the religion of the druids continued pure and unmixed with any foreign customs, they offered only oblations of fine flour sprinkled with salt, and adored the Supreme Being in prayers and thanksgivings. But after they had for some time carried on a commerce with the Phenicians, they lost their original simplicity, adored a variety of gods, adopted the barbarous custom of offering human victims, and even improved on the cruelty of other nations; using these unfortunate mortals for the purposes of divination, with such barbarous cruelty as is shocking to human nature to relate. Practices like these soon rendered them so deaf to voice

Druids
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Drummond

voice of humanity, that on extraordinary occasions they erected a monstrous hollow pile of oil, which they filled with these unhappy wretches, and burnt them to their gods. Criminals were indeed chosen for this barbarous sacrifice; but, in want of these, the innocent became victims of a cruel superstition.

We have already mentioned, that in their sacred groves were several large stones, supposed to be the altars on which they offered their victims. Some of these stones are still remaining in England, Wales, Ireland, and the island of Anglesey; and are of such an amazing magnitude, that the bringing and rearing them was thought by the superstitious to have been the work of those demons supposed to attend on that manner of worship.

Temples they had none before the coming of the Romans, nor in all probability for a long time after: for with regard to those vast piles of stones still remaining, they seem rather to have been funeral monuments than places of worship; especially as all the ancient writers agree that their religious ceremonies were always performed in their consecrated groves. Accordingly Tacitus, speaking of the descent of the Romans, tells us, that their first care was to destroy those groves and woods which had been polluted with the blood of so many human victims.

One of the chief tenets taught by the druids was the immortality of the soul, and its transmigration from one body to another; a doctrine which they considered as proper to inspire them with courage, and a contempt of death. They also instructed their disciples in several traditions concerning the stars and their motions, the extent of the world, the nature of things, and the power of the immortal gods. But as they never committed any of their tenets to writing, in order at once to conceal their mysterious learning from the vulgar, and exercise the minds of their disciples, the greatest part of them are now irrecoverably buried in oblivion.

DRUM, is a martial musical instrument in form of a cylinder, hollow within, and covered at the two ends with vellum, which is stretched or slackened at pleasure by the means of small cords or sliding knots: it is beat upon with sticks. Drums are sometimes made of brass, but most commonly they are of wood.—The drum is by Le Clerc said to have been an Oriental invention, and to have been brought by the Arabians, or perhaps rather the Moors, into Spain.

Kettle Drums, are two sorts of large basons of copper or brass, rounded in the bottom, and covered with vellum, or goat-skin, which is kept fast by a circle of iron round the body of the drum, with a number of screws to screw up and down. They are much used among the horse; as also in operas, oratorios, concerts, &c.

DRUM, or *Drummer*, he that beats the drum; of whom each company of foot has one, and sometimes two. Every regiment has a drum-major, who has the command over the other drums. They are distinguished from the soldiers, by cloaths of a different fashion: their post, when a battalion is drawn up, is on the flanks, and on a march it is betwixt the divisions.

DRUM of the *Ear*, the same with the *Tympanum*. See ANATOMY, n° 405.

DRUMMOND (William), a polite writer, born in Scotland, in 1585, was the son of Sir John Drum-

mond, gentleman-usher to king James VI. He had his education at Edinburgh; and afterwards being sent into France, studied the civil law at Bourges: but his genius leading him to polite literature, he returned to Scotland, and retired to his agreeable seat at Hawthornden. Here he spent his time in reading Greek and Latin authors, and obliged the world with several fine productions. He wrote his *Cypress Grove*, a piece of excellent prose, after a dangerous fit of sickness; and about this time his *Flowers of Sion*, in verse. But an accident befel him, which obliged him to quit his retirement; and that was the death of an amiable lady he was just going to be married to. This affected him so deeply, that he went to Paris and Rome, between which two places he resided eight years. He travelled also through Germany, France, and Italy: where he visited universities; conversed with learned men; and made a choice collection of the best ancient Greek, and of the modern Spanish, French, and Italian books. He then returned to his native country, where a civil war was just ready to break out: upon which he retired again, and in this retirement is supposed to have written his *History of the five James's*, successively kings of Scotland, which was not published till after his death. Besides this, he composed several other tracts against the measures of the covenanters and those engaged in the opposition of Charles I. In a piece called *Irene*, he harangues the king, nobility, and clergy, about their mutual mistakes, fears, and jealousies: he lays before them the consequences of a civil war, from indisputable arguments and the histories of past times. The great marquis of Montrose wrote a letter to him, desiring him to print this *Irene*, as the best means to quiet the minds of a distracted people: he likewise sent him a protection dated August 1645, immediately after the battle of Killyth, with a letter, in which he commends Mr Drummond's learning and loyalty. Mr Drummond wrote other things also with the same view of promoting peace and union, of calming the disturbed minds of the people, of reasoning the better sort into moderation, and checking the growing evils which would be the consequence of their obstinacy. He died in the year 1649, having married a wife five years before, by whom he had some children: William, who was knighted in Charles the II'd's time; Robert; and Elizabeth, who was married to Dr Henderfon a physician at Edinburgh. He had a great intimacy and correspondence with the two famous English poets, Michael Drayton and Ben Jonson; the latter of whom travelled from London on foot, to see him at his seat at Hawthornden. His works consisted of several things in verse and prose; an edition of which, with his life prefixed, was printed in folio at Edinburgh, 1711.

DRUNKENNESS, a well known disorder in the brain, occasioned by drinking too freely of spirituous liquors. Drunkenness appears in different shapes, in different constitutions: some it makes gay, some sullen, and some furious.

The ancient Lacedaemonians used to make their slaves frequently drunk, to give their children an aversion and horror for the same. The Indians hold drunkenness a species of madness; and in their language, the same term (*rangam*), that signifies drunkard, signifies also a phrenetic.

Drunkenness, by the law of England, is looked up-

Drum-
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Drunk-
ness,
Drupa.

on as an aggravation rather than an excuse for any criminal behaviour. A drunkard, says Sir Edward Coke, who is *voluntarius demon*, hath no privilege thereby; but what hurt or illsoever he doth, his drunkenness doth aggravate it: *nam omne crimen ebrietas, et incendit, et delegit*. It hath been observed that the real use of strong liquors, and the abuse of them by drinking to excess, depend much upon the temperature of the climate in which we live. The same indulgence which may be necessary to make the blood more in Norway, would make an Italian mad. A German therefore, says the president Montesquieu, drinks thro' custom founded upon constitutional necessity; a Spaniard drinks through choice, or out of the mere wantonness of luxury; and drunkenness, he adds, ought to be more severely punished where it makes men mischievous and mad, as in Spain and Italy, than where it only renders them stupid and heavy, as in Germany and more northern countries. And accordingly, in the warmer climate of Greece, a law of Pittacus enacted, "that he who committed a crime when drunk, should receive a double punishment;" one for the crime itself, and the other for the ebriety which prompted him to commit it. The Roman law indeed made great allowances for this vice: *per vinum delapsi capitalis pœna remittitur*. But the law of England, considering how easy it is to counterfeit this excuse, and how weak an excuse it is (though real), will not suffer any man thus to privilege one crime by another.

For the offence of drunkenness a man may be punished in the ecclesiastical court, as well as by justices of peace by statute. And by 4 *Jac. I. c. 5.* and 21 *Jac. I. c. 7.* if any person shall be convicted of drunkenness by the view of a justice, oath of one witness, &c. he shall forfeit 5s. for the first offence, to be levied by distress and sale of his goods; and for want of a distress, shall sit in the stocks six hours: and, for the second offence, he is to be bound with two sureties in 10l. each, to be of good behaviour, or to be committed. And he who is guilty of any crime thro' his own voluntary drunkenness, shall be punished for it as if he had been sober. It has been held that drunkenness is a sufficient cause to remove a magistrate: and the prosecution for this offence by the statute of 4 *Jac. I. c. 5.* was to be, and still may be, before justices of peace in their sessions by way of indictment, &c. Equity will not relieve against a bond, &c. given by a man when drunk, unless the drunkenness is occasioned through the management or contrivance of him to whom the bond is given.

DRUPA, or DRUPPEA, in botany, a species of *pericarpium*, or seed-vessel, which is succulent or pulpy, has no valve or external opening like the capsule and pod, and contains within its substance a stone or nut. The cherry, plumb, peach, apricot, and all other stone-fruit, are of this kind.

The term, which is of great antiquity, is synonymous to Tournefort's *fructus molliis ossiculo*, "soft fruit with a stone;" and to the *prunus* of other botanists.

The stone, or nut, which, in this species of fruit, is surrounded by the soft pulpy flesh, is a kind of ligneous or woody cup, which contains a single kernel or seed.

This definition, however, will not apply to every seed-vessel denominated *drupa* in the *Genera Plantarum*. The almond is a *drupa*, so is the seed-vessel of the elm-

tree and the genus *rumpia*; though far from being pulpy or succulent, the first and third are of a substance like leather, the second like parchment. The same may be said of the walnut, pistachia-nut, *guettarda*, *quifqualis*, jack-in-a-box, and some others.

Again, the seeds of the elm, *schrebera*, *flagellaria*, and the mango-tree, are not contained in a stone. The seed-vessel of burr-reed is dry, shaped like a top, and contains two angular stones.

This species of fruit, or more properly seed-vessel, is commonly roundish, and, when seated below the calyx or receptacle of the flower, is furnished, like the apple, at the end opposite to the foot-stalk, with a small umbilicus or cavity, which is produced by the swelling of the fruit before the falling off of the flower-cup.

DRUSIUS (John), a Protestant writer of great learning, born at Oudenarde in Flanders in 1555. He was designed for the study of divinity; but his father being outlawed, and deprived of his estate, they both retired to England, where the son became professor of the Oriental languages at Oxford: but, upon the pacification of Ghent, they returned to their own country, where Drusus was also appointed professor of the Oriental languages. From thence he removed to Friesland, where he was admitted Hebrew professor in the university of Franeker; the functions of which he discharged with great honour till his death in 1616. His works shew him to have been well skilled in Hebrew; and the States General employed him in 1600, to write notes on the most difficult passages in the Old Testament, with a pension of 400 florins a-year: but being frequently disturbed in this undertaking, it was not published till after his death. He held a vast correspondence with the learned; for besides letters in Hebrew, Greek, and other languages, there were found 2300 Latin letters among his papers. He had a son John, who died in England at 21, and was a prodigy for his early acquisition of learning; he wrote Notes on the Proverbs of Solomon, with many letters and verses in Hebrew.

DRYADS, in the heathen theology, a sort of deities, or nymphs, which the ancients thought inhabited groves and woods. They differed from the Hamadryades, these latter being attached to some particular tree, with which they were born, and with which they died; whereas the Dryades were goddesses of trees and woods in general.

DRYDEN (John), one of the most eminent English poets of the 17th century, descended of a genteel family in Huntingdonshire, was born in that county at Oldwinle 1631, and educated at Westminster school under Dr Busby. From thence he was removed to Cambridge in 1650, being elected scholar of Trinity college, of which he appears by his *epithalamia Cantabrigiense*. 4to, 1662, to have been afterwards a fellow. Yet, in his earlier days, he gave no extraordinary indications of genius; for, even the year before he quitted the university, he wrote a poem on the death of Lord Hastings, which was by no means a preface of that amazing perfection in poetical powers which he afterwards possessed.

On the death of Oliver Cromwell he wrote some heroic stanzas to his memory; but, on the Restoration, being desirous of ingratiating himself with the new

Drusus
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Dryden.

court, he wrote, first a poem intitled *Astræa Redux*, and afterwards a panegyric to the king on his coronation. In 1662, he addressed a poem to the Lord Chancellor Hyde; presented on New Year's day; and in the same year a satire on the Dutch. In 1668, appeared his *Annus Mirabilis*, which was an historical poem in celebration of the duke of York's victory over the Dutch. These pieces at length obtained him the favour of the crown; and Sir William Davenant dying the same year, Mr Dryden was appointed to succeed him as poet laureat. About this time also his inclination to write for the stage seems first to have shewn itself. For besides his concern with Sir William Davenant in the alteration of Shakespeare's *Tempest*, in 1669 he produced his *Wild Gallants* a comedy. This met with very indifferent success; yet the author, not being discouraged by its failure, soon published his *Indian Emperor*. This, finding a more favourable reception, encouraged him to proceed; and that with such rapidity, that, in the key to the duke of Buckingham's *Rehearsal*, he is recorded to have engaged himself by contract for the writing of four plays per year; and indeed, in the years 1679 and 1680, he appears to have fulfilled that contract. To this unhappy necessity that our author lay under, are to be attributed all those irregularities, those bombastic flights, and sometimes even puerile exuberances, for which he has been so severely criticized; and which, in the unavoidable hurry in which he wrote, it was impossible he should find time either for lopping away or correcting.

In 1675, the earl of Rochester, whose envious and malevolent disposition would not permit him to see growing merit meet with its due reward, and was therefore sincerely chagrined at the very just applause with which Mr Dryden's dramatic pieces had been received, was determined, if possible, to shake his interest at court; and succeeded so far as to recommend Mr Crowne, an author by no means of equal merit, and at that time of an obscure reputation, to write a masque for the court, which certainly belonged to Mr Dryden's office as poet laureat.—Nor was this the only attack, nor indeed the most potent one, that Mr Dryden's justly acquired fame drew on him. For, some years before, the duke of Buckingham, a man of not much better character than Lord Rochester, had most severely ridiculed several of our author's plays in his admired piece called the *Rehearsal*. But, though the intrinsic wit which runs through that performance cannot even to this hour fail of exciting our laughter, yet at the same time it ought not to be the standard on which we should fix Mr Dryden's poetical reputation, if we consider, That the pieces there ridiculed are not any of those looked on as the *chef d'oeuvres* of this author, that the very passages burlesqued, are frequently, in their original places, much less ridiculous, than when thus detached, like a rotten limb, from the body of the work; and exposed to view with additional distortions, and divested of that connection with the other parts, which, while it preserved, gave it not only symmetry but beauty; and lastly, that the various inimitable beauties, which the critic has sunk in oblivion, are infinitely more numerous than the deformities which he has thus industriously brought forth to our more immediate inspection.

Mr Dryden, however, did not suffer these attacks

to pass with impunity; for, in 1679, there came out an *Essay on Satire*, said to be written jointly by that gentleman and the earl of Mulgrave, containing some very severe reflections on the earl of Rochester and the duchess of Portsmouth, who, it is not improbable, might be a joint instrument in the above-mentioned affront shewn to Mr Dryden; and in 1681 he published his *Abraham and Achitaphel*, in which the well-known character of *Zimri*, drawn for the duke of Buckingham, is certainly severe enough to repay all the ridicule thrown on him by that nobleman in the character of *Bayes*.—The resentment shewn by the different peers was very different. Lord Rochester, who was a coward as well as a man of the most depraved morals, basely hired three ruffians to cudgel Dryden in a coffeehouse; but the duke of Buckingham, as we are told, in a more open manner, took that talk upon himself; and at the same time presented him with a purse containing no very trifling sum of money; telling him, That he gave him the beating as a punishment for his impudence, but bestowed the gold on him as a reward for his wit.

In 1680 was published a translation of *Ovid's Epistles* in English verse, by several hands, two of which, together with the preface, were by Mr Dryden; and in 1682, came out his *Religio Laici*, designed as a defence of revealed religion, against Deists, Papists, &c. Soon after the accession of king James II. our author changed his religion for that of the church of Rome, and wrote two pieces in vindication of the Romish tenets, viz. *A Defence of the papers* written by the late king, found in his strong box; and the celebrated poem, afterwards answered by Lord Halifax, entitled the *Hind and the Panther*.—By this extraordinary step he not only engaged himself in controversy, and incurred much censure and ridicule from his contemporaries wits; but, on the completion of the Revolution, being, on account of his newly-chosen religion, disqualified from bearing any office under the government, he was stripped of the laurel, which, to his still greater mortification, was bestowed on Richard Flecknoe, a man to whom he had a most settled aversion. This circumstance occasioned his writing the very severe poem, called *Mac Flecknoe*.

Mr Dryden's circumstances had never been affluent; but now being deprived of this little support, he found himself reduced to the necessity of writing for mere bread. We consequently find him from this period engaged in works of labour as well as genius, viz. in translating the works of others; and to this necessity perhaps our nation stands indebted for some of the best translations extant. In the year he lost the laurel, he published the life of *St Francis Xavier* from the French. In 1693, came out a translation of *Juvenal and Persius*; in the first of which he had a considerable hand, and of the latter the entire execution. In 1695 was published his prose version of *Presnos's art of painting*; and the year 1697 gave the world that translation of *Virgil's* works entire, which still does, and perhaps ever will, stand foremost among the attempts made on that author. The *petite pieces* of this eminent writer, such as prologues, epilogues, epitaphs, elegies, songs, &c. are too numerous to specify here, and too much dispersed to direct the reader to. The greatest part of them, however, are to be found in a collection of miscellanies, in 6 vols 12mo. His last work is what is called his *Fables*,

Dryden.

Fables, which consists of many of the most interesting stories in Homer, Ovid, Boccace, and Chaucer, translated or modernized in the most elegant and poetical manner; together with some original pieces, among which is that amazing ode on St *Cæcilia's* day, which, though written in the very decline of the author's life, and at a period when old age and distrefs conspired as it were to damp his poetic ardor and clip the wings of fancy, yet possesses so much of both, as would be sufficient to have rendered him immortal, had he never written a single line besides.

Dryden married the lady Elizabeth Howard, sister to the earl of Berkshire, who survived him eight years; though for the last four of them she was a lunatic, having been deprived of her senses by a nervous fever.—By this lady he had three sons; *Charles*, *John*, and *Henry*. Of the eldest of these, there is a circumstance related by Charles Wilson, Esq; in his Life of Congresses, which seems so well attested, and is itself of so very extraordinary a nature, that we cannot avoid giving it a place here.—Dryden, with all his understanding, was weak enough to be fond of judicial astrology, and used to calculate the nativity of his children. When his lady was in labour with his son *Charles*, he being told it was decent to withdraw, laid his watch on the table, begging one of the ladies then present, in a most solemn manner, to take exact notice of the very minute that the child was born; which she did, and acquainted him with it. About a week after, when his lady was pretty well recovered, Mr Dryden took occasion to tell her that he had been calculating the child's nativity; and observed, with grief, that he was born in an evil hour: for Jupiter, Venus, and the Sun, were all under the earth, and the lord of his ascendant afflicted with a hateful square of Mars and Saturn. If he lives to arrive at the 8th year, says he, “he will go near to die a violent death on his very birth-day; but if he should escape, as I see but small hopes, he will in the 23d year be under the very same evil direction; and if he should escape that also, the 33d or 34th year is, I fear”—here he was interrupted by the immoderate grief of his lady, who could no longer hear calamity prophesied to befall her son. The time at last came, and August was the inauspicious month in which young Dryden was to enter into the 8th year of his age. The court being in progress, and Mr Dryden at leisure, he was invited to the country-seat of the earl of Berkshire, his brother-in-law, to keep the long vacation with him in Charlton in Wilts; his lady was invited to her uncle Mordaunt's, to pass the remainder of the summer. When they came to divide the children, lady Elizabeth would have him take *John*, and suffer her to take *Charles*; but Mr Dryden was too absolute, and they parted in anger; he took *Charles* with him, and she was obliged to be content with *John*. When the fatal day came, the anxiety of the lady's spirits occasioned such an effervescence of blood, as threw her into so violent a fever, that her life was despaired of, till a letter came from Mr Dryden, reproving her for her womanish credulity, and assuring her that her child was well; which recovered her spirits, and in six weeks after she received an eclatification of the whole affair. Mr Dryden, either through fear of being reckoned superstitious, or thinking it a science beneath his study, was extremely cautious of letting any one know

Dryden.

that he was a dealer in astrology; therefore could not excuse his absence, on his son's anniversary, from a general hunting-match which Lord Berkshire had made, to which all the adjacent gentlemen were invited. When he went out, he took care to fet the boy a double exercise in the Latin tongue, which he taught his children himself, with a strict charge not to stir out of the room till his return; well knowing the task he had set him would take up longer time. *Charles* was performing his duty, in obedience to his father: but, as ill fate would have it, the flag made towards the house; and the noise alarming the servants, they hasted out to see the sport. One of them took young Dryden by the hand, and led him out to see it also; when, just as they came to the gate, the flag being at bay with the dogs, made a bold push, and leaped over the court-wall, which was very low and very old; and the dogs following, threw down a part of the wall 10 yards in length, under which *Charles Dryden* lay buried. He was immediately dug out; and after six weeks languishing in a dangerous way, he recovered. So far Dryden's prediction was fulfilled. In the 23d year of his age, *Charles* fell from the top of an old tower belonging to the Vatican at Rome, occasioned by a swimming in his head, with which he was seized, the heat of the day being excessive. He again recovered, but was ever after in a languishing sickly state. In the 33d year of his age, being returned to England, he was unhappily drowned at Windsor. He had with another gentleman swam twice over the Thames; but returning a third time, it was supposed he was taken with the cramp, because he called out for help, though too late. Thus the father's calculation proved but too prophetic.

At last, after a long life, harassed with the most laborious of all fatigues, viz. that of the mind, and continually made anxious by distrefs and difficulty, our author departed this life on the first of May 1701.—The day after Mr Dryden's death, the dean of Westminster sent word to Mr Dryden's widow, that he would make a present of the ground, and all other abbey-fees for the funeral: the Lord Halifax likewise sent to the lady Elizabeth, and to Mr Charles Dryden, offering to defray the expences of our poet's funeral, and afterwards to bestow 500l. on a monument in the abbey; which generous offer was accepted. Accordingly, on Sunday following, the company being assembled, the corpse was put into a velvet hearse, attended by 18 mourning coaches. When they were just ready to move, Lord Jefferys, son of Lord Chancellor Jefferys, a name dedicated to infamy, with some of his rakish companions riding by, asked whose funeral it was; and being told it was Mr Dryden's, he protested he should not be buried in that private manner; that he would himself, with the lady Elizabeth's leave, have the honour of the interment, and would bestow 1000l. on a monument in the abbey for him. This put a stop to their procession; and the Lord Jefferys, with several of the gentlemen, who had alighted from their coaches, went up stairs to the lady, who was sick in bed. His Lordship repeated the purport of what he had said below; but the lady Elizabeth refusing her consent, he fell on his knees, vowing never to rise till his request was granted. The lady under a sudden surprise fainted away; and Lord Jefferys pretending to have

Dryden.

have obtained her consent, ordered the body to be carried to Mr Ruffell's an undertaker in Cheapside, and to be left there till further orders. In the mean time the abbey was lighted up, the ground opened, the choir attending, and the bishop waiting some hours to no purpose for the corpse. The next day Mr *Charles Dryden* waited on my Lord Halifax and the bishop; and endeavoured to excuse his mother, by relating the truth. Three days after, the undertaker, having received no orders, waited on the Lord Jefferys; who pretended that it was a drunken frolic, that he remembered nothing of the matter, and he might do what he pleased with the body. Upon this, the undertaker waited upon the lady Elizabeth, who desired a day's respite, which was granted. Mr *Charles Dryden* immediately wrote to the Lord Jefferys, who returned for answer, that he knew nothing of the matter, and would be troubled no more about it. Mr *Dryden* hereupon applied again to Lord Halifax, and the bishop of Rochester; who absolutely refused to do any thing in the affair.

In this distress, Mr Garth, who had been Mr Dryden's intimate friend, sent for the corpse to the college of physicians, and proposed a subscription; which succeeding, about three weeks after Mr Dryden's decease, Dr Garth pronounced a fine Latin oration over the body, which was conveyed from the college, attended by a numerous train of coaches to Westminster-abbey, but in very great disorder. At last the corpse arrived at the abbey, which was all unlighted. No organ played, no anthem sung; only two of the singing boys preceding the corpse, who sung an ode of Horace, with each a small candle in their hand. When the funeral was over, Mr *Charles Dryden* sent a challenge to Lord Jefferys; who refusing to answer it, he sent several others, and went often himself; but could neither get a letter delivered, nor admittance to speak to him: which so incensed him, that finding his Lordship refused to answer him like a gentleman, he resolved to watch an opportunity, and brave him to fight, though with all the rules of honour; which his Lordship hearing, quitted the town, and Mr *Charles* never had an opportunity to meet him, though he sought it to his death, with the utmost application.

Mr Dryden had no monument erected to him for several years; to which Mr Pope alludes in his epitaph intended for Mr Rowe, in this line,

Beneath a rude and nameless stone he lies.

In a note upon which, we are informed, that the tomb of Mr Dryden was erected upon this hint by Sheffield duke of Buckingham, to which was originally intended this epitaph:

This *Sheffield* rais'd.—The sacred dust below
Was *Dryden* once; the rest who does not know.

Which was since changed into the plain inscription now upon it, *viz.*

J. DRYDEN,
Natus Aug. 9, 1631.
Mortuus Maii 1, 1701.

Johannes Sheffield, dux Buckinghamiussis fecit.

Mr Dryden's character has been very differently drawn by different hands, some of which have exalted it to the highest degree of commendation, and others debased it by the severest censure.—The latter, however, we must charge to that strong spirit of party

which prevailed during great part of Dryden's time, and ought therefore to be taken with great allowances. Were we indeed to form a judgment of the author from some of his dramatic writings, we should perhaps be apt to conclude him a man of the most licentious morals; many of his comedies containing a great share of looseness, even extending to obscenity: But if we consider, that, as the poet tells us,

Those who live to please, must please to live;

if we then look back to the scandalous licence of the age he lived in, the indigence which at times he underwent, and the necessity he consequently lay under of complying with the public taste however depraved; we shall surely not refuse our pardon to the compelled writer, nor our credit to those of his cotemporaries who were intimately acquainted with him, and who have assured us there was nothing remarkably vicious in his personal character.

From some parts of his history he appears unsteady, and to have too readily temporized with the several revolutions in church and state. This however might in some measure have been owing to that natural timidity and diffidence in his disposition, which almost all the writers seem to agree in his possessing. Congreve, whose authority cannot be suspected, has given us such an account of him, as makes him appear no less amiable in his private character as a man, than he was illustrious in his public one as a poet. In the former light, according to that gentleman, he was humane, compassionate, forgiving, and sincerely friendly. Of an extensive reading, a tenacious memory, and a ready communication: gentle in the correction of the writings of others, and patient under the reprehension of his own deficiencies: easy of access himself, but slow and diffident in his advances to others; and of all men the most modest and the most easy to be discountenanced in his approaches either to his superiors or his equals. As to his writings, he is perhaps the happiest in the harmony of his numbers, of any poet who ever lived either before or since his time, not even Mr Pope himself excepted. His imagination is ever warm, his images noble, his descriptions beautiful, and his sentiments just and becoming. In his prose he is poetical without bombast, concise without pedantry, and clear without prolixity. His dramatic have, perhaps, the least merit of all his writings. Yet there are many of them which are truly excellent; though he himself tells us that he never wrote any thing in that way to please himself but his *All for Love*. This last, indeed, and his *Spanish Friar*, may be reckoned two of the best plays our language has been honoured with.

DUBLIN, a city of Ireland, in the province of Leinster, and capital of the whole kingdom, situated on the river Liffy, in W. Long. 6. 32. N. Lat. 53. 10. It is certainly a very ancient place, since we find it mentioned by Ptolemy under the name of *Eblana*, which he probably wrote *Deblana*. The Irish call it *Bala-deigh*, that is, "The town founded upon hurdles or piles." It is said to have been in the hands of the English as early as the days of king Edgar. We are assured, however, that it was, long after, in the hands of the Danes, or some other northern Nation, who introduced fortifications and trade into this country. They certainly made choice of and esteemed it for its port, which was a very good one for any vessels then in use;

Dryden,
Dublin.

Dublin,
Dubos.

use; and for this reason, and because it was but 60 miles from the coast of Wales, it came to be preferred by the English when this part of Ireland was reduced under their power. It has gradually, therefore, under the auspices of several princes, acquired almost all the advantages of which any city can boast. It is supposed to have been a bishop's see in the fifth century. The first archbishop was Gregory, in the year 1152; and the bishopric of Glendaloch was annexed to it in 1214, when Henry de Loundres, or Henry of London, was archbishop. He made it a place of strength by building the castle; which still remains the centre of the British force in this place, by the addition of barracks. An university was erected here by the authority of the Pope in 1320; but that not taking effect, queen Elizabeth, in 1591, founded and endowed Trinity college, which has continued ever since, and produced many learned men. This city is the seat of government; the lord lieutenant, lord deputy, or lords justices, residing here. Here also are kept the sovereign courts of law and equity, and the records of the kingdom; and here likewise is held the parliament. As a city or corporation, its chief magistrate is styled *lord mayor*, and wears a collar of SS, both bestowed by Charles II. Succeeding monarchs have confirmed these favours, and most extensive privileges have been granted to the citizens; their liberties also, or corporate jurisdiction, being very large. Besides all this, Dublin may be considered as the centre of the inland trade, and is without doubt the place of the amplest foreign commerce in the island. For the accommodation of merchants, they have a tholse or exchange; a custom-house for the receipt of the revenue; and commissioners for the management of it. The city has increased prodigiously of late. From 1682, to 1752, the number of houses were completely doubled; and the number of inhabitants is now reckoned at 150,000.—Since the introduction of large vessels that draw a great deal of water, the harbour of Dublin is but indifferent; for all along this coast, from Wexford, there lie shoals of sand, divided into the south, middle, and north grounds; and at the mouth of the harbour there is a bar, occasioned by two banks of sand, called the *south* and *north bulls*, stretching from the opposite sides of the haven, upon which at high water there is no more than 17 feet, and at low water it is impossible to go over it. Besides, when the tide is out, except in two places, ships lie dry. Great pains and much money have been employed with a view to remove these inconveniencies, but hitherto not with any great success; yet, notwithstanding all these obstructions, the merchants of Dublin extend their correspondence daily, and probably one half of the foreign commerce of Ireland is carried on at this port.

DUBOS (John Baptist), a learned and ingenious French author, born at Beauvais in 1670. He finished his studies at Paris, and at length was intrusted with the management of several important affairs in Italy, England, and Holland. At his return to Paris, he had a prebendary given him; afterwards he had a pension of two thousand livres, and the abbey of Notre Dame at Reffons, near Beauvais. He died at Paris, when perpetual secretary of the French academy, on the 23d of March 1742. His principal works are, 1. *Critical Reflections on Poetry and Painting*, in three

volumes duodecimo. 2. *A critical History of the French Monarchy in Gaul*, two volumes 4to.

DUCAI, in general, something belonging to a duke. See Duke.

DUCAS, a learned Greek, who wrote an history of what passed under the last emperors of Constantinople, till the ruin of that city. This work, which is esteemed, was printed at the Louvre in 1649, with the Latin translation and notes of Bouilland.

DUCAT, a coin current in Germany, and other countries abroad, of different values.

DUCATON, a silver coin, likewise current in several parts of Europe.

DUCHAL (James), D. D. a late pious and learned dissenting minister, was born in Ireland, and finished his studies at the university of Glasgow; which afterwards, from a regard to his merit, conferred on him the degree of doctor of divinity. He resided 10 or 11 years at Cambridge, as the pastor of a small congregation there; where he enjoyed his beloved retirement, the advantage of books and of learned conversation, which he improved with the greatest diligence. On Mr Abernethy's removal from Antrim, he succeeded him there; and on that gentleman's death, he succeeded him as minister of the dissenting meeting-house in Wood-street, Dublin. In this situation he continued till his death, which happened on the 4th of May 1761, when he had completed his 64th year. He published a volume of excellent discourses on the presumptive arguments in favour of the Christian religion, and many occasional tracts; and after his death were published a number of his sermons, in three volumes 8vo.

DUCENARIUS, in Roman antiquity, a military officer who had the command of 200 men.

DUCHY, in geography, an appellation given to the dominions of a duke.

DUCK, in ornithology. See ANAS, and DECOY.

This fowl is furnished with a peculiar structure of vessels about the heart, which enables it to live a considerable time under water, as is necessary for it in diving. This made Mr Boyle think it a more proper subject for experiments with the air-pump than any other bird. A full grown duck being put into the receiver of an air-pump, of which she filled one third part, and the air exhausted, the creature seemed to bear it better for the first moments than a hen or other such fowl; but, after about a minute, she shewed great signs of uneasiness, and in less than two minutes her head fell down, and she appeared dying, till revived by the letting in of the air. Thus, whatever facility of diving this and other water-fowl may have, it does not appear that they can subsist, without air for respiration, any longer than other animals. A young callow duck was afterwards tried in the same manner, and with the same success, being reduced very near death in less than two minutes. But it is observable, that both birds swelled very much on pumping out the air, so that they appeared greatly larger to the spectators, especially about the crop; it not being intended that any water-fowl should live in an exceedingly rarefied air, but only be able to continue occasionally some time under water. Nature, though she has provided them with the means of this, has done nothing for them in regard to the other.

The strongest instance of these creatures being calculated

Ducal
Duck.

Duck,
Ducking.

culated to live almost in any situation, we have in the accounts of the blind ducks in the Zirchuitzer lake in Carniola. It is supposed that this lake communicates with another lake under ground in the mountain Savornie, and fills or empties itself according to the fullness or emptiness of that lake; the water of the upper lake running off, and that in vast quantities, by holes in the bottom. The ducks, which are here always in great numbers, are often carried down along with the water, and forced into the subterraneous lake to which it retires. In this unnatural habitation, many of these creatures undoubtedly perish, but some remain alive. These become blind, and lose all their feathers; and in the next filling of the lake, both they and vast numbers of fish are thrown up with the water. At this time they are fat, but make a strange appearance in their naked state, and are easily caught, by reason of their want of sight. In about a fortnight they recover their sight and feathers; and are then of the size of a common wild-duck, but of a black colour, with a white spot in their forehead. When opened, on being taken at their first coming up in their blind state, their stomachs are found full of small fishes, and somewhat resembling weeds. From this it seems, that they cannot be absolutely blind; but that the degree of light to which they have been accustomed in their subterraneous habitation, was sufficient to enable them to procure food for themselves; and their blindness, on coming again into open day-light, is no other than that of a man who has been long in the dark, on having in an instant a large blaze of candles set under his eyes.

DUCK (Stephen), originally a thresher in a barn, was born about the beginning of the present century. By his poetical talents he first attracted the notice of some gentlemen at Oxford; and being recommended to Queen Caroline, he, under her patronage, took orders, and was preferred to the living of Byfleet in Surrey. His abilities were, however, much more conspicuous in his primitive station, than in his advancement; though, it is said, he was not disliked as a preacher. Falling at length into a low-spirited melancholy way, probably owing to his change of life, and cessation from his usual labour, he in a fit of lunacy flung himself into the Thames, in 1756.

DUCKING, plunging in water, a diversion anciently practised among the Goths by way of exercise; but among the Celts, Franks, and ancient Germans, it was a sort of punishment for persons of scandalous lives.—At Marfeilles and Bourbon their men and women of scandalous life are condemned to the *cale*, as they call it; that is, to be shut up naked to the shift in an iron cage fastened to the yard of a shallop, and ducked several times in the river. The same is done at Thoulouse to blasphemers.

DUCKING, a sort of marine punishment, inflicted by the French, on those who have been convicted of desertion, blasphemy, or exciting sedition. It is performed as follows: The criminal is placed astride of a short thick batten, fastened to the end of a rope, which passes through a block hanging at one of the yard-arm. Thus fixed, he is hoisted suddenly up to the yard, and the rope being slackened at once, he is plunged into the sea. This chastisement is repeated several times conformable to the purport of the sentence pronounced against the culprit, who has at that time

several cannon-shot fastened to his feet during the punishment; which is rendered public by the firing of a gun, to advertise the other ships of the fleet thereof, that their crews may become spectators.

DUCKING-*Stool*. See CASTIGATORY.

DUCKUP, at sea, is a term used by the steer's-man, when the main-fail, fore-fail, or sprit-fail, hinders his seeing to steer by a land-mark: upon which he calls out, *Duckup the clew-lines of these sails*; that is, hale the fails out of the way. Also when a shot is made by a chace-piece, if the clew of the sprit-fail hinders the sight, they call out, *Duckup*, &c.

DUCT, in general, denotes any tube or canal. It is a term much used by anatomists.

DUCTILITY, in physics, a property possessed by certain solid bodies, which consists in their yielding to percussion, or pressure, and in receiving different forms without breaking.

Some bodies are ductile both when they are hot and when they are cold, and in all circumstances. Such are metals, particularly gold and silver. Other bodies are ductile only when heated to a sufficient degree; such as wax and other substances of that kind, and glass. Other bodies, particularly some kinds of iron, called by the workmen *red-short*, brass, and some other metallic mixtures, are ductile only when cold, and brittle when hot. The degrees of heat requisite to produce ductility in bodies of the first kind, vary according to their different natures. In general, the heat of the body must be such as is sufficient to reduce it to a middle state betwixt solidity and perfect fusion. As wax, for instance, is fusible with a very small heat, it may be rendered ductile by a still smaller one; and glass, which requires a most violent heat for its perfect fusion, cannot acquire its greatest ductility until it is made perfectly red-hot, and almost ready to fuse. Lastly, some bodies are made ductile by the absorption of a fluid. Such are certain earths, particularly clay. When these earths have absorbed a sufficient quantity of water, to bring them into a middle state betwixt solidity and fluidity, that is to the consistence of a considerably firm paste, they have then acquired their greatest ductility. Water has precisely the same effect upon them in this respect, that fire has upon the bodies above mentioned.

DUDLEY (Edmund), an eminent lawyer and able statesman in the reign of Henry VII.; who with Sir Richard Empson, another lawyer of the same complexion, assisted in filling that rapacious monarch's coffers by arbitrary prosecutions of the people on old penal statutes. They were beheaded on the accession of Henry VIII. to pacify the clamours of the people for justice.

DUDLEY, (John), duke of Northumberland, son of the above, a statesman; memorable in the English history for his unsuccessful attempt to place the crown on the head of his daughter-in-law, lady Jane Grey, who fell a victim to his ambition; was born in 1502, and beheaded in 1553. See (*History of*) ENGLAND. Ambrose his eldest son was a brave general and able statesman under queen Elizabeth; and received the appellation of the *good earl of Warwick*. Henry, the duke's second son, was killed at the siege of St Quintin. Robert, the third son, a man of bad character, was created earl of Leicester; and was one of queen Elizabeth's favourites. His fourth son was the unfortunate lord Guildford Dudley, whose only crime was his being the husband

Ducking
Dudley.

Dudley,
Duel.

husband of lady Jane Grey, for which he was beheaded in 1554.

DUDLEY (Sir Robert), as he was called in England, and, as he was styled abroad, *earl of Warwick and duke of Northumberland*, was the son of Robert above mentioned, by the lady Douglas Sheffield; and was born at Sheen in Surry, in 1573, where he was carefully concealed, to prevent the queen's knowledge of the earl's engagements with his mother. He studied at Oxford; when his father, dying, left him the bulk of his estate. He was at this time one of the finest gentlemen in England; and having a particular turn to navigation, fitted out a small squadron at his own expence, with which he sailed to the river Orinocoque, and took and destroyed nine sail of Spanish ships. In 1595, he attended the earl of Essex, and the lord high admiral of England, in their expedition against the Spaniards; when, for his gallant behaviour at the taking of Cadiz, he received the honour of knighthood. He now endeavoured to prove the legitimacy of his birth, in order to be entitled to his hereditary honours. But being overpowered by the interest of the countess dowager of Leicester, he applied for a licence to travel; and being well received at the court of Florence, resolved to continue there, notwithstanding his receiving a letter of recall; on which his whole estate was seized by king James I. and vested in the crown. He discovered at the court of Cosmo II. great duke of Tuscany, those great abilities for which he had been admired in England, and was at length made chamberlain to his serene highness's consort. He there contrived several methods of improving shipping; introduced new manufactures; and by other services obtained for him a reputation, that at the desire of the archduchess, the emperor Ferdinand, in 1620, created him a duke of the holy Roman empire. He afterwards drained a vast tract of morafs between Pisa and the sea; and raised Leghorn, which was then a mean, pitiful place, into a large and beautiful town, improving the haven by a mole, which rendered it both safe and commodious; and having engaged his highness to declare it a free port, he, by his influence and correspondence, drew many English merchants to settle and set up houses there, which was of very great service to his native country, as well as to the Spaniards. He was also the patron of learned men, and held a high place himself in the republic of letters. His most celebrated work is his *Del Arcano del Mare*, in two volumes, folio.

DUEL, a single combat, at a time and place appointed, in consequence of a challenge. This custom came originally from the northern nations, among whom it was usual to decide all their controversies by arms. Both the accuser and accused gave pledges to the judges on their respective behalf; and the custom prevailed so far amongst the Germans, Danes, and Franks, that none were excused from it but women, sick people, cripples, and such as were under 21 years of age, or above 60. Even ecclesiastics, priests, and monks, were obliged to find champions to fight in their stead. The punishment of the vanquished was either death, by hanging or beheading; or, mutilation of members, according to the circumstances of the case. Duels were at first admitted not only on criminal occasions, but on some civil ones for the maintenance of rights to estates, and the like: in latter times, however, be-

fore they were entirely abolished, they were restrained to these four cases. 1. That the crime should be capital. 2. That it should be certain the crime was perpetrated. 3. The accused must by common fame be supposed guilty. And, 4. The matter not capable of proof by witnesses.

DUEL, at present, is used for single combat on some private quarrel; and must be premeditated, otherwise it is called a *rencontre*. If a person is killed in a duel, both the principals and seconds are guilty whether the seconds engage or not. (See the article MURDER.) It is also a very high offence to challenge a person either by word or letter, or to be the messenger of a challenge. (See LAW, N^o cxxxv. 20.) The severe edicts made by Lewis XIV. against duels have in a great measure put a stop to the practice in France.

The general practice of duelling, in this last sense, took its rise in the year 1527, at the breaking up of a treaty between the emperor Charles V. and Francis I. The former desired Francis's herald to acquaint his sovereign, that he would henceforth consider him not only as a base violator of public faith, but as a stranger to the honour and integrity becoming a gentleman. Francis, too high-spirited to bear such an imputation, had recourse to an uncommon expedient to vindicate his character. He instantly sent back the herald with a *cartel* of defiance, in which he gave the emperor the lie in form, challenged him to single combat, requiring him to name the time and place of the encounter, and the weapons with which he chose to fight. Charles, as he was not inferior to his rival in spirit or bravery, readily accepted the challenge; but after several messages concerning the arrangement of all the circumstances relative to the combat, accompanied with mutual reproaches bordering on the most indecent scurrility, all thoughts of this duel, more becoming the heroes of romance than the two greatest monarchs of their age, were entirely laid aside.

The example of two personages so illustrious, drew such general attention, and carried with it so much authority, that it had considerable influence in introducing an important change in manners all over Europe. Duels, as has already been observed, had been long permitted by the laws of all the European nations; and, forming a part of their jurisprudence, were authorized by the magistrate on many occasions, as the most proper method of terminating questions with regard to property, or of deciding in those which regarded crimes. But single combats being considered as solemn appeals to the omniscience and justice of the Supreme Being, they were allowed only in public causes, according to the prescription of law, and carried on in a judicial form*. Men, accustomed to this manner of decision in courts of justice, were naturally led to apply it to personal and private quarrels. Duels, which at first could be appointed by the civil judge alone, were fought without the interposition of his authority, and in cases to which the laws did not extend. The transaction between Charles and Francis strongly countenanced this practice. Upon every affront or injury which seemed to touch his honour, a gentleman thought himself entitled to draw his sword, and to call on his adversary to make reparation. Such an opinion, introduced among men of fierce courage, of high spirit, and of rude manners, where offence was often given, and revenge was always prompt, produced most fatal

Duel.

* See the article *Battel*.

Ducro,
Dugdale.

consequences. Much of the best blood in Christendom was shed; many useful lives were lost; and, at some periods, war itself hath hardly been more destructive than these contests of honour. So powerful, however, is the dominion of fashion, that neither the terror of penal laws, nor reverence for religion, have been able entirely to abolish a practice unknown among the ancients, and not justifiable by any principle of reason; though at the same time it must be admitted, that to this absurd custom we must ascribe, in some degree, the extraordinary gentleness and complaisance of modern manners, and that respectful attention of one man to another, which at present render the social intercourses of life far more agreeable and decent than among the most civilized nations of antiquity.

DUERO, or **DURO**, a large river, which, rising in Old Castile in Spain, runs from east to west, crosses the province of Leon; and, after dividing Portugal from Spain by a southerly course, turns westward, crosses Portugal, and falls into the Atlantic Ocean at Porto-Porto.

DUGDALE (Sir William), an eminent English historian, antiquarian, and herald, born in Warwickshire in 1605. He was introduced into the herald's office by Sir Christopher Hatton; and ascended gradually through all the degrees, until he became garter principal king at arms. His chief work is the *Monasticon Anglicanum*, in three vols folio; containing the charters and descriptions of all the English monasteries, adorned with engravings: in the former part of which work he was assisted by Mr Roger Dodsworth. Nor are his Antiquities of Warwickshire less esteemed. He wrote likewise, among other things of less note, the History of St Paul's Cathedral; a History of Embanking and Draining; a Baronage of England; and completed the second volume of Sir Henry Spelman's Councils, with a second part of his Glossary. He died in 1686. His son, Sir John, was Norroy king at arms, and published a Catalogue of English Nobility: his daughter Elizabeth married the famous Elias Ashmole.

DUKE is either the title of a sovereign prince, as the duke of Savoy, Parma, &c. the grand duke of Tuscany, Muscovy, &c.; or it is the title of honour and nobility next below princes. The commanders of armies in time of war, the governors of provinces and wardens of marches in times of peace, were called *duces* under the later emperors. The Goths and Vandals divided all Gaul into duchies and counties, the governors of which they sometimes call *duces*, and sometimes *comites*. In France, under the second race of kings, though they retained the name and form of ducal government, there were scarce any dukes except those of Burgundy, Aquitain, and France.

In Britain, a duke, though, in respect of his title of nobility*, he is inferior in point of antiquity to many others, yet is superior in rank to all of them; his being the first title of dignity after the royal family. Among the Saxons, the Latin name of dukes, *duces*, is very frequent; and signified, as among the Romans, the commanders or leaders of their armies. But after the Norman conquest, which changed the military polity of the nation, the kings themselves continuing for many generations *dukes* of Normandy, they would not honour any subject with that title till the time of Edward III.; who claiming to be king of France, and

thereby losing the ducal in the royal dignity, in the 11th year of his reign created his son, Edward the black prince, duke of Cornwall; and many, of the royal family especially, were afterwards raised to the same honour. However, in the reign of Queen Elizabeth, A. D. 1572, the whole order became utterly extinct; but it was revived about 50 years afterwards by her successor, who was remarkably prodigal of honours, in the person of George Villiers duke of Buckingham.

A duke is created by patent, circumscribed of sword, mantle of state, imposition of a cap and coronet of gold on his head, and a verge of gold put into his hand. His title is Grace; and, in the style of the heralds, Most high, potent, high-born, and noble prince.

DULCIFYING, in chemistry, is the sweetening any matter impregnated with salts, by frequently washing it in pure water.

DULL, in the menage. The marks of a dull horse, called by the French *marquis de ladre*, are white spots round the eye and on the tip of the nose, upon any general colour whatsoever. Though the vulgar take these spots for signs of stupidity, it is certain they are great marks of the goodness of a horse; and the horses that have them are very sensible and quick upon the spur.

DULLART (Heiman), a Dutch painter and poet. He was a pupil to Rembrandt, for whose works the few he left are often mistaken. He died in 1684.

DUMBNESS, the privation of the faculty of speech. The most general, or rather the sole cause of dumbness, is the want of the sense of hearing. The use of language is originally acquired by imitating articulate sounds. From this source of intelligence, deaf people are entirely excluded: they cannot acquire articulate sounds by the ear: unless, therefore, articulation be communicated to them by some other medium, these unhappy people must for ever be deprived of the use of language; and as language is the principal source of knowledge, whoever has the misfortune to want the sense of hearing, must remain in a state little superior to that of the brute creation. Deafness has in all ages been considered as such a total obstruction to speech, or written language, that an attempt to teach the deaf to speak or read has been uniformly regarded as impracticable, till Doctor Wallis and some others have of late shewn, that although deaf people cannot learn to speak or read by the direction of the ear, there are other sources of imitation, by which the same effect may be produced. The organs of hearing and of speech have little or no connection. Persons deprived of the former generally possess the latter in such perfection, that nothing further is necessary, in order to make them articulate, than to teach them how to use these organs. This indeed is no easy task; but experience shews that it is practicable. Mr THOMAS BRAIDWOOD, of Edinburgh, is perhaps the first who ever brought this surprising art to any degree of perfection. He began with a single pupil in 1764; and for some years past, he has taught many people born deaf, to speak distinctly, to read, to write, to understand figures, the principles of religion and morality, &c. This, at first sight, may appear to be altogether incredible; but the fact is certain. Mr Braidwood has, at present, a considerable number of deaf pupils, some of them above 20 years of age, all making a rapid

Dulcifying
Dumbness.

* See Nobility.

Dumbness. pid and amazing progress in those useful branches of education.

Mr Braidwood's principal difficulty, after he had discovered this art, was to make people believe in the practicability of it. He advertised in the public papers; he exhibited his pupils to many noblemen and gentlemen; still he found the generality of mankind unwilling to believe him. A remarkable instance of this incredulity occurred some years ago. A gentleman in England sent a deaf girl of his to Mr Braidwood's care. A year or two afterwards, Mr Braidwood wrote to the father, that his daughter could speak, read, and write distinctly. The father returned an answer, begging Mr Braidwood's excuse, as he could not believe it; however, he desired a friend of his, who was occasionally going to Edinburgh, to call at Mr Braidwood, and inquire into the truth of what he had wrote him: he did so; conversed with Mr Braidwood, saw the young lady, heard her read, speak, and answer any questions he put to her. On his return, he told the father the surprising progress his child had made; but still the father thought the whole an imposition: the girl herself wrote to her father, but he looked upon the letter as a forgery. About this time the father died; and the mother sent an uncle and cousin of the deaf lady's from Shrewsbury, in order to be satisfied of the truth. When they arrived, Mr Braidwood told the girl her uncle and cousin were in the parlour; and desired her to go and ask them how they did, and how her mother and other friends did. The friends were astonished, and could hardly credit their own ears and eyes.

We have conversed with Mr Braidwood, concerning the nature and method of teaching this wonderful art: he seems to be very desirous of communicating and transmitting his discovery to posterity; but says, and, from the nature of the thing, we believe it to be true, that he cannot communicate it so fully in writing as to enable any other person to teach it. The first thing in the method is, to teach the pupil to pronounce the simple sounds of the vowels and consonants. We have even seen him performing this operation; but are unable to give a clear idea of it. He pronounces the sound of *a* slowly, pointing out the figure of the letter at the same time; makes his pupil observe the motion of his mouth and throat; he then put his finger into the pupil's mouth, depresses or elevates the tongue, and makes him keep the parts in that position; then he lays hold of the outside of the windpipe, and gives it some kind of squeeze, which it is impossible to describe: all the while he is pronouncing *a*, the pupil is anxiously imitating him, but at first seems not to understand what he would have him to do. In this manner he proceeds, till the pupil has learned to pronounce the sounds of the letters. He goes on in the same manner to join a vowel and a consonant, till at length the pupil is enabled both to speak and read.

That Mr Braidwood is capable of teaching his pupils not only the mere *pronunciation*, but also to understand the *meaning* of what they read, may be ascertained by a conversation with any of his pupils. Of this Mr Pennant gives a remarkable instance in a young lady of about 13 years of age, who had been some time under the care of Mr Braidwood. "She readily apprehended (says he) all I said, and returned me answers

with the utmost facility. She read; she wrote well. Her reading was not by rote. She could clothe the same thoughts in a new set of words, and never vary from the original sense. I have forgot the book she took up, or the sentences she made a new version of; but the effect was as follows:

"*Original passage.* Lord Bacon has divided the whole of human knowledge into history, poetry, and philosophy; which are referred to the three powers of the mind, memory, imagination, and reason.

"*Version.* A nobleman has parted the total or all of man's study, or understanding, into An account of the life, manners, religion or customs of any people or country; verse, or metre; moral or natural knowledge: which are pointed to the three faculties of the soul or spirit; the faculty of remembering what is past, thought or conception, and right judgment."

It is altogether in vain for us to attempt to say any more concerning the mode of operation. Mr Braidwood undertakes every deaf person, who is not at the same time foolish or idiotical. The greatest misfortune is, that this art is confined to a single man, and that his pupils must live in the house with him for some years. The expence necessarily attending education of this kind, excludes all but people in opulent circumstances from deriving any advantage from it. Mr Braidwood says, that the only way for preserving the art, and communicating it to a number, is to take people in the way of apprentices: this he is unable to do at his own expence. What a pity, that such a curious and useful art should live and die with a single man! There are many sums mortified in this kingdom, both by government and private persons, for less important purposes, than the preservation and extension of the art of raising a great number of our fellow-creatures from the rank of brutes, to that of reasonable beings and useful members of society.

Periodical DUMBNESS. In the Ephemerides of the Curious, we have an account of a periodical dumbness, which had continued for more than 15 years, and had not gone off at the time the account was wrote. The person was son to an inn-keeper at Jelsing in the duchy of Wirtemberg in Germany. He was one night taken so ill after supper, that he could neither stand nor sit. He continued, for about an hour, oppressed with sickness to such a degree as to be in danger of suffocation. At the expiration of this time he grew better; but, during three months, he was much dejected, melancholy, and, at times, fearful. He was then suddenly struck dumb, and became unable to pronounce the least word, or form the least sound, though he could speak very articulately before. The loss of speech was at first instantaneous, and continued only a few minutes; but the duration of it began to lengthen every day; so that it soon amounted to half an hour, two hours, three hours, and at last to 23 hours, yet without any order. At last the return of speech kept so constant and regular an order, that, for 14 years together, he could not speak except from noon, during the space of one entire hour, to the precise moment of one o'clock. Every time he lost his speech, he felt something rise from his stomach to his throat. Excepting this loss of speech, he was afflicted with no other disorder of any animal function. Both his internal and external senses continued sound: he heard always perfectly well, and answered

Dunfermline
line
Dunbarton.

answered the questions proposed to him by gestures or writing. All suspicion of deceit was removed by his keeping exactly the same hour, though he had no access to any instruments by which time can be measured.

DUMFERMLINE, a parliament-town of Scotland, situated in the county of Fife, 15 miles north-west of Edinburgh: W. Long. 30. 20. N. Lat. 56. 15. Here was formerly a magnificent abbey and palace of the kings of Scotland, in which the princefs Elizabeth, daughter of king James VI. and mother of the princefs Sophia, from whom the present royal family are descended, was born.

DUMFRIES, a county of Scotland, comprehending Annandale, Wachopdale, and Niddisdale, extends in length from west to east about 50 miles, and is about 34 miles in breadth where broadest. It is bounded on the west by Galloway and Kyle; on the east by Solway frith, and the marches between Scotland and England; on the north by part of Clydesdale, Tweeddale, and Teviotdale; and on the south by the Irish sea. The country is rough and mountainous, not so well adapted for corn as for pasture; and, of consequence, innumerable flocks of sheep and herds of black cattle are bred in this county, and fattened for exportation to England. The face of the country is bare and brown, almost destitute of wood, and very deficient in fuel; yet the valleys being watered and fertilized by abundance of streams, produce good corn.—In the division called *Niddisdale*, are mines of lead, and, as it is said, of silver and gold also; but the two last mentioned are not worked.

DUMFRIES, the capital of the above-mentioned county, is a large flourishing town, situated at the mouth of the river Nid, in W. Long. 3. 20. N. Lat. 54. 45. The houses are well built and commodious, the streets open and spacious: The town has an old castle in tolerable repair; four gates; a stately church; an exchange for the merchants; a tolbooth; a large market-place with a curious cross; and a noble bridge of free-stone over the river, consisting of 13 arches, with a gate in the middle as a boundary between the shire of Dumfries and the stewartry of Galloway. This town gives the title of earl to the chief of the family of Crichton; it is the seat of a presbytery and provincial synod, and carries on a considerable foreign trade.

DUMONT (Francis), a Frenchman; compiler of a general collection of treaties of commerce, alliance, and peace, between the powers of Europe. This collection, with Barbeyrac's, containing the treaties B. C. makes 16 vols folio, very useful for historical writers. Dumont retired to Holland in 1720. The time of his death is uncertain.

DUMOSÆ, (from *dumus*, a bush), an order of plants in the *Fragmenta methodi naturalis* of Linnæus, containing the following genera, viz. *Viburnum*, *Tinus*, *Opulus*, *Sambucus*, *Rondeletia*, *Bellonia*, *Cassine*, *Ilex*, *Tomax*, &c.

DUNBAR, a town of Scotland, in the shire of Mid-Lothian, memorable for the victory obtained by Oliver Cromwell over the Scots in 1650. W. Long. 2. 22. N. Lat. 55. 58.

DUNBARTON, the chief town of Lenox or Dunbarton-shire in Scotland, situated in W. Long. 4. 32. N. Lat. 56. 30. It is remarkable for nothing but its castle. This is a steep rock, rising up in two points,

and every where inaccessible, except by a very narrow passage or entry, fortified with a strong wall or rampart. Within this wall is the guard-house, with lodgings for the officers; and from hence a long flight of stone-steps ascends to the upper part of the castle, where there are several batteries mounted with cannon, the wall being continued almost round the rock. In the middle of this upper part where the rock divides, there are commodious barracks with a deep well, in which there is always plenty of water. Here likewise are the remains of a gateway and prodigious high wall, at the top of which there was a wooden bridge of communication from one rock to another. This gateway was sometimes blocked up during the intestine commotions of Scotland, so that garrisons of different factions possessed different parts of the castle, and each had a gate towards the water. The castle stands in the angle formed at the conflux of the Clyde and Leven; so that it is wholly surrounded by water, except a narrow isthmus, and even this is overflowed at every spring-tide: nor is there any hill or eminence within a Scots mile of this fortress. It commands the navigation of the Clyde; and, being deemed the key of the western Highlands, is kept in some repair, and garrisoned with invalids, under the command of a governor and some subaltern officers. The government of it is worth 365 *l.* a-year.

DUNCANNON, a fort in the county of Wexford, and province of Leinster, in Ireland, seated on the river Rofs. It commands the river, inasmuch that no ship can pass to Waterford or Rofs without its permission. Here are barracks for three companies of foot. W. Long. 6. 30. N. Lat. 52. 10.

DUNCARDS, **DUNKARDS**, or *Dumplings*, a religious sect in Pennsylvania, in America. A German hermit, who settled on the spot where Ephrata is now built, was the founder of this extraordinary sect. The fame of his solitude inspired some of his countrymen with curiosity; and the simplicity of his life, with the piety of his conversation, induced them to join, and imitate him. A people who leave their native country to enjoy liberty of conscience, can bear all subsequent mortifications. The Germans of both sexes, who joined the hermit, soon accustomed themselves to his way of thinking, and consequently to his manner of living; industry became part of their duty, and divided their time with devotion. Their gains are thrown into one common stock, which supplies all their exigencies, private as well as public: their females are cloistered up by themselves in a separate part of the town, the situation of which is delightful, and screens them from the north wind. It is triangular, and fenced round with thick rows of apple, beech, and cherry trees, besides having an orchard in the middle. The houses, which are of wood, are mostly three stories high; and every person has a separate apartment, that he may not be disturbed in his devotions. The women never see the men but at public worship, or when it is necessary to consult upon matters of public economy; and the number of both may be about 300. Their garb is the most simple that can be well imagined, being a long white woollen gown in winter, and linen in the summer, with a cap, which serves them for a hat, like that of a capuchin behind, and fastened round the waist with a belt. Under the gown, they wear a waistcoat of the same

same materials, a coarse shirt, trowsers, and shoes. The dress of the women is the same: only, instead of trowsers, they wear petticoats; and when they leave their nunnery (for such it is), they muffle up their faces in their capuchins. The diet of the Dunkards consists of vegetables; but it is no principle with them to abstain from animal-food, only they think that such abstinence is most agreeable to a Christian life. This temperance emaciates their bodies, and, as the men indulge their beards to grow to their full length, gives them a hollow, ghastly appearance. Their beds are no better than benches; a little wooden block serves them for a pillow; and they celebrate public worship twice every day, and as often every night. But though such modes of life appear absurd and impracticable, the Dunkards are far from being extravagant. Their chapel is very decent; and they have, upon a fine stream, a grist-mill, a paper-mill, an oil-mill, and a mill for pearl-barley, all of them most ingeniously constructed by themselves: they have even a printing-press; and they are, especially the nuns, extremely ingenious in working, and in embellishments; which they perform with a variety of beautiful colours, with gilding, in imitation of the initials in ancient manuscripts; and they stick them up, by way of ornament, in their churches and cells. By those different manufactures, the public stock of this ascetic people is well supplied, as no denomination of Christians can be their enemies, their religious tenets being mingled with the absurdities of all. Notwithstanding the two sexes live separate from one another in their town, yet the Dunkards are far from being averse to matrimony. In that case, the parties must indeed leave the town; but they are supplied out of the public fund with whatever is necessary for their settling elsewhere. This they generally do as near as they can to Ephrata, to which they send their children for education. The Dunkards administer baptism by dipping or plunging, but to adult persons only: they hold free-will; and think that the doctrine of original sin, as to its effect upon Adam's posterity, is absurd and impious: they disclaim violence, even in cases of self-defence; and suffer themselves to be defrauded or wronged, rather than go to law: they are superstitious to the last degree in observing their sabbath; and all their prayers and preachings, during their worship, are extempore: humility, chastity, temperance, and other Christian virtues, are commonly the subjects of their discourses; and they imagine, that the souls of dead Christians are employed in converting those of the dead who had no opportunity of knowing the gospel: they deny the eternity of hell-torments; but believe in certain temporary ones, that will be inflicted on infidels and obdurate persons who deny Christ to be their only Saviour; but they think, that at a certain period all will be admitted to the endless fruition of the Deity.

DUNDEE, the ALLECTUM or *Taidonum* of the ancients; a well-built, flourishing town of Scotland, in the shire of Angus or Forfar, and ranking the 3d of the royal boroughs. It is seated on the north-side of the river Tay, about eight miles from its mouth, in W. Long. 2. 48. N. Lat. 56. 26. Its situation for commerce is very advantageous: trading vessels of the largest burden can get into its harbour; and on the key there are three very convenient and handsome

warehouses, built in 1756; as well as good room for ship-building, which is carried on to a considerable extent. The houses are built of stone, generally four stories high. The market-place, or high-street, in the middle of the town, is a very spacious square, from whence branch out the four principal streets; which, with several lesser ones, have been all lately well paved. On the south-side of the market-place, stands the town-house, an elegant structure, finished in the year 1734: it contains the guild-hall, the court-room, a finely painted mason-ledge, the post-office, the bank, and vaulted repositories for the records. At the east end of the high-street, there is a fine new edifice, erected principally for a trades-hall, but designed also to answer occasionally for a theatre. Three established churches, besides several chapels and meeting-houses, having been found insufficient for the number of inhabitants, a new church has been lately built, which is reckoned one of the most elegant in the kingdom.—Here is also a magnificent square Gothic tower or steeple, now standing by itself, but which formerly made part of a venerable and superb building of churches in the form of a cross, erected by David earl of Huntingdon brother to William I. of Scotland, and dedicated to the Virgin Mary. This he did on his return from the third crusade, (in which, with 500 of his countrymen, he had accompanied Richard I. of England, anno 1189), in gratitude for his deliverance from several imminent dangers; and particularly from shipwreck, by which he had nearly perished when in sight of this place. At the same time he changed the name of the town from *Allectum* to *Dei Donum*, from which its present name is thought by many to be derived; and under this new name we find it increasing considerably in the 13th century. The destruction of the churches adjoining to this tower, was the work of Edward I. of England, that barbarous destroyer of Scottish monuments and records. He was so exasperated at the inhabitants standing out against him, and aiding his inveterate foe the famous Wallace, that he set fire both to the churches and to the town itself; the flames destroying all but a part on the east end, now called the *old kirk*. The town suffered very much about the middle of the last century. For just six years after it had been taken by storm by Montrose, it was besieged in form by General Monk: and although it made a gallant defence under major-general Lumden, it was at last, on the 1st of September 1651, carried by force, when all that were in arms were put to the sword; and so great were the riches of the town, all the neighbouring gentlemen with their best effects having retired to it as a place of safety, that every private soldier in general Monk's army had near 60 pounds Sterling to his share of the plunder. This is reckoned the greatest loss ever Scotland sustained at one stroke, there being above 60 vessels in the harbour at that time. To enable the inhabitants to recover from this calamity, and to repair their harbour and other public works, Charles II. granted them an excise of one third of an English penny upon every gallon of ale or beer sold in town for 25 years, which has been continued by five subsequent acts, and is highly serviceable. At present Dundee is in a very flourishing condition. The shipping are reckoned near 100 sail; and the manufactures go on briskly. These consist

Dung
Dunkirk.

consist of linen (especially osnaburghs), sail-cloth, cordage, threads, thread-stocks, buckrams (a new work in Scotland), tanned leather, shoes, and hats; not only sufficient for their own consumpt, but for exportation in considerable quantities. An excellent sugar-house has also now subsisted for about 10 years, and does considerable business. The Osnaburgh trade is undoubtedly the staple, of which there have been above four millions of yards stamped here annually of late. Their coloured threads have been long famous; and are manufactured to a considerable amount. The number of inhabitants is reckoned near 16,000.

DUNG, in husbandry. See AGRICULTURE, n° 21.
DUNG-Bird. See UPURA.

DUNG Meers, in husbandry, places where soils and dungs are mixed and digested together. These consist of pits, prepared at the bottom with stone and clay, that they may hold water, or the moisture of the dung; and ought to be so situated, that the sinks and drips of the houses and barns may run into them. Into these pits they cast refuse, fodder, litter, dung, weeds, &c. where they lie and rot together, till the farmer have occasion for them.

DUNG Worms, a species of fly-worms, of a short and somewhat flat body, found in great plenty among cow-dung in the months of September and October.

DUNGANNON, the chief town of the county of Tyrone, in the province of Ulster, in Ireland. It is seated on a hill, and is a place of some strength.

DUNGARVON, a town of Ireland, in the county of Waterford. It stands on a bay of the same name, has a commodious harbour for ships, and is a walled town with a castle. W. Long. 7. 55. N. Lat. 51. 57.

DUNKELD, a town of Scotland, in the shire of Perth, pleasantly situated on the north side of the river Tay. It was formerly a bishop's see, and the remains of the cathedral are still visible. It is the chief market-town of the Highlands. W. Long. 3. 18. N. Lat. 56. 36.

DUNKIRK, a maritime town of the French Netherlands, situated in E. Long. 2. 28. N. Lat. 51. 10. and is the most easterly harbour on the side of France which is next to Great Britain.—It was originally a mean hamlet, consisting only of a few fishermens huts: but a church being built there, it was from that, and from its situation, which is a sandy eminence, called *Dunkirk*; *dun* signifying, in the old Gallic language, a hill; and *kirk* being the old Flemish name for church.

About the year 960, Baldwin, earl of Flanders, thinking the situation convenient, enlarged it into a kind of town, and surrounded it with of wall. In the year 1322, Robert of Flanders, who held it as an appendage, built a castle for its defence; which was afterwards demolished by the revolvers of Flanders. Robert of Bar erected a fortification round it, the remains of which are visible on the side next the harbour. The emperor Charles V. who held it as part of Flanders, built another castle to defend the harbour: but this was also demolished soon afterwards. In 1558, the French, under marshal de Thermes, took Dunkirk by storm, and almost ruined the place; the Spaniards recovered it again in about a fortnight, and put all the French to the sword.

During a peace procured for the Dunkirkers by Philip II. of Spain, they rebuilt their town with greater

splendor than before, and the inhabitants for a long time subsisted by privateers fitted out against the Dutch; and at length, growing rich by these hostilities, they fortified their town and harbour, and fitted out no less than 15 ships of war at their own charge.

In 1634, the Dunkirkers agreed with the inhabitants of Bergues, to dig a canal, at their joint expence, for a communication between the two towns; which was some time afterwards effected. By this time, Dunkirk was become the best harbour the Spaniards possessed in Flanders, which induced many foreigners to settle there; and it being necessary to enlarge the town for their accommodation, a new fortified wall was built at a considerable distance from the former. In 1646, it was besieged and taken by the prince of Condé. In 1652, it was retaken by the archduke Leopold, then governor of the Netherlands. France entering into a treaty with England in 1655, the Dunkirkers, with views of pecuniary advantage, fitted out privateers against both those powers: the consequence of which was, that the French, assisted by Cromwell, attacked and took it; and it was put into the hands of the English, in consequence of a treaty between them and the French. To the English it was even then of very great importance; for, during the war in which it was taken, the Dunkirkers had made prizes of no less than 250 of their ships, many of which were of great value. They therefore improved the fortifications, and built a citadel: yet they kept it only four years; for in 1662, two years after the restoration, Charles II. sold this valuable acquisition to France, for the paltry sum of 500,000*l.* In consequence of this sale, the town was taken possession of for the French king Lewis XIV. by the count d'Elstrades, on the 29th of November 1662. Lewis having acquainted the celebrated engineer Monsieur Vauban, that he intended to make Dunkirk one of the strongest places in Europe, Vauban drew up a plan with that view, which was gradually executed. An arsenal was erected, large enough to contain all the stores necessary for fitting out and maintaining a large fleet of men of war; the fortifications on the land-side were constructed in a manner that was thought to render them impregnable; and towards the sea, the entrance of the harbour being properly formed, it was fortified by the jetties, and the two forts called *Green Fort* and the *Fort of Good Hope* at their extremities; the famous Ribbank was also erected on one side of the jetties, and Fort Galliard on the other, to secure the town. These works were all completed in 1683; and in 1685, the whole circumference of the bastion was faced with masonry, and the keys completely formed: at the same time care was taken to build at the entrance of this bastion a sluice, almost 45 feet wide, that the ships within might be constantly afloat. In 1689, the fort called the *Cornichon*, and some other works, were completed. But though 30 years had been now employed in improving the fortifications of Dunkirk, it was not yet in the state in which Lewis intended to put it; and therefore, in 1701, he caused a new ribbank to be built, called *Fort Blanc*.

At the treaty of Utrecht, it having been made appear, that the privateers of Dunkirk had, during the war then closing, taken from the English no less than 1614 prizes, valued at 1,334,375*l.* Sterling, it was stipulated, that the fortifications of the city and port

Dunkirk

of Dunkirk should be entirely demolished, and the harbour filled up, so as never to be an harbour again.

The treaty, of which this demolition of Dunkirk was an article, was signed on the 28th of April 1713; but the demolition did not take place till the September following, when the queen deputed colonel Armstrong and colonel Clayton to oversee the execution of the treaty as far as concerned the works and harbour of Dunkirk.

Under the inspection of these gentlemen, the places of arms were broken down, the ditches filled up, and the demi-lunes, bastions, and covered way, totally destroyed; the citadel was razed, and the harbour and basin filled up; the jetties were also levelled with the strand, and all the forts which defended the entrance into the harbour were demolished. A large dam, or bar, was also built across the mouth of the harbour between the jetties and the town, by which all communication between the harbour and the canal, which formed its entrance, was entirely cut off. The sluices were also broken up, and the materials of them broken to pieces.

But this was no sooner done, than Lewis XIV. ordered 30,000 men to work incessantly upon a new canal, the canal of Mardick, which in a short time they accomplished; by which the harbour was rendered almost as commodious as ever: but in 1717 this likewise was rendered unserviceable.

In the year 1720, during a great storm, the sea broke up the bar or dam, and restored to the Dunkirkers the use of the harbour in a very considerable degree.

In the year 1740, when Great Britain was engaged in a war with Spain, Lewis XV. set about improving the advantage which Dunkirk had derived from the storm in 1720, by restoring the works, and repairing the harbour. He rebuilt the jetties, and erected new forts in the place of those which had been destroyed; and soon afterwards he espoused the cause of Spain, and became a principal in the war against us.

But at the peace of Aix-la-Chapelle in 1748, it was stipulated, that all the works towards the sea should be destroyed a second time; yet, before the declaration of the last war, the place was in as good a state of defence towards the sea as it was at any time during the war which was concluded by the treaty of Aix-la-Chapelle.

DUNS, a market-town of Scotland, in the shire of Mers, seated in W. Long. 2. 15. N. Lat. 55. 42.

DUNS SCOTUS (John), a Franciscan friar, commonly called *doctor subtilis*, was born in the year 1274; but whether in England, Scotland, or Ireland, hath long been a matter of dispute among the learned of each nation. Dempster, Mackenzie, and other Scottish writers, assert positively that he was born at Duns, a town in Scotland, about fifteen miles from Berwick; and, to secure him more effectually, Mackenzie makes him defended from the Dunses in the Mers. Mac Caghwel, an Irish author, who wrote the life of this Scotus, proves him to have been born at Down in the province of Ulster in Ireland: but Leland, Bale, Camden, and Pits, assure us, that he was born at Dunstan in the parish of Emildune, near Alnwick in Northumberland; and this opinion is rendered probable by the following conclusion of his manuscript works in the

library of Merton college in Oxford—"Here end the writings of that subtle doctor of the university of Paris, John Duns, who was born in a certain village, in the parish of Emildune, called *Dunston*, in the county of Northumberland." We are told, that, when a boy, he became accidentally known to two Franciscan friars; who, finding him to be a youth of very extraordinary capacity, took him to their convent at New-castle, and afterwards persuaded him to become one of their fraternity. From thence he was sent to Oxford, where he was made fellow of Merton college and professor of divinity; and Mackenzie says, that not less than 30,000 students came to Oxford to hear his lectures. His fame was now become so universal, that the general of his order commanded him to go to Paris, that the students of that university might also profit from his lectures. He went to Paris in the year 1304, where he was honoured first with the degree of bachelor, then of doctor of divinity, and in 1307 was appointed regent of the divinity schools: during his residence here, the famous controversy about the *Immaculate conception of the virgin Mary* arose. Albertus Magnus maintained that she was born in original sin. Scotus advanced 200 arguments in support of the contrary opinion, and convinced the university of Paris that she was really conceived immaculate. This important nonsense, however, continued to be disputed till the year 1496, after the council of Basil, when the university of Paris made a decree, that no student, who did not believe the *immaculate conception*, should be admitted to a degree. Our author had not been above a year at Paris, when the same general of the Franciscans ordered him to remove to Cologne; where he was received with great pomp and ceremony by the magistrates and nobles of that city, and where he died of an apoplexy soon after his arrival, in the year 1308, in the 34th year of his age. Some writers have reported, that Scotus was buried in an epileptic fit; and that, upon removing his bones, he appeared to have turned himself in his coffin. This *doctor subtilis* was doubtless one of the first wranglers of his time, admirably well versed in scholastic divinity, and a most indefatigable scribbler; but the misfortune is, that all his huge volumes do not contain a single page worth the perusal of a rational being. He was the author of a new sect of schoolmen called *Scotists*; who opposed the opinions of the Thomists, so called from St Thomas Aquinas. The reader will find a more particular account of Scotus in the Franciscan Martyrology, published at Paris in 1638.—He was a most voluminous writer; his works making 12 vols folio, as published at Lyons by Luke Wadding, 1639.

DUNSTABLE, a town in Bedfordshire, with a market on Wednesdays. It is seated on a chalky hill; and has ponds in the street, which are never dry, tho' only supplied with rain water. It is remarkable for several good inns, it being a great thoroughfare on the northern road. It consists of four streets, intersecting each other at right angles; and in the centre stood one of those beautiful crosses of queen Eleanor, which was destroyed by the enthusiasts in the time of the civil wars. W. Long. 0. 29. N. Lat. 51. 50.

DUNSTAN (canonized), archbishop of Canterbury, in the reign of king Edwy, who was obliged to banish him for his overbearing insolence. He was an encourager

Duo
||
Duppa.

encourager of learning, and an author of some note for the age he lived in. He died about 988. There are many legendary stories about his contests with the devil.

DUO, in music, a song or composition, to be performed in two parts only, one sung, the other played on an instrument, or by two voices.

Duo is also when two voices sing different parts, as accompanied with a third which is a thorough bass. It is seldom that unisons and octaves are used in duos, except at the beginning and end.

DUODECIMA, in music, is the twelfth, or the fifth doubled.

DUODENUM. See **ANATOMY**, n° 354, g.
DUPIN (Lewis Ellis), a learned doctor of the Sorbonne, and one of the greatest critics of his time, especially in ecclesiastical matters, was born at Paris in 1657. When he published the first volume of his *Bibliothèque Universelle des Auteurs Ecclesiastiques*, in 1686, the liberty with which he treated some ecclesiastical writers, gave such offence, that M. de Harlay, archbishop of Paris, obliged Dupin to retract many propositions, and suppress the work. He was nevertheless suffered to continue it, by altering the title from *Bibliothèque Universelle*, to *Bibliothèque Nouvelle*. This great undertaking, continued in several successive volumes, though sufficient to occupy the life of an ordinary man, did not hinder M. Dupin from obliging the world with several other works. He was a man of prodigious reading; and had an easy, happy way of writing, with an uncommon talent at analysing the works of an author; which makes his Ecclesiastical Bibliothèque so valuable. M. Dupin was professor of philosophy in the royal college; but was banished some time from the chair to Chatelleraut, on account of the famous *Cas de Conscience*; but was restored, and died in 1719.

DUPLE, among mathematicians, denotes the ratio of 2 to 1. Thus the ratio of 8 to 4 is duple, or as 2 to 1.

Sub-Duple Ratio, is just the reverse of the former, or as 1 to 2. Such is 4 to 8, or 6 to 12.

DUPPLICATE, among lawyers, denotes a copy of any deed, writing, or account. It is also used for the second letters-patent, granted by the lord chancellor in a case wherein he had before done the same. Also a second letter written and sent to the same party and purpose as a former, for fear of the first's miscarriage, is called a *duplicate*.

DUPPLICATE Proportion, or Ratio. See **RATIO**.
DUPPLICATION, in general, signifies the doubling of any thing, or multiplying of it by 2: also the folding of any thing back again on itself.

DUPPLICATE, among anatomists, a term used to denote the folds of any membrane, or vessel: thus we say, the *duplicatures of the intestines, peritoneum, &c.*

DUPONDUS, in antiquity, the weight of two pounds: also a piece of money equal to two asses in value.

DUPPA (Brian), a learned English bishop born in 1589 at Lewisham in Kent, of which place his father was then vicar. In 1634, he was instituted chancellor of the church at Sarum, and soon after made chaplain to Charles I. He was appointed tutor to Charles

prince of Wales, and his brother James duke of York; was made bishop of Chichester; and in 1641 translated to Salisbury, though the confusions that followed deprived him of all benefit from his promotion. Charles I. held him in high esteem, and he is said to have assisted the king in composing the *Eikon Basilike*. On the Restoration he was made bishop of Winchester, and lord high almoner; but died in 1662. He bequeathed large sums to charitable purposes; and published a few sermons, with other religious pieces.

DURANDUS (William), born at Poumoisson in Provence, in the 13th century, was one of the most knowing lawyers of his time. Pope Martin made him one of his nuncios, and then bishop of Mende and Langue-doc. His *Speculum Juris* gave him the name of *Speculator*; his second piece was *Rationale divinorum officiorum*, containing eight books. He wrote several others.

DURATION. See **METAPHYSICS**, n° 60, 61.
DURATION, as marked by certain periods and measures, is what we most properly call *time*. See **TIME**.

DURATION of Action, according to Aristotle, is confined to a natural day in tragedy; but the epopea, according to the same critic, has no fixed time.*

DURER (Albert), descended of an Hungarian family, and born at Nuremberg in 1471, was one of the best engravers and painters of his age. He was at the same time a man of letters and a philosopher; and he was an intimate friend of Erasmus, who revised some of the pieces which he published. He was a man of business also, and for many years the leading magistrate of Nuremberg. Though not the inventor, he was one of the first improvers of the art of engraving; and he bethought himself of working also in wood, for expedition, having an inexhaustible fund of designs. In many of those prints which he executed on copper, the engraving is elegant to a great degree. His *Hell-Scene* particularly, which was engraved in the year 1513, is as highly finished a print as ever was engraved, and as happily executed. In his wooden prints too we are surprised to see so much meaning in so early a master; the heads so well marked, and every part so well executed.—This artist seems to have understood the principles of design. His composition, too, is often pleasing; and his drawing generally good. But he knows very little of the management of light; and still less of grace: and yet his ideas are purer and more elegant than we could have supposed from the awkward archetypes which his country and education afforded. In a word, he was certainly a man of a very extensive genius; and, as Vafari remarks, would have been an extraordinary artist, if he had had an Italian instead of a German education. His prints are very numerous. They were much admired in his own life-time, and eagerly bought up; which put his wife, who was a teasing woman, upon urging him to spend more time upon engraving than he was inclined to do. He was rich; and chose rather to practise his art as an amusement, than as a business. He died in the year 1527.

D'URFEY (Thomas), an eminent English satirist and songster, whose name, though as well known as that of any writer extant, yet there are very few particulars of his life to be collected. He was born in Devonshire; but when, where, or of what family, are all uncertain. He was bred to the law, which he for-

Durandus
D'Ursey.

* See Poetry
chap. ii.

fook for the more agreeable employment of writing plays and songs; and the latter he had so happy a talent both of writing and singing, that he received many favours from persons of quality on that account. Even crowned heads did not disdain his company. The writer of the *Guardian*, No 67, tells us, he has remembered to have seen Charles II. leaning on Tom D'Urfey's shoulder more than once, humming over a song with him. This indeed was not extraordinary in so merry a monarch; but even the phlegmatic king William could relax his muscles on hearing him sing. He was certainly, by all accounts, a cheerful, honest, good-natured man: but as this character does not include prudence, D'Urfey grew poor as he grew old; and prevailing on the managers of the play-house to act his comedy of the *Plotting Sisters* for his benefit, Mr Addison wrote the abovementioned paper in the *Guardian*, and with another, No 82, representing him in a good-humoured light, to procure him a full house. He died very old, in 1723.

DURHAM, (bishopric of), one of the counties of England. It lies between Cumberland and Yorkshire, being bounded on the west by part of Cumberland and Westmoreland, and on the east washed by the German ocean. It is 39 miles long and about 35 broad, of a triangular shape, the basis being formed by the sea-coast; and contains 52 parishes, four wakes, one city, eight market-towns, a considerable number of villages and villas, and about 100,000 inhabitants. The climate varies in different parts. Towards the west, among the inland hills, the air is keen, pure, and penetrating; on the sea-side more soft, though not so wholesome. The county is watered by 16 rivers, some of which are navigable by boats and lighters; and most of them abound with trout, pike, and salmon. The face of the country is agreeably diversified with hill and dale, wood and water; and, except in the western part, where there is a great number of naked hills, it generally exhibits the appearance of extraordinary cultivation and fertility. The soil in the hilly parts is barren; but the plains are remarkably fruitful. It produces corn and cattle in great abundance and perfection. The mountains yield iron, vitriol, and a considerable quantity of lead; and almost every part of the bishopric affords plenty of coal, which employs a great number of hands and vessels.

Durham is a county palatine, governed by the bishop, who had formerly great prerogatives. He had power to create barons, appoint judges, convoke parliaments, raise taxes, and coin money. The courts of justice were kept in his name; and he granted pardons for trespasses, alienations, rapes, murders, and felonies of every denomination. He erected corporations, granted markets and fairs, created officers by patent, was lord admiral of the seas and waters within the county palatine: great part of the lands were held of the see *in capite*. In a word, he exercised all the power and jurisdiction of a sovereign prince. How and at what period these prerogatives were obtained, it is not easy to determine. Malmesbury says, the lands were granted by king Alfred, who likewise made the church a sanctuary for criminals. This see was anciently called the *patrimony of St Cuthbert*, who had been bishop of Lindisfarne or Holy Island near Berwick. His bones being transferred to Durham, were long esteemed as precious relics; and the people of the county con-

sidered themselves as Halwerd men, exempted from all other but holy work, that is, the defence of St Cuthbert's body. Certain it is, they pretended to hold their lands by this tenure; and refused to serve out of the county either for the king or bishop: but king Edward I. broke through these privileges, and curtailed the prerogatives of the bishops, which were still further abridged by Henry VIII. Nevertheless, the bishop is still earl of Sadberg, a place in this county, which he holds by barony. He is sheriff paramount, and appoints his own deputy, who makes up his audit to him, instead of accounting to the exchequer. He has all the forfeitures upon outlawries; and he and his temporal chancellor act as justices of the peace for the county palatine, which comprehends Creke in Yorkshire, Bedlington, Northam, and Holy Island, in Northumberland, the inhabitants of these places having the benefit of the courts at Durham. The judges of assize, and all the officers of the court, have still their ancient salaries from the bishop; and he constitutes the standing officers by his letters patent. He has the power of presiding in person in any of the courts of judicature. Even when judgment of blood is given; this prelate may fit in court in his purple robes, tho' the canons forbid any clergyman to be present in such cases: hence the old saying, *Solum Dunelmensis solus jus dicit et ense*. It was not till the reign of Charles II. that the bishopric sent representatives to parliament. At present it sends only four; two knights for the shire, and two burgesses for the city.

DURHAM, the capital of the above mentioned county, is situated in W. Long. 1. 14. N. Lat. 54. 50. It stands on a hill almost surrounded by the river Wre; and is considerable for its extent and the number of its inhabitants, as well as for being the see and seat of the bishop, who is lord paramount. It stands about 280 miles north from London; being remarkable for the salubrity of its air, and the abundance and cheapness of its provisions. These circumstances have induced a great deal of good company to take up their residence at Durham, which is still further animated by the presence and court of the bishop and his clergy. The town is said to have been built about 70 years before the Norman conquest, on occasion of bringing hither the body of St Cuthbert. It was first incorporated by king Richard I. but queen Elizabeth extended its privileges. At length, in the year 1684, it obtained a charter; in consequence of which, it is now governed by a mayor, 12 aldermen, 12 common council men, with a recorder, and inferior officers. These can hold a court-leet and court-baron within the city; but under the style of the bishop, who as count palatine appoints a judge, steward, sheriffs, and other inferior magistrates. The mayor and aldermen also keep a *pie pouldres* court at their fairs, and pay a yearly toll to the bishop. They have a weekly market on Saturday, and three annual fairs. Durham is about a mile in length, and as much in breadth, resembling the figure of a crab, the market-place exhibiting the body, and the claws being represented by the streets, which bend according to the course of the river, that almost surrounds one part of the city. They are, moreover, dark and narrow; and some of them lying on the acclivity of a steep hill, are very difficult and dangerous to wheel-carriages. The houses are in general strong

Durham.

built, but neither light nor elegant. The most remarkable edifices are the cathedral with six other churches, three standing in the city, and as many in the suburbs; the college; the castle, or bishop's palace; the tolbooth near St Nicholas's church; the cros and conduit in the market-place; with two bridges over the Elvet. The cathedral was begun by bishop Carlepho in the 11th century. It is a large, magnificent, Gothic structure, 411 feet long, and 80 in breadth, having a cros aisle in the middle 170 feet in length, and two smaller aisles at each end. On the south-side is a fine cloister; on the east, the old library, the chapter-house, and part of the deanery; on the west, the dormitory, under which is the treasury and a chantry; and on the west side is the new library, an elegant building begun by dean Sudbury about 70 years ago, on the spot where stood the old refectory of the convent. The middle tower of the cathedral is 212 feet high. The whole building is arched and supported by huge pillars. Several of the windows are curiously painted; and there is a handsome screen at the entrance into the choir. Sixteen bishops are interred in the chapter-house, which is 75 feet long and 33 broad, arched over-head, with a magnificent feat at the upper end for the interment of the bishops. The confistory is kept in the chapel or west aisle called *Galilee*, which was built by bishop Pudsey, and had formerly 16 altars for women, as they were not allowed to advance farther than the line of marble by the side of the font; here likewise are deposited the bones of the venerable Bede, whose elogium is written on an old parchment scroll that hangs over his tomb. The long cros aisle, at the extremity of the church, was formerly distinguished by nine altars, four to the north, and four to the south, and the most magnificent in the middle dedicated to the patron St Cuthbert, whose rich shrine was in this quarter, formerly much frequented by pilgrims. The church is possessed of some old records relating to the affairs of Scotland, the kings of which were great benefactors to this cathedral. The ornaments here used for administering the divine offices, are said to be richer than those of any other cathedral in England. Before reformation, it was distinguished by the name *ecclesia sancta Mariæ et sancti Cuthberti*; but it obtained the appellation of *ecclesia cathedralis Christi et beata Mariæ*, in the reign of Henry VIII. who endowed the deanery with 12 prebendaries, 12 minor canons, a deacon, sub-deacon, 16 lay singing men, a schoolmaster and usher, a master of the choir, a divinity reader, eight alms-men, 18 scholars, 10 choiristers, two vergers, two porters, two cooks, two butlers, and two sacristans. On the south-side of the cathedral, is the college; a spacious court formed by the houses of the prebendaries, who are richly endowed and extremely well lodged. Above the college-gate, at the east end, is the exchequer; and at the west, a large hall for entertaining strangers, with the granary and other offices of the convent. The college-school, with the master's house, stands on the north side of the cathedral. Between the churchyard and castle, is an open area called the *palace-green*; at the west end of which stands the shire-hall, where the assizes and sessions are held for the county. Hard by is the library built by bishop Cosin; together with the exchequer raised by bishop Nevil, in which are kept the offices belonging to the county-palatine court.

There is an hospital on the east, endowed by bishop Cosin, and at each end of it are two schools founded by bishop Langley. On the north, is the castle built by William the Conqueror, and afterwards converted into the bishop's palace, the outward gate of which is at present the county-goal.

The city consists of three manors; the bishop's manor containing the city liberties and the bailey, held of him by the service of castle-guard; the manor of the dean and chapter, consisting of the Elvet's cros gate, south-gate street; and the manor of Gilligate, formerly belonging to the dissolved hospital of Kepyar in this neighbourhood, but granted by Edward VI. to John Cockburn, lord of Ormilton, and late in the possession of John Tempett, Esq. The bishopric of Durham is one of the best in England, not only on account of its ample revenues and prerogatives, but because living is remarkably cheap in this county, and the bishop has a great number of rich benefices in his gift.

In the neighbourhood of this city is Nevil's cros, famous for the battle fought in the year 1346, against David II. king of Scotland, who was defeated and taken.

DURY (John), a Scots divine, who travelled much, and laboured with great zeal to reunite the Lutherans with the Calvinists. His discouragements in this scheme started another still more impracticable; and this was to reunite all Christians by means of a new explication of the Apocalypse, which he published at Frankfurt in 1674. He enjoyed then a comfortable retreat in the country of Hesse; but the time of his death is unknown: his letter to Peter du Moulin concerning the state of the churches of England, Scotland, and Ireland, was printed at London in 1658, by the care of du Moulin, and is esteemed to be curious.

DUSSELDORP, a city of Westphalia in Germany, and capital of the duchy of Berg. It is situated at the conflux of the river Duffel with the Rhine, in E., Long. 6. 20. N. Lat. 51. 15.

DUTCHY. See DUCHY.

DUTY, in general, denotes any thing that one is obliged to perform.

DUTY, in a moral sense; see MORAL Philosophy, n° 73, &c.

DUTY, in polity and commerce, signifies the impost laid on merchandizes, at importation or exportation, commonly called the duties of customs; also the taxes of excise, stamp-duties, &c. See CUSTOMS, EXCISE, &c.

The principles on which all duties and customs should be laid on foreign merchandizes which are imported into these kingdoms, are such as tend to cement a mutual friendship and traffick between one nation and another; and therefore due care should be taken in the laying of them, that they may answer for good an end, and be reciprocal in both countries: they should be so laid as to make the exports of this nation at least equal to our imports from those nations wherewith we trade, so that a balance in money should not be issued out of Great Britain, to pay for the goods and merchandizes of other countries; to the end that no greater number of our landholders and manufacturers should be deprived of their revenues arising from the product of the lands, and the labour of the people, by foreign importations, than are maintained by exportations to such countries. These are the national principles on which

Duty
Duty.

all

Duty
Dwarf.

all our treaties of commerce with other countries ought to be grounded.

DURY, in the military art, is the exercise of those functions that belong to a soldier: with this distinction, that mounting guard and the like, where there is no enemy directly to be engaged, is called duty; but their marching to meet and fight an enemy is called going on service.

DUUMVIRATE, the office or dignity of the duumviri. See the next article.

The duumvirate lasted till the year of Rome 388, when it was changed into a decemvirate.

DUUMVIRI, in Roman antiquity, a general appellation given to magistrates, commissioners, and officers, where two were joined together in the same functions.

DUUMVIRI Capitales were the judges in criminal causes: from their sentence it was lawful to appeal to the people, who only had the power of condemning a citizen to death. These judges were taken from the body of the decurions; they had great power and authority, were members of the public council, and had two lictors to walk before them.

DUUMVIRI Municipales, were two magistrates in some cities of the empire, answering to what the consuls were at Rome: they were chosen out of the body of the decurions; their office lasted commonly five years, upon which account they were frequently termed *quinquinales magistratus*. Their jurisdiction was of great extent: they had officers walking before them, carrying a small switch in their hands; and some of them assumed the privilege of having lictors, carrying axes and the fasces, or bundles of rods, before them.

DUUMVIRI Navales, were the commissaries of the fleet, first created at the request of M. Decius, tribune of the people, in the time of the war with the Samnites. The duty of their office consisted in giving orders for the fitting of ships, and giving their commissions to the marine officers, &c.

DUUMVIRI Sacrorum, were magistrates created by Tarquinius Superbus, for the performance of the sacrifices, and keeping of the sybils books. They were chosen from among the patricians, and held their office for life: they were exempted from serving in the wars, and from the offices imposed on the other citizens, and without them the oracles of the sybils could not be consulted.

DUVELAND, or **DIVELAND**, one of the islands of Zealand, in the United Provinces, lying eastward of Schonen, from which it is only separated by a narrow channel.

DWAL, in heraldry, the herb nightshade, used by such as blazon with flowers and herbs, instead of metals and colours, for fable or black.

DWARF, in general, an appellation given to things greatly inferior in size to that which is usual in their several kinds: thus there are dwarfs of the human species, dwarf-dogs, dwarf-trees, &c.

The Romans were passionately fond of dwarfs, whom they called *nani* or *nane*, inasmuch that they often used artificial methods to prevent the growth of boys designed for dwarfs, by inclosing them in boxes, or by the use of tight bandages. Augustus's niece, Julia, was extremely fond of a dwarf called Sonopas, who was only two feet and an hand-breadth high.—We

have many other accounts of human dwarfs, but most of them deformed in some way or other besides the smallness of their size. Many relations also concerning dwarfs we must necessarily look upon to be fabulous, as well as those concerning giants.—The following history, however, which we have reason to look upon as authentic, is too remarkable not to be acceptable to the generality of our readers.

Jeffery Hudfon, the famous English dwarf, was born at Oakham in Rutlandshire in 1619; and about the age of seven or eight, being then but 18 inches high, was retained in the service of the duke of Buckingham, who resided at Burleigh on the Hill. Soon after the marriage of Charles I. the king and queen being entertained at Burleigh, little Jeffery was served up to table in a cold pye, and presented by the duchess to the queen, who kept him as her dwarf. From 7 years of age till 30, he never grew taller; but after 30, he shot up to three feet nine inches, and there fixed. Jeffery became a considerable part of the entertainment of the court. Sir William Davenant wrote a poem called *Jeffreidos*, on a battle between him and a turkey-cock; and in 1636 was published a very small book, called the *New Year's Gift*, presented at court by the lady Parvula to the lord Minimus (commonly called Little Jeffery) her majesty's servant, &c. written by Microphilus, with a little print of Jeffery prefixed. Before this period, Jeffery was employed on a negotiation of great importance: he was sent to France to fetch a midwife for the queen; and on his return with this gentleman, and her majesty's dancing-master, and many rich presents to the queen from her mother Mary de Medicis, he was taken by the Dunkirkers. Jeffery, thus made of consequence, grew to think himself really so. He had borne with little temper the teasing of the courtiers and domestics, and had many squabbles with the king's gigantic porter. At last, being provoked by Mr Crofts, a young gentleman of family, a challenge ensued: and Mr Crofts coming to the rendezvous armed only with a squirt, the little creature was so enraged, that a real duel ensued; and the appointment being on horseback with pistols, to put them more on a level, Jeffery, with the first fire, shot his antagonist dead. This happened in France, whither he had attended his mistress in the troubles. He was again taken prisoner by a Turkish rover, and sold into Barbary. He probably did not remain long in slavery: for at the beginning of the civil war, he was made a captain in the royal army; and in 1644 attended the queen to France, where he remained till the Restoration. At last, upon suspicion of his being privy to the Popish plot, he was taken up in 1682, and confined in the Gatehouse, Westminster, where he ended his life, in the 63d year of his age.

DWINA, the name of two large rivers; one of which rises in Lithuania, and, dividing Livonia from Courland, falls into the Baltic sea a little below Riga: the other gives name to the province of Dwina, in Russia, discharging itself into the White Sea, a little below Archangel.

DYE, in architecture, any square body, as the trunk or notched part of a pedestal: or it is the middle of the pedestal, or that part included between the base and the cornice; so called because it is often made in the form of a cube or dye *.

Dwarf
Dye.

* See Architecture, n^o 66.

Dyer.

DYER, a person who professes the art of dyeing all manner of colours. See DYEING.

DYER (Sir James), an eminent English lawyer, chief judge of the court of common pleas in the reign of queen Elizabeth. He died in 1581; and about 20 years after, was published his large collection of *Reports*, which have been highly esteemed for their succinctness and solidity: he also left other writings behind him, relative to his profession.

DYER (John), the son of Robert Dyer, Esq; a Welsh solicitor of great capacity, was born in 1700, and edu-

cated a painter; for which purpose he travelled to Rome, where he collected materials for his instructive poem called the *Ruins of Rome*: his ill health and literary turn, however, induced him to turn clergyman; and he obtained the living of Coningsby in Lincolnshire, where he resided until his death. He distinguished himself by his poems of *Grangar Hill*, the *Ruins of Rome* above-mentioned, and the *Fleece*, published in 1757, which his bad health hardly permitted him to finish.

DYER'S *Weed*, in botany. See RESEDA.

Dyer's.

D Y E I N G,

IN the utmost latitude of the word, may be defined, The art of tingeing cloth, stuff, or other matter, with a permanent colour, which penetrates the substance thereof.—It is, however, commonly restrained to the art of tingeing silk, wool, cotton, and linen, with different colours; and, as such, is practised as a trade by those who do not meddle with any of the other branches, as staining of leather, &c.

Antiquity
of the art,
&c.

The dyeing art is of great antiquity; as appears from the traces of it in the oldest sacred, as well as profane, writers. The honour of the invention is attributed to the Tyrians; though what lessens the merit of it is, that it is said to have owed its rise to chance. The juices of certain fruits, leaves, &c. accidentally crushed, are supposed to have furnished the first hint: Pliny assure us, that even in his time the Gauls made use of no other dyes: it is added, that coloured earthen, and minerals, washed and soaked with rain, gave the next dyeing materials.—But purple, an animal juice, found in a shell-fish called *murex**, *conchylium*, and *purpura*, seems from history to have been prior to any of them. This indeed was reserved for the use of kings and princes; private persons were forbidden by law to wear the least scrap of it. The discovery of its tingeing quality is said to have been taken from a dog, which having caught one of the purple-fishes among the rocks, and eaten it up, stained his mouth and beard with the precious liquor; which struck the fancy of a Tyrian nymph so strongly, that she refused her lover Hercules any favours till he had brought her a mantle of the same colour.

* See Mus-
tex.

Pliny seems to ascribe the invention of the art of dyeing wool to the Lydians of Sardis: "*Inficere lanas Sardibus Lydi*," where the word *incipere* must be understood. But a modern critic suspects a false reading here; and, not without reason, for *Lydi*, substitutes *Lydda*, the name of a city on the coast of Phœnicia, where the chief mart of the purple dye was.

After the Phœnicians, the Sardinians seem to have arrived at the greatest perfection in the dyeing art; in so much, that *βαμμα Σαρδινιακον*, *Sardinian dye*, passed into a proverb among the Greeks. Till the time of Alexander, we find no other sort of dye in use among the Greeks but purple and scarlet.—It was under the successors of that monarch, that these people applied themselves to the other colours; and invented, or at least perfected, blue, yellow, green, &c.—For the ancient purple, it has been long lost; but the perfection to which the moderns have carried the other colours, abundantly indemnifies them of the loss. It is still,

however, greatly to be doubted whether the permanency of the modern colours at all equals that of the ancient ones; though it is certain, that the former greatly exceed them in brightness.

SECT. I. Theory of Dyeing.

BEFORE we can enter into any consideration of the true theory of dyeing, it is necessary to make the following observation concerning the practice, namely, That salts are almost the only means we are acquainted with by which any colouring substance can be made to fix itself upon those matters which are the common subjects of dyeing. A solution of cochineal, for instance, will of itself impart no permanent colour to a piece of woollen cloth put into it. The red colour of the cochineal will indeed stain the cloth while it remains immersed in the solution; but as soon as it is taken out and washed, this temporary stain will immediately vanish, and the cloth become as white as before. If now the cloth is dipped in the solution of any saline substance, alkalies alone excepted, and then immersed in the solution of cochineal for some time, it will come out permanently coloured; nor will the colour be discharged even by washing with soap and water. If a quantity of salt is added to the solution of cochineal, and the cloth put in without being impregnated with any saline substance, the effect will be the same; the cloth will come out coloured; only in this last case, it must be well dried before washing it with soap, or moist of the colour will be discharged.

Salts the
only means
of fixing
colours.

By comparing this with what is delivered under the article *COLOUR-Making*, n° 13, 14, we shall be able to form a pretty rational theory of dyeing. It is there remarked, that a saline substance, (solution of tin in aqua regia), had a surprising power of coagulating the colouring matter of certain solutions, such as cochineal, Brazil-wood, logwood, &c. If therefore a piece of cloth is previously impregnated with this solution, and put into the colouring one, it is plain that some part of the colouring matter will be coagulated by the solution remaining in the cloth, in the very same manner that it would have been if a small quantity of the saline solution had been poured into the other. The cloth therefore will take up a part of the colouring matter, which cannot be discharged but by entirely discharging the solution of tin. This, however, seems to unite itself with the cloth very firmly, so that scarce a particle of colour will be discharged by washing in plain water, or even with soap; nor can the whole be taken out, without boiling the cloth in a solution of fixed alkali.

They operate
by coagulation.

THEORY. alkali.

Though solution of tin produces this coagulation in the most remarkable manner, it is not to be doubted that the same power is possessed in some degree by most of the neutrals and imperfect salts. Alum possesses it very considerably, though not so much as solution of tin; and hence that salt is very much used in dyeing, as well as sugar of lead, which also has a very strong power of coagulation. The process of dyeing, therefore, seems to be most analogous to that of the coagulation or curdling of milk. Before it has suffered this change, the milk is easily miscible with water; but after it is once coagulated, the curd, or caseous part, is very difficultly soluble in any liquid whatever. In like manner, the colouring matter in the solution of cochineal, before the cloth is put in, is easily soluble in water, and may be diffused through any quantity of fluid: but no sooner is the cloth dipped in it, than the saline substance contained in the cloth coagulates that part of the colouring matter which lies in immediate contact with it; and, as all the fluid successively comes into contact with it, the whole of the colour is by degrees coagulated and deposited on the cloth.

⁴ Hypotheses concerning the adhesion of the colour.

To account for the strong adhesion of the colour to the dyed cloth, several hypotheses have been formed. One is, That the fibres of wool, silk, &c. are hollow tubes; and that the colouring matter enters them; and, after being there coagulated, shews itself through the fine transparent sides of the tubes.—Another considers these filaments as solid lengthwise, but having all round their sides an infinite number of small pores like the extremities of the fine absorbing and exhaling vessels of the human body. In these pores, according to the hypothesis, the colour is lodged; and as the pores are placed exceedingly close to one another, the fine threads appear to our eyes of one uniform colour.—A third is, That the fibres are solid, or at least with respect to us may be considered as such. The saline substance, whatever it is, that is employed to make the colour strike, sinks into the surface, partly corrodes and unites itself with it into a third kind of substance no longer soluble in plain water, nor even easily by soap, but which still preserves its coagulating quality. According to this hypothesis, the dye lies entirely on the outside of the stuff, and continues as long as the effect of the salt continues upon the fibres of the matter to be dyed.

Concerning the truth of these hypotheses, or indeed any others that can be invented, it is impossible to bring any decisive proof. It seems, however, more probable that the process of dyeing is accomplished by a coagulation of the colouring matter itself, rather than by any agglutination of it to the fibres by means of a vitriolated tartar, as Mr Hellot supposes. According to this gentleman's theory, a vitriolated tartar is generated in every process for dyeing, and proceeds from the acid of the alum and alkaline basis of the tartar used in the preparations, or in some of the dyeing ingredients themselves. He supposes that the pores of the stuff are cleaned and enlarged by the preparatory salts, and by the boiling water, in such a manner as to receive the colouring particles, which particles are afterwards detained by the contraction of the pores occasioned by cold; and further, that these pores are lined with a saline crust of tartar or vitriolated tartar.

⁵ Mr Hellot's hypothesis disproved.

On this theory, the translator of the Chemical Dictionary has the following observations. "Mr Hellot has not shown that pure fixed alkali is incapable of producing the effects which he attributes to his tartar and vitriolated tartar; and both these salts, though they are difficult of solution, and require a great quantity of water for this purpose, will yet dissolve at last; and therefore, if the colouring particles were fixed chiefly by means of these salts, they might be washed out by a large quantity of water; which we find to be contrary to experience.

⁶ Another hypothesis.

"We shall find it more difficult to substitute a true theory, than to refute that of Mr Hellot. Many experiments ought to be previously made. Nevertheless it may be observed, That the colorific particles of most substances used in dyeing seem to be insoluble in water, in spirit of wine, and even in alkaline lixiviums: that their diffusion thro' these liquids is caused merely by their adhesion to certain gummy and resinous particles: and that they may be disengaged from those gummy and resinous matters, by applying a piece of stuff to which they have a greater adhesive power, which seems to be the case of the root-coloured and blue dyes; or by applying another substance to which these particles have a greater power of adhesion; such as the earth of alum, in those dyes where that salt is used, together with some other substance, as fixed or volatile alkali, capable of decomposing alum; or as the ferruginous earth of the green vitriol in black dyes, to which the colorific particles of the galls adhere; which earths are capable of applying themselves and of adhering to the stuffs. The separation of the colouring particles from the gummy and resinous matters is probably facilitated by the addition of acids and neutral salts, which may coagulate in some measure the vegetable matters, and leave the colorific particles disengaged; so that they may apply themselves to the stuff, or to the earths above-mentioned."

But, in whatever way the salts used in dyeing do act, it is certain they are capable, except in a very few instances, of fixing and giving a lustre and permanency to the colour which otherwise could never be obtained. The exception to this general rule most commonly known, is that of indigo. This is a fine blue fecula produced by fermentation from the leaves of the Indian plant called *anil*. It is very difficult of solution; however, it may be dissolved by alkaline salts, concentrated oil of vitriol, orpiment, or combinations of sulphur with quicklime. If a quantity of indigo is dissolved in a fixed alkali, (for volatile alkalis will not dissolve it), the solution is always green, which is the natural colour produced in all vegetable blues by the alkali: but if any piece of stuff is put into this solution, though it remains green while immersed in the liquid, the moment it comes in contact with the air, the dissolving power of the alkali is totally destroyed; the indigo is precipitated upon the cloth, resumes its native colour, and dyes the cloth blue.

⁷ Exceptions to the general rule.

The cause of this precipitation is very difficult to be investigated. Perhaps it may be owing to an attraction of fixed air by the alkali from the atmosphere, which renders the salt unable to dissolve the indigo any longer. The adhesion of the colour seems merely owing to an attraction between it and the cloth; for the alkaline salt can contribute nothing to this, but would.

would rather have the contrary effect. Perhaps, however, the great solvent power possessed by alkaline salts, by perfectly clearing away every kind ofordes, may bring the indigo and cloth into nearer contact with each other, than when it is dissolved in any other way; and consequently the attraction will in these cases be the stronger. This seems to have some probability; for when indigo is dissolved in vitriolic acid, as in dyeing Saxon blue, the colour is much more easily discharged.

Another exception is in the juices of some vegetables, such as the nuts of the anacardium. This produces, without addition, a most deep and lasting black, never to be washed out or discharged by any means whatever. Several other plants are to be found in different parts of the world, which give an indelible black stain upon linen without addition; and the colouring matter of these seems to adhere by means of a very tenacious gluten, with which it is mixed, and which, when once thoroughly dried, can never be again dissolved. In this respect, these black staining colours seem analogous to the *purpura* of the ancients; which stained indelibly without addition, and was of an exceedingly viscous and adhesive nature.

SECT. II. Practice of Dyeing.

§ 1. Of the colouring materials, and ingredients for fixing the colours.

8
True and
false dyes.

THE materials for dyeing different colours are so many and various, that an enumeration of them all is scarce to be expected. The same difference, however, takes place among the materials for dyeing which we have observed to take place among those for COLOUR-MAKING. Some ingredients produce durable colours, which cannot be discharged either by exposure to the air, or by washing with soap; others, though they may be made to stand the action of soap pretty well, cannot by any means be enabled to resist the action of the air. These are distinguished by the different names of *true* and *false*, *permanent* and *fading*, &c.; nor is there any method yet discovered of giving the false colours an equal degree of durability with the true ones. This hath been attempted by mixing a permanent and a fading colour together; in which case it was thought that the former would impart somewhat of its durability to the latter: but this hath always been found to misgive; the fading colour soon flying off, and leaving the permanent one behind. The same hath also been attempted by dyeing a piece of stuff partially with a fading colour, and then completing the dye with a permanent one. In this case, it was hoped, that the fading colour being covered over, and defended from the injuries of the air, by the permanent one, would necessarily become equally durable, or at least remain a much longer time than if the stuff was dyed with it alone. But this also hath been found ineffectual; and the fading colour hath been dissipated as soon when covered with a permanent one, as when left without any such cover.—Solution of tin in aqua regia will give most of these fading colours an high degree of beauty, and some share of durability, though even that is not able to make them equal to the others.—The most permanent dyes we have are cochineal and gum lac for fine reds and scarlets: indigo and woad for blue; and,

when mixed in different proportions with cochineal, or lac, for purple and violet colours. Weld, and some other vegetables, for yellow; and madder for coarse reds, purples, and blacks.—The fading colours are much more numerous. In this class are included Brazil-wood, logwood, peach-wood, red-wood, fustic, turmeric root, annatto, archil, &c. &c.

With regard to the salts made use of in dyeing, it hath been but too often customary to jumble together such a quantity of different ones, that it was not only impossible to know in what particular salt the virtue resided, but often the efficacy of the whole hath been totally destroyed, and the colour entirely spoiled by such injudicious management. It is proper, therefore, where a mixture of two or more salts is intended to be made for dyeing, first to try the change of colour produced by each of the salts upon the colouring substance. If the colours are nearly alike, the mixture may be safely made as to that particular. But if the two colours produced by the different salts are very different from one another, to mix them together must be very injudicious. Thus, suppose you want to dye scarlet, solution of tin in aqua regia produces the necessary change of colour on the decoction of cochineal, and converts it into a high flame-colour, which shews it to be a proper ingredient; but, to the solution of tin, it would surely be the greatest absurdity to add a quantity of saccharum saturni, the effect of which is to change the colour of cochineal to a dull purple. But, tho' the salts taken separately should produce a colour nearly similar, another thing must be regarded, namely, whether they can be mixed with safety to one another. It is the nature of many salts to destroy one another whenever they come into perfect contact by being dissolved in water. Thus, solution of tin and saccharum saturni destroy one another; and so do solution of tin, and tartar, or cream of tartar. To mix these together must therefore be absurd; and yet we find this last mixture ordered in almost every receipt for dyeing scarlet. It is also to be observed, that a mixture of different salts ought never to be made, out of a notion that the colour will keep the better on that account; for most commonly it will keep the worse. A single salt will answer for this purpose, better than a hundred. A mixture should only be made where it is necessary to produce the colour desired; and if a dyer proceeds in this simple manner, he may not only attain to great perfection in the art from his own experience without being taught by others, but even make considerable discoveries; as dyeing is at present far enough from being brought to perfection.—The salts chiefly to be used in dyeing are fixed alkalies; solutions of tin in the vitriolic and marine acids, and in aqua regia; sugar of lead; cream of tartar; alum; oil of vitriol; and solution of iron in the acetic acid. By means of these, almost all kinds of colours may be dyed at an easy rate, and with very little trouble.

§ 2. Of the manner of using the ingredients, and of producing the different colours.

As the art of dyeing is, by the principles above laid down, reduced to a great degree of simplicity, almost all the directions for the practice will be contained in the following general rule.

Having cleaned the substance to be dyed as well as possible, and made choice of the salt proper for producing

10
General
rule for dye-
ing all col-
ours.

cing the colour desired, dissolve the salt in water, and steep the substance in that solution for 24 hours. Then take it out; and, without wringing, hang it up to dry, but without heat: and for this it will be proper to allow a pretty long time; for the more perfectly the salt penetrates the cloth, the more durable will the colour be. Having then prepared a coloured solution or decoction, put the cloth into it. The less heat that is applied during the time the cloth remains in the dye, the finer the colour will be, but the longer time will be required for completing the operation. If time cannot be spared, so that a strong heat must be applied, it will be necessary to roll the cloth during the time of dyeing, or the colour will be in danger of proving unequal.—After the dyeing is completed, rinse the cloth in cold water, but do not wring it severely; and then hang it up to dry.

In this way may be dyed a great variety of colours, on wool, silk, cotton, and linen, without any variation in the process. Solution of tin in the vitriolic acid will produce all degrees of red, from the palest pink or rose-colour, to the highest crimson and scarlet; and that on all the above-mentioned substances without exception.—A method of producing these fine colours upon cotton and linen, as well as wool, hath been a great desideratum in dyeing; but by the abovementioned solution these substances may be dyed of the most beautiful red, crimson, and scarlet colours, as any one may very readily satisfy himself by a trial.—The same thing may be done by solution of tin in aqua regia; but unless the nitrous acid prevails greatly in the mixture, the colours produced by this last will incline more to the purple than the former. With solution of tin in the marine acid, they incline remarkably to purple, and are likewise deficient in lustre. The two first solutions therefore are capital ingredients in dyeing red.

The same preparations will also serve for dyeing all other colours, blue and green only excepted. Thus, a piece of cloth prepared with solution of tin in the vitriolic acid, if boiled in a decoction of cochineal, will come out of a scarlet colour; if with turmeric, weld, fustic, or many of the common yellow flowers, it will come out of different degrees of yellow; with Brazil-wood, peach-wood, &c. it will give a fine purplish crimson; with logwood, a fine deep purple, &c.; and by combining these together in different ways, an infinity of different shades may be produced.

For the coarse reds produced from madder, the solutions of tin are not found, to answer. The proper salts for these are alum and cream of tartar. In dyeing with madder, it is always necessary, more than when any other ingredient is used, to let the heat be gentle; because the root, besides the red colour it contains, has also a great quantity of brownish matter in it, which is extracted by strong boiling, and debascs every colour with which it is mixed. Sugar of lead produces a purple with this root; which, however, will be brightened by an addition of alum and sal ammoniac. A dark purple may also be produced from madder by mixing alum with a little solution of iron in the vegetable acids, particularly the aceticus. With regard to blue colours, they are only to be dyed by means of indigo. This substance may be dissolved, as we have already observed, by alkaline salts, concentrated acids, and orpiment. The first of these produces the common blues;

the second, the Saxon blue; and the third, the blue which is used in callico-printing.—The method of dyeing the common blue requires only the stuff to be dipped in a solution of indigo in the alkaline salt; and if the liquor is hot, the dyeing will be over almost instantaneously. For cotton and linen, another method hath been used. Lime is added to the pot-ash, and the strength of the alkali being by this means increased, the indigo is very soon dissolved. Some raisins are now to be beat in a brags or marble mortar to a pulp, and thrown into the solution of the indigo as soon as taken off the fire. It soon throws up a copper-coloured scum to the surface; and the cotton being now put into the liquor, receives the colour in an instant. This is a very beautiful blue; but in what manner the raisins act, is a matter which yet remains to be determined. If a piece of cloth is dipped in a solution of copper in the nitrous acid, and then boiled in logwood, it will come out of a purplish blue colour. This dye, however, has very little beauty or durability, and is therefore scarce worthy of notice.

Common green vitriol or copperas is thought to improve blue colours in general; but on what foundation, is not very apparent. By means of it, however, the colour of Prussian blue may be struck upon cloth in such a manner as to produce a temporary stain of exceeding great beauty; and could any method of fixing this colour be fallen upon, it would undoubtedly be a most valuable acquisition. The method is, to digest some Prussian blue in fixed alkali till the colour is extracted. In this solution dip the cloth intended to be dyed, and dry it; then let it lie for a little time in a weak solution of copperas, and it will immediately become of a most beautiful blue colour. This colour, however, is discharged by washing with soap, and even with simple water.

A receipt was published by Mr Woulfe, in the Philosophical Transactions, for an improved method of dyeing the Saxon blue; which is done by dissolving indigo in concentrated oil of vitriol. The only improvement in Mr Woulfe's process, consisted in digesting the oil of vitriol and indigo in the heat of boiling water instead of a sand-heat, because the latter was often found to spoil the colour. After the indigo is dissolved, the solution may be weakened at pleasure with water; and any piece of stuff then dipped in it will imbibe the colour, in proportion to the strength of the solution. This dye is very beautiful; but will neither keep its colour, nor stand washing with soap: unless great care is taken, it is also very apt to prove unequal.

Green colours are to be produced only by a mixture of blue and yellow; for there is no ingredient yet discovered, that will, by itself, give a good green dye. Sap-green will indeed communicate its own colour to cloth of any kind, and for that purpose is used in some places; but the colours dyed with this ingredient are by no means eligible. It is common first to dye the cloth blue with indigo, and then yellow with any yellow colouring ingredient; by which means a green colour is produced. For the dyeing of Saxon green, however, it is necessary to produce a particular kind of yellow from indigo. This is obtained by dissolving indigo in spirit of nitre. Mr Woulfe recommends an ounce and an half of powdered indigo to be mixed with two ounces of spirit of nitre diluted with four times its quantity

11
Method of
dyeing cot-
ton and li-
nen scarlet.

12
And a
number of
other co-
lours.

13
Directions
for the
coarser co-
lours.

14
Mr
Woulfe's
receipt for
Saxon blues

15
Green co-
lour how
dyed.

16
Mr
Woulfe's
receipt for
Saxon
green.

quantity of water. The mixture is then to stand for a week; and, at the end of that space, must be digested in a sand-heat for an hour or more; after which, four ounces more of water is to be added: the solution, when filtered, will be of a fine yellow colour.—Strong spirit of nitre is apt to set fire to indigo; for which reason, as well as to hinder the mixture from frothing up, it must be diluted with water. Two ounces and an half of strong spirit of nitre will set fire to one ounce and an half of indigo; but if the acid is highly concentrated, a less quantity will serve.

If the indigo be digested 24 hours after the spirit of nitre is poured on it, it will froth and boil over; but, after standing a week or less, it has not that property.

One part of the solution of indigo in the acid of nitre, mixed with four or five parts of water, will dye silk or cloth of the palest yellow colour, or of any shade to the deepest, and that by letting them boil more or less in the colour. The addition of alum is useful, as it makes the colour more lasting. According as the solution boils away, more water must be added.

None of the colour in the operation separates from the water, but what adheres to the silk or cloth; of consequence, this colour goes far in dyeing.

Cochineal, Dutch litmus, archil, cudbear, and many other colouring substances, treated in this manner, will all dye silk and wool of a yellow colour.

The indigo which remains undissolved in making Saxon blue, and collected by filtration, if digested with spirit of nitre, dyes silk and wool of all shades of brown inclining to a yellow.

Cloth and silk may be dyed green with indigo; but they must first be boiled in the yellow dye, and then in the blue.

Black colours are dyed by preparing the cloth with any solution of iron, (but that in the acetic acid is best,) and then boiling it in a decoction of any astringent vegetable. Those chiefly made use of for the purposes of dyeing, are galls, fumach, logwood, and madder. Of these the last is the most durable; though galls will also produce a pretty lasting colour, if properly managed. Logwood dyes a very pretty, but fading, black colour. It appears, however, from some experiments made by Mr Clegg, that, by a proper preparation of the cloth with fixed alkaline salts, black colours dyed with logwood might be improved both as to beauty and durability.—"I took (says he) two vessels, containing equal measures of a strong astringent liquor, composed of galls and logwood: into one vessel I put a small quantity of pearl-ashes; the other remained as a standard. Pieces of linen and cotton cloth, after maceration in these liquors, were thrown together into a strong solution of copperas; they were soon after taken out, and washed in cold water. When dry, the pieces prepared in ashes were, all of them, much deeper than the others.

"I made use of different kinds of pearl and pot ashes, as well as many kinds of astringents: the ashes had the same effect whatever astringent was made use of, and the strongest alkali always produced the deepest colour; and though ashes, used with an astringent, always gave a deeper colour than the same astringent without ashes, yet logwood, which without ashes gave not so deep a colour as galls with them, gave a much deeper black than galls with the same addition.

"There was a remarkable difference in this case between lime and ashes in their effect upon logwood; with lime it gave no blackness, but with ashes it produced a deeper black than any other astringent I made use of.

"Being desirous of trying the duration of colours produced by astringents, in which different quantities of pearl-ashes had been dissolved; in two pints of river water I boiled one ounce of logwood during ten minutes; I then added half an ounce of Aleppo galls, and boiled them together ten minutes longer; the liquor having stood to cool, was decanted off, and divided into six equal quantities. N° 1 remained as a standard; into N° 2, I put six grains of fine pearl-ashes; N° 3, twelve grains; N° 4, eighteen grains; N° 5, twenty-four grains; N° 6, thirty grains. To fix drops of each of these liquors, I added two drops of a saturated solution of copperas. N° 2 and 3 struck a deep black; N° 1 and 4, black, but inferior to 2 and 3; N° 5, a brown black; N° 6, brown.

"From this experiment it appears, that N° 5 and 6 were spoiled by an over proportion of ashes.—All these colours were tried by writing with them on paper, and the writings have now been exposed six months to the air. In N° 5 and 6, the blackness is quite destroyed; N° 4 is something faded; N° 1, 2, 3, remain nearly as they were, N° 2 and 3 being still superior to the standard."

The finest blacks are first dyed blue, with indigo; and afterwards black with solution of iron, and some astringent vegetable, according to the directions already given.

These are the best methods for producing permanent colours of all kinds. As it is necessary, however, often to give another colour to stuffs which have been already dyed, it is plain, that it is as necessary for a dyer to know how to discharge colours, as how to make the cloth imbibe them.—Concerning this, it is only necessary to observe, that alkaline salts are in general the best, and, where the colours are well dyed, the only means of discharging them. If a piece of cloth is dyed with logwood, and the colour struck upon it with alum, that colour will be nearly discharged by oil of vitriol, or any other strong acid; but if solution of tin has been employed in striking the colour, acids have then no effect, and alkalis only can be employed. Neither will they discharge the colour totally, but the stuff must be bleached for some time to get out the remainder. If alkaline salts cannot be employed with safety to the stuff, it is then impossible to dye it any other colour than black; unless it be dyed a compound colour, of which the original one is a component part.

Concerning the weight that colours give to silk, (in which it is most taken notice of, being sold by weight, and a commodity of great price), it is observed, that one pound of raw silk loatheth four ounces by washing out the gums and the natural furies; that the same scoured silk may be raised to above thirty ounces from the remaining twelve, if it be dyed black with some materials. Of all the materials used in dyeing, especially of black, nothing increases weight so much as galls, by which black silks are restored to as much weight as they lost by washing out their gum: nor is it counted extraordinary, that blacks should gain about four or six ounces in the dyeing upon each pound. Next to the galls, old fustic increases the weight about $1\frac{1}{2}$ in 12; madder, about

17
Black colours how dyed.

Perceval's
Experiments, III.
p. 335.

19
How to discharge colours when dyed.

19
Of the increase of weight in dyeing.

about one ounce; weld, half an ounce. The blue vats in deep blues of the fifth stall, give no considerable

weight; neither do logwood, cochineal, nor even copers, where galls are not.

Dynasty
E.

DYEING of Hats. See HATS.

DYEING of Leather. See LEATHER.

DYEING, or Staining, of paper, wood, bone, marble, &c. See BONE, MARBLE, PAPER, WOOD, &c.

DYNASTY, among ancient historians, signifies a race or succession of kings of the same line or family. Such were the dynasties of Egypt. The word is formed from the Greek *δυναστία*, of *δυναστω*, to be powerful, or king.

The Egyptians reckon 30 dynasties within the space of 36,525 years; but the generality of chronologers look upon them as fabulous. And it is very certain, that these dynasties are not continually successive, but collateral.

DYSCRACY, among physicians, denotes an ill habit or state of the humours, as in the scurvy, jaundice, &c.

DYSENTERY, in medicine, a diarrhoea or flux, wherein the stools are mixed with blood, and the bowels miserably tormented with gripes. See (the *Index* subjoined to) MEDICINE.

DYSENTERIC FEVER. *Ibid.*

DYSERT, a parliament-town of Scotland, in the county of Fife, situated on the northern shore of the

frith of Forth, about 111 miles north of Edinburgh.

DYSOREXY, among physicians, denotes a want of appetite, proceeding from a weakly stomach.

DYSPEPSY, a difficulty of digestion.

DYSPNOEA, a difficulty of breathing, usually called *asthma*.

DYSURY, in medicine, a difficulty of making urine, attended with a sensation of heat and pain. See (the *Index* subjoined to) MEDICINE.

DYTISCUS, WATER-BEETLE, in zoology, a genus of insects of the order of the coleoptera; the antennæ of which are slender and setaceous, and the hind feet are hairy and formed for swimming. There are 23 species, distinguished by their antennæ, the colour of the elytra, &c.

DYVOUR, in Scots law; otherwise *Bare-man*: A person who, being involved in debt, and unable to pay the same,—for avoiding imprisonment and other pains, makes cession of his effects in favour of his creditors; and does his *devoir* and duty to them, proclaiming himself bare man and indigent, and becoming debt-bound to them of all that he has. The word is used in the same sense as *BANKRUPT*: see that article; and *LAW*, N^o clxxxv. 11, 12. clxxii. 10, 11, 12, &c.

E.

E, THE second vowel, and fifth letter, of the alphabet. The letter E is most evidently derived from the old character 𐤂 in the ancient Hebrew and Phœnician alphabets, inverted by the Greeks to this position E, and not from the Hebrew He ה . From the same origin is also derived the Saxon *e*, which is the first letter in their alphabet that differs from the Latin one. It is formed by a narrower opening of the larynx than the letter A; but the other parts of the mouth are used nearly in the same manner as in that letter.

It has a long and short found in most languages. The short found is audible in *bed, fret, den*, and other words ending in consonants: its long found is produced by a final *e*, or an *e* at the end of words; as in *glebe, bere, hire, scene, sphere, interfere, reverse, sincere*, &c. in most of which it sounds like *ee*; as also in some others by coming after *i*, as in *believe, chief, grief, reprieve*, &c. and sometimes this long found is expressed by *ee*, as in *bleed, beer, creed*, &c. Sometimes the final *e* is silent, and only serves to lengthen the sound of the preceding vowel, as in *rage, rage, stage, bug, huge*, &c. The found of *e* is obscure in the following words, *aven, heaven, bounden, fire, massacre, maigre*, &c.

The Greeks have their long and short *e*, which they call *epsilon* and *eta*. The French have at least six kinds

of *e*'s: the Latins have likewise a long and short *e*; they also write *e* instead of *a*, as *dicem* for *dicam*, &c. and this is, no doubt, the reason why *a* is so often changed into *e*, in the preter tense, as, *ago, egi; facio, feci*, &c.

As a numeral, E stands for 250, according to the verse,

E, quoque ducentos et quingenta tenet.

In music it denotes the tone *e-la-mi*. In the calendar it is the fifth of the dominical letters. And in sea-charts it distinguishes all the easterly points: thus, E alone denotes east; and E. by S. and E. by N. East by South, and East by North.

EACHARD (John), an English divine of great learning and wit in the 17th century, bred at Cambridge, author (in 1670) of *The Grounds and Occasions of the Contempt of the Clergy and Religion inquired into*. In 1675 he was chosen master of Catharine-hall upon the decease of Dr John Lightfoot; and the year following was created D.D. by royal mandate. He died in 1696.

EACHARD (Laurence), an eminent English historian of the 18th century, nearly related to Dr John Eachard. He was the son of a clergyman, who, by the death of his elder brother, became master of a good estate in Suffolk. He was educated in the university of Cambridge, entered into holy orders, and was presented to the living of Welton and Elkinton in Lincolnshire,

Eagle
||
Ear.

where he spent above 20 years of his life, and distinguished himself by his writings, especially his History of England, which was attacked by Dr Edmund Calamy, and by Mr John Oldmixon. His "General Ecclesiastical History from the Nativity of Christ to the first Establishment of Christianity by Human Laws under the emperor Constantine the Great," has passed through several editions. He was installed archdeacon of Stowe and prebend of Lincoln in 1712. He died in 1730.

EAGLE, in ornithology. See **FALCO**.

Eagle, in heraldry, is accounted one of the most noble bearings in armoury; and, according to the learned in this science, ought to be given to none but such as greatly excel in the virtues of generosity and courage, or for having done singular services to their sovereigns; in which cases they may be allowed a whole eagle, or an eagle naissant, or only the head or other parts thereof, as may be most agreeable to their exploits.

The eagle has been borne, by way of ensign or standard, by several nations. The first who seem to have assumed the eagle, are the Persians; according to the testimony of Xenophon. Afterwards, it was taken by the Romans; who, after a great variety of standards, at length fixed on the eagle, in the second year of the consulate of C. Marius: till that time, they used indifferently wolves, leopards, and eagles, according to the humour of the commander.

The Roman eagles, it must be observed, were not painted on a cloth, or flag: but were figures in relief, of silver or gold, borne on the tops of pikes; the wings being displayed, and frequently a thunder-bolt in their talons. Under the eagle on the pike, were piled bucklers, and sometimes crowns. Thus much we learn from the medals.

EAGLE, in astronomy. See there, n° 203, 206.

EAGLE-Stone. See **ETITES**.

Black Eagle, an order of knighthood, instituted by the elector of Brandenburg, in 1701, on his being crowned king of Prussia.

The knights of this order wear an orange-coloured ribband suspending a black eagle.

White Eagle, a like order in Poland, instituted in 1325, by Uladislaus V. on occasion of the marriage of his son Casimir to the daughter of the great duke of Lithuania.

The knights of this order wear a chain of gold, suspending a silver eagle crowned.

EAGLET, a diminutive of eagle, properly signifying a young eagle. In heraldry, when there are several eagles on the same escutcheon, they are termed *eaglets*.

EAR, in anatomy. See there, n° 405.

EAR, in music, denotes a kind of internal sense, whereby we perceive and judge of harmony and musical sounds. See **MUSIC**.

In music we seem universally to acknowledge something like a distinct sense from the external one of hearing; and call it a *good ear*. And the like distinction we should probably acknowledge in other affairs, had we got distinct names to denote these powers of perception by. Thus a greater capacity of perceiving the beauties of painting, architecture, &c. is called a *fine taste*.

EAR is also used to signify a long cluster of flowers, or seeds, produced by certain plants; usually called by botanists, *spica*. The flowers and seeds of wheat, rye, barley, &c. grow in ears. The same holds of the flowers of lavender, &c. We say the *stem* of the ear, i. e. its tube, or straw: the knot of the ear; the lobes, or cells wherein the grains are inclosed: the beard of the ear, &c.

EAR-Ach. See (the *Index* subjoined to) **MEDICINE**.
EAR-Pick, an instrument of ivory, silver, or other metal, somewhat in form of a probe, for cleansing the ear.

The Chinese have a variety of these instruments, with which they are mighty fond of tickling their ears; but this practice, Sir Hans Sloane observes, must be very prejudicial to so delicate an organ, by bringing too great a flow of humours on it.

EAR-Ring. See **PENDENT**.

EAR-Wax. See **Ear-WAX**.

EARWIG, in zoology. See **FORFICULA**.

EARING, in the sea-language, is that part of the bolt-rope which at the four corners of the sail is left open, in the shape of a ring. The two uppermost parts are put over the ends of the yard-arms, and so the sail is made fast to the yard; and into the lowermost earings, the sheets and tacks are seized or bent at the clew.

EARL, a British title of nobility, next below a marquis, and above a viscount.

The title is so ancient, that its original cannot be clearly traced out. This much, however, seems tolerably certain, that among the Saxons they were called *ealdormen*, quasi elder men, signifying the same with *senior* or *senator* among the Romans; and also *shiremen*, because they had each of them the civil government of a several division or shire. On the irruption of the Danes they changed their names to *eorles*, which, according to Camden, signified the same in their language. In Latin they are called *comites*, (a title first used in the empire), from being the king's attendants; a *societate nomen sumperunt, regis enim tales sibi associant*. After the Norman conquest they were for some time called *counts*, or *countesses*, from the French; but they did not long retain that name themselves, tho' their shires are from thence called *counties* to this day. It is now become a mere title: they have nothing to do with the government of the county; which is now entirely devolved on the sheriff, the earl's deputy, or *vicecomes*. In writs, commissions, and other formal instruments, the king, when he mentions any peer of the degree of an earl, usually styles him "trusty and well-beloved *cousin*;" an appellation as ancient as the reign of Henry IV; who being either by his wife, his mother, or his sisters, actually related or allied to every earl in the kingdom, artfully and constantly acknowledged that connexion in all his letters and other public acts: from whence the usage has descended to his successors, though the reason has long ago failed.

An earl is created by cincture of sword, mantle of state put upon him by the king himself, a cap and a coronet put upon his head, and a charter in his hand. All the earls of England are denominated from some shire, town, or place, except three; two of whom, viz. earl Rivers, and earl Paulet, take their denomination from illustrious families: the third is not only honorary as

Ear
||
Earl.

Earl
Earth.

Earth.

all the rest, but also officary, as the earl-marshal of England.

EARL Marshal of England, is a great officer who had anciently several courts under his jurisdiction, as the court of chivalry, and the court of honour. Under him is also the herald's office or college of arms. He hath some pre-eminence in the court of Marshalsea, where he may sit in judgment against those who offend within the verge of the king's court. The office is of great antiquity in England, and anciently of greater power than now; and has been for several ages hereditary in the most noble family of Howard.

EARNEST, *ἄρρηκτος*, money advanced to bind the parties to the performance of a verbal bargain. By the civil law, he who recedes from his bargain loses his earnest, and if the person who received the earnest give back, he is to return the earnest double. But with us, the person who gave it, is in strictness obliged to abide by his bargain; and in case he decline it, is not discharged upon forfeiting his earnest, but may be sued for the whole money stipulated.

EARTH, among ancient philosophers and chemists, one of the four elements of which the whole system of nature was thought to be composed. See **ELEMENT**; and **CHEMISTRY**, n° 10.

EARTH, in astronomy and geography, one of the primary planets; being this terraqueous globe which we inhabit.

The cosmogony, or knowledge of the original formation of the earth, the materials of which it was composed, and by what means they were disposed in the order in which we see them at present, is a subject which, though perhaps above the reach of human sagacity, has exercised the wit of philosophers in all ages. To recount the opinions of all the eminent philosophers of antiquity upon this subject would be very tedious: it may therefore suffice to observe, that, ever since the subject began to be canvassed, the opinions of those who have treated it may be divided into two classes. 1. Those who believed the earth, and whole visible system of nature, to be the Deity himself, or connected with him in the same manner that a human body is with its soul. 2. Those who believed the materials of it to have been eternal, but distinct from the Deity, and put into the present order by some power either inherent in themselves, or belonging to the Deity. Of the first opinion were Xenophanes, the founder of the *elastic* sect, Strato of Lampascus, the *Pepipatetics*, &c.

The second opinion, namely, that the substance of the earth or universe (for it is impossible to speak of the one without the other) was eternal, though not the form, was most generally held among the ancients. From that established axiom, that "nothing can be produced from nothing," they concluded that *creation* was an impossibility; but at the same time they thought they had good reason to believe the world had not been always in its present form. They who held this opinion may again be divided into two classes: first, those who endeavoured to account for the generation of the world, or its reduction into the present form, by principles merely mechanical, without having recourse to any assistance from divine power; and secondly, those who introduced an intelligent mind as the author and disposer of all things. To the first of these classes be-

longed the cosmogony of the Babylonians, Phœnicians, and Egyptians; the particulars of which are too absurd to deserve notice. Of the same opinion also were most of the poets; the philosophers Thales, Anaximander, Anaximenes, Anaxagoras, &c. The latter attempted to reform the philosophy of his master Anaximenes by introducing an intelligent principle into the world, distinct from matter; thus making his intelligent principle, or God, the soul of the world. Diogenes of Apollonia supposed air, which he made the first principle of all things, to be ended with reason: His manner of philosophizing differed very little from that of Des Cartes. "All things, (says he,) being in motion, some became condensed, and others rarefied. In those places where condensation prevailed, a whirling motion, or vortex, was formed; which by its revolution drew in the rest, and the lighter parts flying upwards formed the sun."

The most remarkable of the atheistic systems, however, was the atomic one, supposed to have been invented by Democritus; though Laertius attributes it to Leucippus, and some make it much older. According to this system, the first principles of all things were an infinite multitude of atoms, or indivisible particles of different sizes and figures; which, moving fortuitously, or without design, from all eternity, in infinite space, and encountering with one another, became variously entangled during their conflict. This first produced a confused chaos of all kinds of particles; which afterwards, by continual agitation, striking and repelling each other, disposed themselves into a vortex, or vortices, where, after innumerable revolutions, and motions in all possible directions, they at last settled into their present order.

The hypothesis of Democritus agrees in the main with that of Epicurus as represented by Lucretius; excepting that no mention is made of those vortices, which yet were an essential part of the former. To the two properties of magnitude and figure which Democritus attributed to his atoms, Epicurus added a third, namely, weight; and without this, he did not imagine they could move at all. The system of Democritus necessarily introduced absolute fatal necessity; which Epicurus not choosing to agree to, he invented a third motion of the atoms, unknown to those who had gone before him. His predecessors allowed them to have a perpendicular and reflexive motion: but Epicurus, though he allowed these motions to be absolutely necessary and unavoidable, asserted that the atoms could also of themselves decline from the right line; and from this declination of the atoms, he explained the free-will of man.—The most material difference between the two systems, however, was, that Epicurus admitted no principle but the atoms themselves; whereas Democritus believed them to be animated.

Of those who held two distinct and coeternal principles, *viz.* God and Matter, we shall only take notice of the opinions of Pythagoras, Plato, and Aristotle, as being the most remarkable. Pythagoras is said to have asserted two substantial self-existent principles: a *monad*, or unity; and a *dyad*, or duality. The meaning of these terms is now somewhat uncertain. Some think, that by the monad, he meant the Deity; and, by the dyad, matter. Others think, that the Pythagoric mo-

²
Systems of
Democritus
and Epicurus.

³
Of Pytha-
goras, Pla-
to, and
Aristotle.

¹
Different
opinions
respecting
the cosmo-
gony.

Earth.

nads were atoms. The dyad is sometimes thought to signify a demon or evil principle; but Porphyry's interpretation, which seems the most probable, is as follows. The cause, says he, of that sympathy, harmony, and agreement which is in things, and of the conservation of the whole, which is always the same and like itself, was by Pythagoras called *unity*; that unity which is in the things themselves, being but a participation of the first cause: but the reason of difference, inequality, and constant irregularity in things, was by him called a *dyad*. This philosopher held numbers to be the principles of all things, and from them he accounted for the production of the world in the following manner. He supposed that the monad and dyad were the two sources of numbers, from whence proceeded points; from points, lines; from lines, plane figures; from planes, solids; from solids, sensible bodies. The elements of sensible bodies are four; but besides these, there was a fifth (never yet discovered.) The four elements which manifest themselves to our senses are fire, air, earth, and water. These are in a perpetual change, and from them the world was formed; which is animated, intelligent, and spherical; containing, in the midst of it, the earth, a globe and inhabited body. The world, he said, began from fire, and the fifth element; and that as there were five figures of solid bodies, called mathematical or regular, the earth was made of the cube, fire of the pyramid or tetrahedron, the air of the octahedron, water of the icosahedron, and the sphere of the universe of the dodecahedron.—This method of philosophizing, which has no manner of foundation in nature, was adopted by Plato and Aristotle; and hence proceeded all the absurdities concerning ideas, forms, qualities, &c. with which the Aristotelian philosophy was loaded.

For a long time, however, the philosophy of Aristotle prevailed, and the world was thought to be upheld by forms, qualities, and other unintelligible and imaginary beings.—At last the French philosopher, Descartes, superseded the Aristotelian, by introducing the atomic, or Democritic, and Epicurean philosophy†. The Cartesian system was quickly superseded by the Newtonian; which still continues, though considerably different from what it was left by that great man.—His opinions, indeed, concerning the cosmogony seem to have been in a fluctuating state; and hence he delivers himself in such a manner, that he hath often incurred the charge of contradicting himself.—He maintained, for instance, that matter was infinitely divisible, and the mathematical demonstrations of this proposition are well known. Notwithstanding this, however, when he comes particularly to speak of the original construction of the world, he seems to retract this opinion, and adopt the atomic philosophy. He tells us, that it seems probable, that in the beginning God formed matter in *solid, massy, impenetrable, particles, &c.**; and that of these particles, endowed with various powers of attraction and repulsion, the present system of nature is formed. His primary laws of nature are only three in number, and very simple. The first is, that all matter has a tendency to continue in that state in which it is once placed, whether of rest or motion. If it is at rest, for example, it will continue at rest for ever, without beginning motion of itself; but if it is once set in motion, by any cause whatever, it

will for ever continue to move in a right line, until something either stops it altogether, or forces it to move in another direction. 2. That the change of motion is always equivalent to the moving force employed to produce it, and in the direction of the right line in which it is impeded; that is, if a certain force produces a certain motion, double that force will produce double that motion, &c. 3. Reaction is always contrary and equal to action; or the actions of two bodies upon one another are always equal and contrary to one another.

From these three laws, together with the two contrary forces of attraction and repulsion, Sir Isaac Newton and his followers have attempted to explain all the phenomena of nature. When they come to explain the nature of the attractive and repulsive forces, however, they are exceedingly embarrassed. Sir Isaac hath expressed himself in two different ways concerning them. In his Principia, he pretty positively determines them to be owing to a cause that is not material; and in his Queries, he supposes they may be effects of some subtle matter which he calls *ether*. This disagreement with himself hath produced no small disagreement among his followers. One party, laying hold of his assertions in the Principia, determine the world to be upheld by *immaterial* powers; while the other, neglecting the Principia, and taking notice only of the Queries at the end of the Optics, strenuously maintain, that attraction and repulsion are owing to the action of some exceedingly fine and subtle ether.—The first of these suppositions, it is argued, necessarily involves us in one of the following dilemmas. 1. If the attractive and repulsive forces are not material, they must either be occasioned by spiritual beings, or they must be *qualities* of matter. If they are occasioned by the action of immaterial beings, these beings must either be created or uncreated. If they are produced by the action of created beings, we run into the supposition of some of the ancient heathens, that the world is governed by demons or subordinate intelligences; and thus may make an easy transition to polytheism. If attraction and repulsion are the immediate action of the Deity himself, we run into the doctrine of making God the soul of the world.—This last hypothesis hath been most strenuously adopted by Mr Baxter in his treatise of the Immateriality of the human Soul. Mr Boscovich, Mr Mitchel, and Dr Priestley, have likewise adopted the hypothesis of immaterial powers to such a degree, that, according to them, the whole world consists of nothing else but *attractions and repulsions* mixed with *physical* nious. *points**. 2. If we suppose the attractive and repulsive powers to be only *properties, qualities, or laws*, impressed on matter by the Deity, we might as well have been contented with the occult qualities of Aristotle.—If attraction and repulsion are occasioned by the action of mere matter, and all the powers in nature are only material, the charge is incurred of making nature direct itself in such a manner, that there is no occasion for the interposition, or even the existence, of a Deity at all.

Thus we see, the Newtonian cosmogony must incline either to the Platonic and Aristotelian, or to the Atomic or Epicurean; according to the hypothesis we lay down concerning the nature of attraction. Des Cartes's system was plainly a revival of that of Democri-

Earth.

6
Disagree-
ment a-
mong his
followers.

† See
Astronomy,
nº 77.

4
Newtonian
system im-
perishes the
Aristote-
lian and
Cartesian.

* See *Coben-
son*, nº 2.

5
Three laws
of nature
laid down
by Sir Isaac.

7
Mr Mit-
chel, Bos-
covich, and
Dr Priest-
ley's opi-
nions.

* See *Coben-
son*, nº 8.

Earth.

8
Mr Hut-
chinson's
system.

tus and Epicurus, with some corrections and improvements. It was farther improved and corrected by Mr Hutchinson, who added to it the authority of Revelation. The created agents he chose in his cosmogony were fire, light, and air. These, we see, have indeed a very considerable share in the operations of nature; but unless we explain the manner in which they operate, our knowledge is not at all increased, and we might as well have been contented with the Newtonian attraction and repulsion, or even the occult qualities of Aristotle. Attempts have indeed been made to solve the phenomena of nature, from the action of these three agents, both by Hutchinson himself, and many of his followers.—These attempts, however, have always proved unsuccessful. Some phenomena indeed may be explained pretty plausibly from the known action of these three; but when we come to speak of what may be called the *nicer operations* of nature, such as the growth of plants and animals, we are utterly at a loss. A short account of the Hutchinsonian cosmogony is given under the article *DELUGE*, par. 6.

9
A deficiency
of active
principles
in all the
theories yet
invented.

The manifest deficiency of active principles in all the theories of the earth that have yet been invented, hath occasioned a constant search after others which should be able, by their superior activity, to fill up the blank which necessarily remained in the system.—Pythagoras, Plato, and Aristotle, being unable to account for the formation of the earth from their four elements, called in the assistance of a *fifth*, which was never yet discovered. Epicurus, finding the motions attributed to his atoms by Democritus to be insufficient, had recourse to an imaginary, and on his own principles *impossible*, declination of the atoms. Descartes finding the atoms themselves insufficient, asserted that they were not atoms, but might be broken into smaller parts, and thus constitute matter of various degrees of subtilty*. The Newtonian philosophers have found Des Cartes's system insufficient; but being greatly distressed in their attempts to solve all the phenomena of nature by mere attraction and repulsion, have been obliged to call in the action of *mind* to their assistance. The Hutchinsonians were hardly put to it in accounting for every thing by the action of fire, light, and air, when luckily the discoveries in electricity came to their assistance. It must be owned, that this fluid does indeed come in like a kind of fifth element, which in many cases appears to be the animating principle of nature. For some time past, almost all the remarkable phenomena in nature have been explained by electricity, or the action of the electric fluid. But unless this action is explained, we are got no farther than we were before. To say any thing is done by electricity, is not more intelligible than to say it was done by attraction. If we explain an effect by a material cause, it ought to be done upon mechanical principles. We ought to be sensible how one part of matter acts upon another part in such a manner as to produce the effect we desire to explain. The electrical philosophers, however, have not yet been able to investigate the manner in which this subtle fluid operates; and hence the many discoveries in electricity have not contributed to throw that light on the theory of the earth, which perhaps they may do hereafter. With some philosophers, however, the electric fluid itself, and indeed all the powers of nature, seem in danger of being superseded by a prin-

* See
Astronomy,
p. 77.

ciple, at present very little known, called the *phlogiston*.—Thus, Mr Henly tells us*, that Mr Clarke, an ingenious gentleman in Ireland, hath discovered all the different kinds of air produced from metals, &c. by Dr Priestley, to be only *phlogistic vapours* arising from these substances. Dr Priestley himself supposes, that the electric light is a modification of *phlogiston*; and consequently thinks it probable, that all light is a modification of the same. Fire or flame is thought to be a chemical combination of air with the phlogiston; and phlogiston is thought to give the elasticity to air, and every other elastic fluid, &c.—Be this as it will, however, the late discoveries in electricity have tended very much to change the form of the Newtonian philosophy, and to introduce that *materialism* into our theories of the natural phenomena which is by some people so much complained of.

From this general history of the different agents which philosophers have chosen to account for the original formation of the earth, and for its preservation in the present form, it appears, that scarce any advance in true knowledge hath yet been made. All the agents have been prodigiously defective; electricity itself, as far as yet known, not excepted. But, before entering into a particular consideration of those theories which seem most worthy of notice, it will be necessary to point out the principal difficulties which stand in the way of one who attempts to give a complete theory of the earth.

1. The earth, although pretty much of a spherical figure, is not completely so; but protuberates considerably about the equatorial parts, and is proportionally flattened at the poles, as is undeniably proved by the observations of modern mathematicians*. The question here is, Why the natural cause which gave the earth so much of a spherical figure, did not make it a complete and exact sphere?

2. The terraqueous globe consists of a vast quantity of water as well as dry land. In many places, such as the Isthmus of Darien, a narrow neck of land is interposed betwixt two vast oceans. These beat upon it on either side with vast force; yet the Isthmus is never broke down nor diminished. The cause is the same with the Isthmus of Suez which joins Asia and Africa, and with that which joins the Morea or ancient Peloponnesus to the continent. The difficulty is, By what natural power or law are these narrow necks of land preserved amidst the waters which threaten them on both sides with destruction?

3. The surface of the earth is by no means smooth and equal; but in some places raised into enormous ridges of mountains, and in others sunk down in such a manner as to form deep valleys. These mountains, though they have been exposed to all the injuries of the weather for many thousand years, exhibit no signs of decay. They still continue of the same size as before, though vast quantities of earth are frequently washed down from them by the rains, which, together with the force of gravity, tending to level and bring them on an equality with the plains on which they stand, we might reasonably think, ought by this time to have rendered them smaller than before. It must therefore be inquired into, By what natural cause the mountains were originally formed, and how they come to preserve their size without any remarkable diminution?

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* Phil.
Trans.
vol. 67.

10
Little pro-
gress as yet
made in
true philo-
sophy.

11
Difficulties
which occur
in
forming a
theory of
the earth.

* See *Geo-
graphy*.

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4. The internal parts of the earth are still more wonderful than the external. The utmost industry of man, indeed, can penetrate but a little way into it. As far as we can reach, however, it is found to be composed of dissimilar strata lying one upon another, not commonly in a horizontal direction, but inclined to the horizon at different angles. These strata seem not to be disposed either according to the laws of gravity or according to their density, but as it were by chance. Beddes, in the internal parts of the earth are vast chasms and vacuities. By what means were these strata originally deposited, the fissures and chasms made, &c.?

5. In many places of the earth, both on the surface, and at great depths under it, vast quantities of marine productions, such as shells, &c. are to be met with. Sometimes these shells are found in the midst of solid rocks of marble and limestone. In the very heart of the hardest stones also, small vegetable substances, as leaves, &c. are sometimes to be found. The question is, By what means were they brought thither?

These are some of the most striking difficulties which present themselves to one who undertakes to write a natural history or theory of the earth. The most remarkable attempts to produce a theory of this kind are those of Burnet, Woodward, Whiston, and Buffon.

¹²
Dr Burnet's
theory.

According to Dr Burnet, the earth was originally a fluid mass, or chaos, composed of various substances differing both in density and figure. Those which were most heavy sunk to the centre, and formed there a hard solid body: those which were specifically lighter remained next above; and the waters, which were lightest of all, covered the earth all round. The air, and other ethereal fluids, which are still lighter than water, floated above it, and surrounded the globe also. Between the waters, however, and the circumambient air, was formed a coat of oily and unctuous matters lighter than water. The air at first was very impure, and must necessarily have carried up with it many of those earthy particles with which it was once blended: however, it soon began to purify itself, and deposit those particles upon the oily crust abovementioned; which, soon uniting together, the earth and oil became the crust of vegetable earth, with which the whole globe is now covered. His account of the destruction of the primeval world by the flood, by the falling down of the shell of earth into the waters of the abyss, is given under the article DELUGES. It only remains then to give his account of the manner in which he relieves the earth from this universal destruction; and this he does as follows. These great masses of earth, says he, falling into the abyss, drew down with them vast quantities also of air; and by dashing against each other, and breaking into small parts by the repeated violence of the shock, they at length left between them large cavities filled with nothing but air. These cavities naturally offered a bed to receive the influent waters; and in proportion as they filled, the face of the earth became once more visible. The higher parts of its broken surface, now become the tops of mountains, were the first that appeared; the plains soon after came forward; and at length the whole globe was delivered from the waters, except the places in the lowest situations; so that the ocean and seas are still a part of the ancient abyss, that have had no place to which they might return. Islands and rocks are frag-

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ments of the earth's former crust; continents are larger masses of its broken substance; and all the inequalities that are to be found on the surface of the present earth are effects of the confusion into which both earth and water were at that time thrown.

¹³
Dr Woodward's.

Dr Woodward begins with asserting, that all terrene substances are disposed in beds of various natures, lying horizontally one over the other, somewhat like the coats of an onion: that they are replete with shells, and other productions of the sea; these shells being found in the deepest cavities, and on the tops of the highest mountains. From these observations, which are warranted by experience, he proceeds to observe, that these shells, and extraneous fossils, are not productions of the earth, but are all actual remains of those animals which they are known to resemble; that all the strata or beds of the earth lie under each other in the order of their specific gravity, and that they are disposed as if they had been left there by subsiding waters. All this he very confidently affirms, tho' daily experience contradicts him in some of them; particularly, we often find layers of stone over the lightest soils, and the softest earth under the hardest bodies. However, having taken it for granted, that all the layers of the earth are found in the order of their specific gravity, the lightest at top, and the heaviest next the centre, he consequently asserts, that all the substances of which the earth is composed, were originally in a state of dissolution. This dissolution he supposes to have taken place at the flood: but being aware of an objection, that the shells, &c. supposed to have been deposited at the flood are not dissolved, he exempts them from the solvent power of the waters, and endeavours to shew that they have a stronger cohesion than minerals; and that, while even the hardest rocks are dissolved, bones and shells may remain entire.

¹⁴
Mr Whiston's.

Mr Whiston supposes the earth to have been originally a comet; and considers the Mosaic account of the creation as commencing at the time when the Creator placed this comet in a more regular manner, and made it a planet in the solar system. Before that time, he supposes it to have been a globe without beauty or proportion; a world in disorder, subject to all the vicissitudes which comets endure; which, according to the present system of philosophy, must be alternately exposed to the extremes of heat and cold. These alternations of heat and cold, continually melting and freezing the surface of the earth, he supposes to have produced, to a certain depth, a chaos resembling that described by the poets, surrounding the solid contents of the earth, which still continued unchanged in the midst; making a great burning globe of more than 2000 leagues in diameter. This surrounding chaos, however, was far from being solid: he resembles it to a dense, though fluid atmosphere, composed of substances mingled, agitated, and shocked against each other; and in this disorder he supposes the earth to have been just at the eve of the Mosaic creation. But upon its orbit being then changed, when it was more regularly wheeled round the sun, every thing took its proper place, every part of the surrounding fluid then fell into a certain situation according as it was light or heavy. The middle, or central part, which always remained unchanged, still continued so; retaining a part of that heat which it received in its primeval approaches to-

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towards the fun; which heat he calculates may continue about 6000 years. Next to this fill the heavier parts of the chaotic atmosphere, which serve to sustain the lighter: but as in descending they could not entirely be separated from many watery parts, with which they were intimately mixed, they drew down these also along with them; and these could not mount again after the surface of the earth was consolidated: they therefore surrounded the heavy first-descending parts in the same manner as these surrounded the central globe. Thus the entire body of the earth is composed next the centre of a great burning globe: next this is placed an heavy terrene substance that encompasses it; round which is circumsfled a body of water. Upon this body of waters is placed the crust of earth on which we inhabit: so that, according to Mr Whiston, the globe is composed of a number of coats, or shells, one within the other, all of different densities. The body of the earth being thus formed, the air, which is the lightest substance of all, surrounded its surface; and the beams of the sun darting through, produced the light, which, we are told by Moses, first obeyed the Divine command.

The whole oeconomy of the creation being thus adjusted, it only remained to account for the ridings and depressions on the surface of the earth, with the other seeming irregularities of its present appearance. The hills and valleys are by him considered as formed by their pressing upon the internal fluid which sustains the external shell of earth, with greater or less weight: those parts of the earth which are heaviest sink the lowest into the subjacent fluid, and thus become valleys: those that are lightest rise higher upon the earth's surface, and are called *mountains*.

Such was the face of nature before the deluge: the earth was then more fertile and populous than it is at present; the life of men and animals was extended to ten times its present duration; and all these advantages arose from the superior heat of the central globe, which has ever since been cooling. As its heat was then in its full power, the genial principle was also much greater than at present; vegetation and animal increase were carried on with more vigour; and all nature seemed teeming with the seeds of life. But as these advantages were productive only of moral evil, it was found necessary to destroy all living creatures by a flood; and in what manner this punishment was accomplished, according to Mr Whiston, is particularly taken notice of under the article *DELUGE*.

Mr Buffon's theory differs very widely from all the rest. He begins with attempting to prove, that this world which we inhabit is no more than the ruins of a world. "The surface of this immense globe, says he, exhibits to our observation, heights, depths, plains, seas, marshes, rivers, caverns, gulfs, volcanoes; and, on a cursory view, we can discover in the disposition of these objects neither order nor regularity. If we penetrate into the bowels of the earth, we find metals, minerals, stones, bitumens, sands, earths, waters, and matter of every kind, placed as it were by mere accident, and without any apparent design. Upon a nearer and more attentive inspection, we discover funk mountains, caverns filled up, shattered rocks, whole countries swallowed up, new islands emerged from the ocean, heavy substances placed above light ones, hard bodies

inclosed within soft bodies: in a word, we find matter in every form, dry and humid, warm and cold, solid and brittle, blended in a chaos of confusion, which can be compared to nothing but a heap of rubbish, or the ruins of a world."

When taking a particular survey of the external surface of the globe, he begins with the ocean, and the motion communicated to it by the influence of the sun and moon which produces the tides.—"In examining the bottom of the sea, (says he), we perceive it to be equally irregular as the surface of the dry land. We discover hills and valleys, plains and hollows, rocks and earths of every kind; we discover likewise, that islands are nothing but the summits of vast mountains, whose foundations are buried in the ocean. We find other mountains whose tops are nearly on a level with the surface of the water; and rapid currents which run contrary to the general movement. These currents sometimes run in the same direction; at other times their motion is retrograde; but they never exceed their natural limits, which seem to be as immutable as those which bound the efforts of land-rivers. On one hand we meet with tempestuous regions, where the winds blow with irresistible fury; where the heavens and the ocean, equally convulsed, are mixed and confounded in the general shock; violent intestine motions, tumultuous swellings, water-spouts, and strange agitations, produced by volcanoes, whose mouths, though many fathoms below the surface, vomit forth torrents of fire; and push, even to the clouds, a thick vapour, composed of water, sulphur, and bitumen; and dreadful gulfs or whirlpools, which seem to attract vessels for no other purpose than to swallow them up. On the other hand we discover vast regions of an opposite nature, always smooth and calm, but equally dangerous to the mariner. To conclude, directing our eyes toward the southern or northern extremities of the globe, we discover huge masses of ice, which, detaching themselves from the polar regions, advance, like floating mountains, to the temperate climates, where they dissolve and vanish from our view. The bottom of the ocean and the shelving sides of rocks produce plentiful crops of plants of many different species: its soil is composed of sand, gravel, rocks, and shells; in some places it is a fine clay, in others a compact earth: and in general, the bottom of the sea has an exact resemblance to the dry land which we inhabit.

"Let us next take a view of the dry land. Upon an attentive observation of this, we will find, that the great chains of mountains lie nearer the equator than the poles; that in the old continent their direction is more from east to west than from south to north; and that, on the contrary, in the new continent they extend more from north to south than from east to west. But what is still more remarkable, the figure and direction of these mountains, which have a most irregular appearance, correspond so wonderfully, that the prominent angles of one mountain are constantly opposite to the concave angles of the neighbouring mountain, and of equal dimensions, whether they be separated by an extensive plain or a small valley. I have further remarked, that opposite hills are always nearly of the same height; and that mountains generally occupy the middle of continents, islands, and promontories, dividing them by their greatest lengths. I have likewise

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traced the courses of the principal rivers, and find that their direction is nearly perpendicular to the sea-coasts into which they empty themselves; and that, during the greatest part of their courses they follow the direction of the mountains from which they derive their origin. The sea-coasts are generally bordered with rocks of marble, and other hard stones; or rather with earth and sand accumulated by the waters of the sea, or brought down and deposited by rivers. In opposite coasts, separated only by small arms of the sea, the different strata or beds of earth are of the same materials. I find that volcanoes never exist but in very high mountains; that a great number of them are entirely extinguished; that some are connected to others by subterranean passages, and their eruptions not unfrequently happen at the same time. There are similar communications between certain lakes and seas. Some rivers suddenly disappear, and seem to precipitate themselves into the bowels of the earth. We likewise find certain mediterranean or inland seas, that constantly receive from many and great rivers prodigious quantities of water, without any augmentation of their bounds; probably discharging by subterraneous passages all those extraneous supplies. It is likewise easy to distinguish lands which have been long inhabited, from those new countries where the earth appears in a rude state, where the rivers are full of cataracts, where the land is nearly overflowed with water or burnt up with drought, and where every place capable of producing trees is totally covered with wood.

"Proceeding in our examination, we discover that the upper stratum of the earth is universally the same substance: that this substance, from which all animals and vegetables derive their growth and nourishment, is nothing but a composition of the decayed parts of animal and vegetable bodies, reduced into such small particles that their former organic state is not distinguishable. Penetrating a little deeper, we find the real earth, beds of sand, limestone, clay, shells, marble, gravel, chalk, &c. These beds are always parallel to each other, and of the same thickness throughout their whole extent. In neighbouring hills, beds or strata of the same materials are uniformly found at the same levels, though the hills be separated by large and deep valleys. Strata of every kind, even of the most solid rocks, are uniformly divided by perpendicular fissures. Shells, skeletons of fishes, marine plants, &c. are often found in the bowels of the earth, and on the tops of mountains, even at the greatest distances from the sea. These shells, fishes, and plants, are exactly similar to those which exist in the ocean. Petrified shells are to be met with almost every where in prodigious quantities; they are not only inclosed in rocks of marble and limestone, as well as in carths and clays, but are actually incorporated and filled with the very substances in which they are inclosed. In fine, I am convinced, from repeated observation, that marbles, limestones, chalks, marls, clays, sand, and almost all terrestrial substances, wherever situated, are full of shells and other spoils of the ocean."

From these positions, which he lays down as facts, Mr Buffon draws the following conclusions:

1. The changes which the earth has undergone within these last 2000 or 3000 years must be inconsiderable, when compared with the great revolutions

that took place in those ages immediately succeeding the creation. The reason he gives for this assertion is, that terrestrial substances could not acquire solidity but by the continued action of gravity: hence, the earth must have been originally much softer than it is now, and therefore more apt to be changed by causes which cannot now affect it.

2. It seems an uncontrovertible fact, that the dry land which we now inhabit, and even the summits of the highest mountains, were formerly covered with the waters of the sea; for shells and other marine bodies are still found upon the very tops of mountains.

3. The waters of the sea have remained for a long track of time upon the surface; because in many places, such immense banks of shells have been discovered, that it is impossible for a great multitude of animals could exist at the same time.

4. From this circumstance it likewise appears, that, although the materials on the surface of the earth were then soft, easily disunited, moved, and transported by the waters, yet these transportations could not be suddenly effected: they must have been gradual and successive, as sea-bodies are sometimes found more than 1000 feet below the surface; and such a thickness of earth, or stone, could not be accumulated in a short time.

5. It is impossible these effects could be owing to the universal deluge. For, though we should suppose that all the shells in the bottom of the ocean should be deposited upon the dry land; yet, besides the difficulty of establishing this supposition, it is plain, that as shells are found incorporated in marble, and in the rocks of the highest mountains, we must suppose these rocks and marbles to have been formed all at the very instant when the deluge took place; and that before this grand revolution, there were neither mountains, nor marbles, nor rocks, nor clays, nor matter of any kind similar to what we are now acquainted with; as they all, with few exceptions, contain shells, and other productions of the ocean. Besides, at the time of the universal deluge, the earth must have acquired a considerable degree of solidity, by the action of gravity for more than 16 centuries. During the short time the deluge lasted, therefore, it is impossible that the waters should have overturned and dissolved the whole surface of the earth to the greatest depths.

6. It is certain, (for what reason he does not mention), that the waters of the sea have, at some period or other, remained for a succession of ages upon what we now know to be dry land; and consequently that the vast continents of Asia, Europe, Africa, and America, were then the bottom of an immense ocean, replete with every thing which the present ocean produces.

7. It is likewise certain, that the different strata of the earth are horizontal and parallel to each other. This parallel situation must therefore be owing to the operation of the waters, which have gradually accumulated the different materials, and given them the same position which the water itself invariably assumes.

8. It is certain that these strata must have been gradually formed, and are not the effect of any sudden revolution; because nothing is more frequent than strata composed of heavy materials placed above light ones; which never could have happened, if, according to some authors, the whole had been blended and dissolved

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ved by the deluge, and afterwards precipitated.

9. No other cause than the motion and sediments of water could possibly produce the regular position of the various strata of which the superficial part of this earth consists. The highest mountains are composed of parallel strata, as well as the lowest valleys. Of course, the formation of mountains cannot be attributed to the shocks of earthquakes, or to the eruptions of volcanoes. Such small eminences as have been raised by volcanoes or convulsions of the earth, instead of being composed of parallel strata, are mere masses of weighty materials, blended together in the utmost confusion.

Having now, as he thinks, *proved*, that the dry and habitable part of the earth has remained for a long time under the waters of the sea, and consequently must have undergone the same changes that now take place at the bottom of the sea, he proceeds to inquire what these changes are.

10. The ocean, since the creation of the world, has been constantly agitated by the tides, occasioned by the action of the sun and moon; and this agitation is greater in the equatorial than in the other parts of the globe, because the action of the sun and moon is there strongest.

11. The earth performs a rapid motion on its axis; and consequently its parts have a centrifugal force, which is also greatest at the equator.

12. From the combined action of the two last mentioned causes, the tides, and the motion of the earth, it may be fairly concluded, that although this globe had been originally a perfect sphere, its diurnal motion, and the ebbing and flowing of the tides, must necessarily, in a succession of time, have elevated the equatorial parts, by gradually carrying mud, earth, sand, shells, &c. from other climates, and depositing them at the equator.

13. On this supposition, the greatest inequalities on the surface of the earth ought to be found, and in fact are found, in the neighbourhood of the equator.

14. As the alternate motion of the tides has been constant and regular since the existence of the world, it is natural to think, that, at each tide, the water carries from one place to another a small quantity of matter, which falls to the bottom as a sediment, and forms those horizontal and parallel strata that every where appear. Here it may indeed be objected, that as the flux is equal to, and regularly succeeded by, the reflux, the two contrary motions will balance each other; and whatever is brought in by the flux will be carried back by the reflux. The motion of the ocean, therefore, could never be the cause of the formation even of parallel strata; much less of mountains, and all the inequalities to be observed in this globe. To this Mr Buffon replies, that the alternate motion of the waters is by no means equal; for the sea has a continual motion from east to west: the agitations occasioned by the winds likewise produce great inequalities in the tides. It must also be acknowledged, that, by every motion of the sea, particles of earth and other matter must be carried from one place and deposited in another; and that these collections of matter must assume the form of parallel and horizontal strata. Lastly, this objection is obviated by a well known fact. On all coasts where the ebbing and flowing of the sea is discernible, numberless materials are brought in by the flux, which

are not carried back by the reflux. The sea gradually increases on some places and recedes from others; narrowing its limits by depositing earth, sand, shells, &c. which naturally take a horizontal position. These materials when accumulated, and elevated to a certain degree, gradually shut out the water, and remain for ever in the form of dry land.

15. The possibility of a mountain's being formed at the bottom of the sea by the motion and sediments of the water, will appear from the following considerations. On a coast which the sea washes with violence during the flow of tide, some part of the earth must be carried off at every stroke of the waves. Even where the sea is bounded by rock, it is a known fact, that the rock itself is greatly wasted by the water; and consequently that small particles are carried off by the retreat of every wave. Those particles of earth or stone are necessarily transported to some distance. Whenever the agitation of the water ceases, the particles are precipitated in the form of a sediment, and lay the foundation of a first stratum, which is either horizontal or inclined, according to the situation of the surface on which they fall. This stratum is soon succeeded by another, produced by the same cause; and thus a considerable quantity of matter will be amassed, and deposited in parallel beds. In process of time this gradually accumulating mass will become a mountain in the bottom of the sea, exactly resembling, both in external and internal structure, those mountains which we see on the dry land. If there happened to be shells in that part of the bottom of the sea where we have supposed the sediments to be deposited, they will be covered, filled, and incorporated with the deposited matter, and form a part of the general mass. These shells will be lodged in different parts of the mountain, corresponding to the times in which they were deposited: those which lay at the bottom before the first stratum was formed, will occupy the lowest stratum; the others will be found in places more elevated.

16. It has been imagined that the agitation of the sea, produced by the winds and tides is only superficial, and does not affect the bottom, especially where it lies very deep. But it ought to be remembered, that whatever be the depth, the whole mass is put in motion by the tides at the same time; and that, in a fluid globe, this motion would be communicated even to the centre. The attractive power, which occasions the flux and reflux, is penetrating. It acts equally upon every particle of the mass; so that the quantity of its force at different depths may be determined by calculation. We cannot therefore hesitate in pronouncing, that the tides, the winds, and all other causes of motion in the sea, must produce heights and inequalities in its bottom; and that these heights must uniformly be composed of regular strata either horizontal or inclined. The heights thus produced will gradually augment; like the waves which formed them, they will mutually respect each other; and if the extent of the base be great, in a course of years they will form a vast chain of mountains.

17. Whenever eminences are formed, they interrupt the uniform motion of the waters, and produce currents. Between two neighbouring heights in the bottom of the ocean there must be a current which will follow their common direction, and, like a river, cut a channel, the angles of which will be alternately opposite

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sites through the whole extent of its course. These heights must continually increase; for, during the flow, the water will deposit its ordinary sediment upon their ridges; and the waters which are impelled by the current will force along, from great distances, quantities of matter, which will subside between the hills, and, at the same time, scoop out a valley with corresponding angles at their foundation. Now, by means of these different motions and sediments, the bottom of the ocean, though formerly smooth, must soon be furrowed and interspersed with hills and chains of mountains, as we actually find it at present. The soft materials of which the eminences were originally composed, would gradually harden by their own gravity. Such of them as consisted of sandy and crystalline particles, would produce those enormous masses of rock and flint, in which we find crystals and other precious stones. Others, composed of stony particles mixed with shells, give rise to those beds of limestone and marble in which vast quantities of sea-shells are still found incorporated.

18. These causes, as before observed, act with greater force under the equator than in other climates; for there the tides are higher, and the winds more uniform. The mountains of Africa and Peru are the highest in the world; often extending through whole continents, and stretching to great distances under the waters of the ocean. The mountains of Europe and Asia, which extend from Spain to China, are not so high as those of Africa and South America. According to the relations of voyagers, the mountains of the north are but small hills, when compared with the mountains of the equatorial regions. Those prodigious chains of mountains which run from east to west in the old continent, and from north to south in the new, must have been formed by the general motion of the tides. But the origin of the less considerable hills must be ascribed to particular motions occasioned by winds, currents, and other irregular agitations of the sea.

Having thus discussed some very important points respecting the theory of the earth, our author now proceeds to answer other questions which seem still more difficult of solution.

19. But how has it happened that this earth, which we and our ancestors have inhabited for ages, which, from time immemorial, has been an immense continent, dry, compact, and removed from the reach of water, should, if formerly the bottom of an ocean, be now exalted to such a height above the waters, and so completely separated from them. Since the waters remained so long upon the earth, why have they now deserted it? What accident, what cause, could introduce a change so great? A little reflection, says he, will furnish us with at least plausible solutions to these seemingly so difficult questions. We daily observe the sea gaining ground on certain coasts, and losing it on others. We know that the ocean has a general and uniform motion from east to west: that it makes violent efforts against the rocks and low grounds which encircle it; that there are whole provinces which human industry can hardly defend against the fury of the waves; and that there are instances of islands which have but lately emerged from the waters, and of regular inundations. History informs us of inundations and deluges of a more extensive nature. Ought not all this to convince us, that the surface of the earth has experienced very great re-

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volutions, and that the sea may have actually given up possession of the greatest part of the ground which it formerly occupied? For example, let us suppose, that the old and new worlds were formerly but one continent; and that, by a violent earthquake, the ancient Atlantis of Plato was sunk. The consequence of this mighty revolution must necessarily be, that the sea would rush in from all quarters, and form what is now called the *Atlantic ocean*; and vast continents, perhaps those we now inhabit, would of course be left dry. This great revolution might be effected by the sudden failure of some immense cavern in the interior parts of the globe, and an universal deluge would infallibly succeed.

20. But, however conjectures of this kind may stand, it is certain that such a revolution hath happened: and we may even believe that it hath happened naturally; for if a judgment of the future is to be formed from the past, we have only to attend carefully to what passes before our eyes. It is a fact established by the repeated observation of voyagers, that the ocean has a constant motion from east to west. This motion, like the trade-winds, is not only perceived between the tropics, but through the whole temperate climates, and as near the poles as navigators have approached. As a necessary consequence of this motion, the Pacific Ocean must make continual efforts against the coasts of Tartary, China, and India; the Indian-ocean must act against the east coast of Africa; and the Atlantic must in a similar manner act against all the eastern coasts of America. Hence the sea must have gained, and will always continue to gain, on the east, and to lose on the west. This of itself would be sufficient to prove the possibility of the change of the sea into land, and land into sea. If such is the natural effect of the sea's motion from east to west, may it not reasonably be supposed, that Asia, and all the eastern continent, is the most ancient country in the world; and that Europe, and part of Africa, especially the west parts of these continents, as Britain, France, Spain, &c. are countries of a more recent date?

21. The cause of the perpendicular fissures with which the earth abounds, is easily investigated. As various materials constituting the different strata were transported by the waters, and deposited in the form of sediments, they would at first be in a very diluted state, and would gradually harden and part with the superfluous quantity of moisture they contained. In process of time, drying, they would naturally contract and split at irregular distances. These fissures necessarily assumed a perpendicular direction: because in this direction the action of gravity of one particle upon another is equal to nothing; but it acts directly opposite to this description, in a horizontal situation: the diminution in bulk could have no sensible effect but in a vertical line. The contraction of the parts in drying, therefore, and not the contained water forcing an issue, as has been alleged by some, is the cause of perpendicular fissures; for it may be often remarked, that the sides of those fissures, through their whole extent, correspond exactly as the two sides of a split piece of wood.

22. Perpendicular fissures vary greatly as to the extent of their openings. Some are about half an inch or an inch; others a foot or two feet; some extend several fathoms, and give rise to those vast precipices which

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How the
earth was
deserted by
the ocean,
and left
dry.

Earth.

which so frequently occur between opposite parts of the same rocks, in the Alps and other high mountains. It is plain, that the fissures, the openings of which are small, have been occasioned solely by drying. But those which extend several feet are partly owing to another cause; namely, the sinking of the foundation upon one side, while that of the other remains firm. If the base sinks but a line or two, when the height is considerable, an opening of several feet, or even fathoms, will be the consequence. When rocks are founded on clay or sand, they sometimes slip a little to one side; and the fissures are of course augmented by this motion.

23. The large openings, however, and prodigious cuts, which are to be met with in rocks and mountains, are to be ascribed to another cause. They could be produced no other way than by the sinking of immense subterraneous caverns, that were unable any longer to sustain their incumbent load. But these cuts or intervals in mountains are not of the same nature with the perpendicular fissures: they appear to have been ports opened by the hand of nature for the communication of nations. This seems to be the intention of all large openings in chains of mountains, and of those straits by which different parts of the ocean are connected; as the straits of Thermopylæ, of Gibraltar, &c. the gaps or ports in mount Caucasus, the Cordilleras, &c.

24. But the greatest changes upon the surface of the earth are occasioned by rains, rivers, and torrents from the mountains. These derive their origin from vapours raised by the sun from the surface of the ocean, and which are transported by the winds through every climate. The progress of these vapours, which are supported by the air, and transported at the pleasure of the winds, is interrupted by the tops of the mountains, where they accumulate into clouds, and fall down in the form of rain, dew, or snow. At first, these waters descended into the plains without any fixed course; but they gradually hollowed out proper channels for themselves. By the power of gravity they ran to the bottom of the mountains; and penetrating or dissolving the lower grounds, they carried along with them sand and gravel, cut deep furrows in the plains, and thus opened passages to the sea, which always receives as much water by rivers as it loses by evaporation. The windings in the channels of rivers have uniformly corresponding angles on their opposite banks; and as mountains and hills, which may be regarded as the banks of the valleys by which they are separated, have likewise sinuosities with corresponding angles, this circumstance seems to demonstrate, that the valleys have been gradually formed by currents of the ocean, in the same manner as the channels of rivers have been produced. Rivers produce considerable changes on the surface of the earth; they carry off the soil, wear away the most solid rocks, and remove every thing that opposes their passage. The waters of the clouds also, which descend upon the mountains, by continually washing away some part of the earth, tend to level them with the plains; and would undoubtedly do so, if time enough were allowed for that purpose.

25. From what has been advanced, we may conclude, that the flux and reflux of the ocean have produced all the mountains, valleys, and other inequalities on the

surface of the earth: that currents of the sea have scooped out the valleys, elevated the hills, and bestowed on them the corresponding directions: that the same waters of the ocean, by transporting and depositing earth, &c. have given rise to the parallel strata: that the waters from the heavens gradually destroy the effects of the sea, by continually diminishing the heights of the mountain, filling up the valleys, and chocking up the mouths of rivers; and by reducing every thing to its proper level, they will in time restore the earth to the sea, which by its natural operations will again create new continents interperfed with mountains and valleys, and every way similar to those which we now inhabit.

Thus far our author preserves some degree of plausibility in his reasoning; but in his account of the original formation of the earth, he certainly goes to the utmost verge of *probability*, or perhaps of *possibility*, in his suppositions. According to him, all the planets in our system were originally parts of the sun himself. They were detached from his body all at once by a mighty stroke of a comet. The possibility of driving off such a quantity of matter from the sun by a single stroke, he labours hard to prove; but this is far from being the greatest difficulty in his system.—“To this theory, says he, it may be objected, that if the planets had been driven off from the sun by a comet, in place of describing circles round him, they must, according to the law of projectiles, have returned to the same place from whence they had been forced; and therefore, that the projectile force of the planets cannot be attributed to the impulse of a comet.

“I reply, that the planets issued not from the sun in the form of globes, but in the form of torrents; the motion of whole anterior particles behaved to be accelerated by those behind, and the attraction of the anterior particles would also accelerate the motion of the posterior; and that this acceleration, produced by one or both of these causes, might be such as would necessarily change the original motion arising from the impulse of the comet; and that, from this cause, might result a motion similar to what takes place in the planets; especially when it is considered, that the shock of the comets removes the sun out of its former situation. This reasoning may be illustrated by an example. Suppose a musket-ball discharged from the top of a mountain, and that the force of the powder was sufficient to send it beyond a semidiameter of the earth: it is certain that this ball would revolve round the earth, and return at every revolution to the place from whence it had been discharged. But, instead of a musket-ball, if a rocket were employed, the continued action of the fire would greatly accelerate the original impulsive motion. This rocket would by no means return to the same point like the ball; but, *celeriter paribus*, would describe an orbit, the perigee of which would be more or less distant from the earth in proportion to the greatness of the change produced in its direction by the accelerating force of the fire. In the same manner, if the original projectile force impressed by the comet on the torrent of solar matter was accelerated, it is probable, that the planets formed by this torrent acquired their circular or elliptical movements around the sun.”

In like manner, he accounts for the formation and

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Buffon's account of the formation of the planets.

Earth.

Earth.

circulation of the secondary planets. The revolutions of the primaries on their axes, he accounts for from the obliquity of the original stroke impressed by the comet. The oblate spheroidal figure of the earth is easily deduced from its diurnal motion, and the fluidity of the whole at its first formation. The flattening at the poles he estimates at about one 230th part of the whole. As this computation differs considerably from the account given by the mathematicians who were sent to different parts of the world on purpose to determine the figure of the earth, and who made the flatness at the poles equal to one 175th part of the whole, he supposes this difference to have arisen from changes that have since taken place on the surface of the earth, occasioned by the causes already mentioned. He then proceeds to account for the formation of all things, in the following manner.—“ It is therefore evident, that the earth assumed its figure when in a melted state: and, to pursue our theory, it is natural to think, that the earth, when it issued from the sun, had no other form but that of a torrent of melted and inflamed matter: that this torrent, by the mutual attraction of its parts, took on a globular figure, which its diurnal motion changed into a spheroid: that when the earth cooled, the vapours, which are expanded like the tail of a comet, gradually condensed, fell down in the form of water upon the surface, depositing at the same time a slimy substance mixed with sulphur and salts; part of which was carried by the motion of the waters into the perpendicular fissures of the strata, and produced metals; and the rest remained on the surface, and gave rise to the vegetable mould, which abounds in different places, with more or less of animal or vegetable particles, the organization of which is not obvious to the senses.

“ Thus the interior parts of the globe were originally composed of vitrified matter; and, I believe, they are so at present. Above this vitrified matter were placed those bodies which the fire had reduced to the smallest particles, as sands, which are only portions of glass; and above these, pumice-stones, and the scorias of melted matter, which produced the different clays. The whole was covered with water to the depth of 500 or 600 feet, which originated from the condensation of the vapours when the earth began to cool. This water deposited a stratum of mud, mixed with all those matters which are capable of being sublimed or exhaled by fire: and the air was formed of the most subtle vapours, which, from their levity, rose above the water.

“ Such was the condition of the earth when the tides, the winds, and the heat of the sun, began to introduce changes on its surface. The diurnal motion of the earth, and that of the tides, elevated the waters in the equatorial regions, and necessarily transported thither great quantities of slime, clay, and sand; and by thus elevating those parts of the earth, they perhaps sunk those under the poles about two leagues, or a 230th part of the whole, as was formerly remarked: for the waters would easily reduce into powder pumice-stones, and other spongy parts of the vitrified matter upon the surface; and by this means excavate some places and elevate others, which, in time, would produce islands and continents, and all those inequalities on the surface, which are more considerable towards

the equator than towards the poles. The highest mountains lie between the tropics and the middle of the temperate zones, and the lowest from the polar circles towards the poles. Indeed, both the land and sea have most inequalities between the tropics, as is evident from the incredible number of islands peculiar to those regions.”

From the preceding extracts, the theories of Drs Burnet and Woodward, as well as Mellis Whifton and Buffon, will be easily understood; but the deficiency of all of them must be exceedingly obvious even to the most superficial reader. They all assume only the powers of attraction and repulsion as agents; without considering, that these two powers, or indeed any other two with which we are acquainted, could only have composed matters nearly similar to each other. If the original particles of matter are homogeneous, and endowed with similar powers, all the matter we see ought to be homogeneous also. But this is far from being the case. Some parts of it we see are exceedingly hard, others proportionably soft. The parts of some bodies attract each other violently; those of others have hardly any attraction for each other, but are separable by the smallest force. And though it should be granted, that the powers of attraction and repulsion were originally different in different parts of matter, we have still to explain by what means the similar parts of matter found out each other in such a chaos as the earth originally was. This seems an insuperable difficulty in the systems of Drs Burnet and Woodward; and is equally, though less conspicuously so, in those of Whifton and Buffon.

Mr Whifton's system has another and very remarkable defect. He supposes the earth to have been originally a comet, and at a certain time to have become a planet: but he forgets to tell us by what means this comet was originally formed, or what kind of bodies the comets are. Yet certainly this theory of the comet was as necessary to his system, as the theory of the earth itself: for all the substances now existing on the earth must originally have existed in the comet; and if the natural powers were known which made a distinction between one substance and another in the comet, we would also know those which distinguished terrestrial substances from one another. But though even this great deficiency should be overlooked, the supposition of a chaos or original confusion of any kind involves us in the greatest difficulties. If the whole surface of the earth consisted of a chaos of melted matter, we cannot reasonably think it would have appeared otherwise when cool than the lavas of burning mountains do just now; and this is a consequence of his system which Mr Whifton seems to have entirely overlooked.

Mr Buffon's theory is liable to the same difficulties with the rest. He places his chaos in the sun, and therefore ought to have given a theory of the sun before he gave one of the earth. It ought also to have been shewn for what purpose the sun was created when he had nothing to shine upon, or what probability there is that comets existed when there were no planets. His account of the formation of the planets by the stroke of a comet, is just within the verge of possibility; but his account of the formation of mountains by the motion of the winds and tides, is certainly inconsistent with the common principles of mechanics. Though it should

18
All theories insufficient.

19
Powers of attraction and repulsion insufficient.

20
Deficiency of Mr Whifton's theory.

21
Of Mr Buffon's.

Earth.

be granted, that water can dissolve every terrestrial substance when vitrified by a heat 10,000 times greater than our hottest furnaces, ²² the sun must necessarily be; and though the water should let fall this matter as a sediment in what quantities and forms we think proper to imagine, it is impossible any of it could be thrown two or three miles above the surface of the water, in order to form those high mountains which are to be met with in different parts of the world. It is indeed very plain, that though by the motion of the waters their sediment might be collected in great heaps, it could never reach higher than their surface. The mountain, once formed, must then be for ever covered with water; for the sediment would take up precisely the same bulk when a mountain that it did when in a state of dissolution, and the water could never retire from it as he supposes. If the waters retired into vast subterraneous caverns, according to another of Mr Buffon's suppositions, they must have remained for ever in these caverns, from whence they could not have returned to effect those wonderful changes he ascribes to them. But what in the strongest manner shews the fallacy of Mr Buffon's hypothesis, is the analogy he draws between mountains on dry land, and islands in the sea. The islands, he says, are only the tops of great mountains in the ocean. If therefore the ocean had for a series of many ages covered the present habitable part of the world, as our author supposes, we should undoubtedly find many mountains upon the dry land, the tops of which had formerly been islands. But no such thing is to be found. There is not on earth a mountain with a top broad and flat like the island of Great Britain or Ireland, or even like islands of much less consideration.

These, and many other objections that will naturally occur to an attentive reader, shew the extreme difficulties under which the hypothesis of Mr Buffon labours, as well as others. These difficulties arise, in the first place, from their assuming too few natural powers. ²³ Though it is certain that the powers of attraction and repulsion exist in nature, it is no less certain that there are many others. One very remarkable power entirely different from those of attraction and repulsion, may be called the power of *assimilation* or *transmutation*. By this, each animal, and each plant, changes the nutritious particles thrown into its stomach, or which it meets with in the earth, into a substance of its own peculiar kind. Thus, a stalk of wheat, by means of its roots, always assimilates the nutritious particles of the ground into that particular grain we call wheat, and no other. This power naturalists have not been able to explain on the principles of attraction and repulsion, or any others with which we are acquainted; and therefore it may justly be called one of the primary laws of this earth at least, whether we understand the manner in which it operates or not.—Another power which seems to be diffused throughout this terraqueous globe, and common to all substances, water alone excepted, is that of multiplying themselves, or producing others of the same species. With regard to plants and animals, this is exceedingly evident; but may be disputed in the case of minerals. It is certain, however, that mines which have been exhausted, will in time be again replenished with ore; that spars and crystals, if broken or cut while their connection with

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the earth remains, will protrude a substance similar to the rest, as certainly as the wounded body of an animal will protrude flesh of a kind similar to what was taken away. The earth itself is capable of this multiplication. We see how it hath a tendency to ascend, and cover stones, &c. which lie a long time on its surface; and thus does this element, seemingly the most sluggish of all others, swallow up every thing that lies for some time undisturbed upon it. Hence we now meet with many monuments of antiquity below ground, which formerly were undoubtedly above it. Yet we have no right from thence to conclude, that there was at that time any considerable difference between the height of the dry-land above the water and what it is now. This multiplication of earth is chiefly owing to vegetation; which continually produces a new crust on the top, and thus tends to bury all such matters as rest upon the surface. This crust, however, does not produce a continual increase in the height of the dry land; for whatever quantity the vegetables add to the surface, they take from the under parts by the suction of their roots. Thus the ground becomes more porous, and the weight of ancient buildings, bones, &c. gradually forcing them downwards, they are at last buried under ground to a considerable depth.—Hence it is easy to account for the sinking of the marine bodies that are to be found at different depths in the earth, even supposing them to have been left on its surface by the deluge. Mr Buffon's objection, drawn from the great quantities of shells, seems but very weak: for it is certain, that marine animals, both of the crustaceous and other kinds, are found in the sea at this day in amazing quantities; and there is no bed of shells so large, that we can reasonably think it *impossible* for all the animals to have existed in it at once.

With regard to the strata, it seems undeniable that they may be produced from natural causes. Clay will sometimes be consolidated into stone; flint, marble, and limestone, are all found to grow naturally in the earth; so that we cannot draw any conclusion from the order in which we now find them. Though we find a bed of shells, then, in the heart of a solid rock, this makes no difficulty in the theory of the earth; since we know that the rock hath by some natural cause been consolidated around them. In fact, this is not so wonderful, as what is related by Mr Price in his treatise of minerals, mines, &c. *viz.* That at the town of Redruth in Cornwall, "some labourers being put to clear and level the street for a pavement, they found a piece of hard stone in the ground, with abundance of common small pins of brass interperfed in and throughout the stone, in such manner and form, that all those who saw it afterwards, were convinced it was not done artificially, but that the stone was formed and produced by petrification, subsequent to the time the pins were dropped into the ground. Doctor Plot, in his Natural History of Staffordshire, says, that near Newcastle under Lyne, there was found a stone with a man's skull, teeth and all, inclosed in it."—From these and other facts in some measure similar, this author concludes, that "every earth or clay, in some places, may be converted into stone in process of time, at such a depth where it is undisturbed by being never lacerated nor molested, and also where it abounds with an uncommon quantity of juices of a lapidescent quality: but

²² A number of natural powers besides attraction and repulsion proved to exist.

²³ Appearance of shells at great depths accounted for.

²⁴ Changes may naturally happen in the strata of the earth.

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but this property being extenuated or destroyed, the earthy stones may not improbably again return to their primitive clay. Thus we see some sorts of stone, when dug out of the ground and exposed to the air for a considerable time, do moulder again into earth, at least in appearance; while others, of an earth-like quality, are indurated, and become more compact and durable by lying above ground."

25
No sufficient proof of extraordinary changes on the surface of the earth.

With regard to the extraordinary changes which Mr Buffon and others imagine to have taken place on the surface of the earth, they do not appear to have any solid foundation. Changes, no doubt, have happened in particular parts; new islands have been thrown up from the bottom of the sea by the force of subterraneous fire, and others have been swallowed up. But these appear to be merely the effects of volcanoes, which are common in many parts of the world; and we are not warranted to conclude, because we see a small volcanic island arise, and another swallowed up, that this has been the case with the whole habitable world.—An imperfect theory hath indeed been suggested by Sir William Hamilton, Mr Brydson, and others, concerning the use of volcanoes and subterraneous fires; from whence it might seem probable, though they do not indeed say so in direct terms, that all the dry land was originally thrown up from the bottom of the sea by the force of these fires. Sir William Hamilton, in his letter to Doctor Maty, broaches this theory in the following words. "I am myself convinced, that the whole circuit, so far as I have examined, within the boundaries marked in the map, (extending at least 50 Italian miles in length, and 30 in breadth where broadest,) is wholly and totally the production of subterraneous fires; and that most probably the sea formerly reached the mountains that lie behind Capua and Caserta, and are a continuation of the Apennines. If I may be allowed to compare small things with great, I imagine the subterraneous fires to have worked in this country under the bottom of the sea, as moles in a field, throwing up here and there a hillock; and that the matter thrown out of some of these hillocks formed into settled volcanoes, filling up the space between the one and the other, has composed this part of the continent, and many of the islands adjoining.

"From the observations I have made upon Mount Ætna, Vesuvius, and the neighbourhood, I dare say, that, after a careful examination, most mountains that are, or have been, volcanoes, would be found to owe their existence to subterraneous fire; the direct reverse of what I find the commonly received opinion.—Nature, though varied, is certainly in general uniform in her operations; and I cannot conceive, that two such considerable volcanoes as Ætna and Vesuvius, should have been formed otherwise than every other considerable volcano of the known world. I do not wonder that so little progress hath been made in the improvement of natural history, and particularly in that branch of it which regards the theory of the earth: nature acts slowly; it is difficult to catch her in the fact."

"From repeated observations I have made in the neighbourhood of Vesuvius, I am sure that no virgin soil is to be found there; and that all is composed of different strata of erupted matter, even to a great depth below the level of the sea. In short, I have not any doubt in my own mind but that this volcano took its

rise from the bottom of the sea; and as the whole plain between Vesuvius and the mountains behind Caserta, which is the best part of Campagna Felice, is (under its good soil) composed of burnt matter, I imagine the sea to have washed the feet of those mountains, until the subterraneous fires began to operate, at a period certainly of a most remote antiquity.

"The soil of the Campagna Felice is very fertile; I saw the earth opened in many places. The stratum of good soil was in general four or five feet thick; under which was a deep stratum of cinders, pumice, fragments of lava, and such burnt matter as abounds near Mount Vesuvius and all volcanoes. The mountains at the back of Caserta are mostly of a sort of limestone, and very different from those formed by fire; though Signior Van Vitelli, the celebrated architect, has assured me, that in the cutting of the famous aqueduct of Caserta through these mountains, he met with some soils that had evidently been formed by subterraneous fires. The high grounds which extend from Castell-a-Mare to the point of Minerva towards the island of Caprea, and from the promontory that divides the bay of Naples from that of Salerno, are of limestone. The plain of Sorrento, that is bounded by these high grounds, beginning at the village of Vico, and ending at that of Massa, is wholly composed of the same sort of tufa as that about Naples; except that the cinders or pumice-stones intermixed in it, are larger than in the Naples tufa. I conceive, then, that there has been an explosion in this spot from the bottom of the sea. This plain, as I have remarked to be the case with all soils produced by subterraneous fire, is extremely fertile; whilst the ground about it, being of another nature, is not so. The island of Caprea does not shew any signs of having been formed by subterraneous fire; but is of the same nature as the high grounds last mentioned, from whence it has been probably detached by earthquakes, or the violence of the waves. Roviigliano, an island, or rather a rock, in the bay of Castell-a-Mare, is likewise of limestone, and seems to have belonged to the original mountains in its neighbourhood: in some of these mountains also, there are petrified fish and fossil shells, which I never have found in the mountains which I suppose to have been formed by explosion. Bracini, however, in his account of the eruption of 1613, says, that he found many sorts of sea-shells on Vesuvius after that eruption; and P. Ignatio, in his account of the same eruption, says, that he and his companions picked up many shells likewise at that time upon the mountain: this circumstance would induce one to believe, that the water thrown out of Vesuvius during that formidable eruption, came from the sea."

This may serve to shew upon what grounds the volcanic theory stands; but though we should admit it in its utmost extent, the theory of the earth can receive but very little assistance from it. Mr Hamilton himself does not say that *all* the mountains have been volcanoes, or that *all* the soil throughout the different quarters of the world hath been thrown up from the bottom of the sea. If, therefore, there remains but one mountain in the whole world which never was a volcano, we shall be as much difficulties to account for the production of that one, as though there were ever so many; and at any rate our theory will be absolutely useless, because what will account for the origin of that

27
Insufficiency of the volcanic theory.

mountain

Earth.

mountain, will also account for the origin of others. If we go a step beyond Mr Hamilton, and say, that there are no mountains whatever that have not been originally volcanoes, but that all the dry land is the production of subterraneous fire, our difficulties are so far from being removed, that they are greatly increased. The lavas and volcanic ashes, though in time they become covered with an exceedingly fertile soil, remain absolutely barren for a great number of years, inasmuch that, by the adopters of the volcanic hypothesis, the period at which Moses fixes the creation is reckoned by far too late to have given time for covering the many lavas of Italy and Sicily with the depth of earth they just now have upon them. The whole world therefore must have remained for many ages in a state of absolute sterility; and by what means vegetation first began, or in what corner of the world, remains to be inquired into.

19
Centrifugal
force not
the cause of
the earth's
spheroidal
figure.

Without entering further into the theories either of Mr Hamilton, or any other person, it is easy to see, that all of them are insufficient to solve the difficulties mentioned n° 11. It is common to account for the spheroidal figure of the earth, from the greater centrifugal force of the equatorial parts than of the polar ones; but this explication can by no means be deemed sufficient. The globe we inhabit is composed of two very different kinds of matter, earth and water. The former has a very considerable power of cohesion, besides the gravitating power; the latter has very little cohesion, and its parts may be separated from each other by whatever will overcome its weight. It follows, therefore, that the solid parts of the earth, resisting, by their cohesion, the centrifugal force more than the water, ought not to dilate so much. The waters of the ocean therefore ought, about the equator, to swell up and overflow the land; and this they ought to do at this present moment as much as at the first creation. That this ought to be the case, is evident from the phenomena of the tides. It is not to be doubted but that the attraction of the moon affects the solid earth as well as the sea; but because of the greater cohesion of the former, it cannot yield as the ocean does, and therefore the waters are raised to some height above it. The height to which the waters would have covered the equatorial parts by the centrifugal force, must have been equal to the depression at the poles; which, according to Mr Buffon, is about 17 miles, according to other mathematicians 25 or 26 miles.

The other difficulties are so totally inexplicable, that Buffon, who seems to exert himself as much as possible in order to remove them, is obliged at last to own, that the earth is in a perishing state; that the hills will be levelled, and the ocean at last cover the whole face of the earth; a prophecy which wears no very favourable aspect to the inhabitants of this globe. — For these imaginations, however, there does not seem to be the smallest foundation in nature. The mountains have continued what they were, from the earliest accounts of time, without any signs of decay. Mount *Ætna*, besides the waste common to it with other mountains, hath been exhausting itself by throwing out incredible quantities of its own substance; yet it still seems to be what it was called by Pindar 2200 years ago, the *pillar of heaven*. It seems extremely probable therefore, that there are powers in the system of nature

29
Natural
powers for
preserving
the moun-
tains.

which tend to preserve, and are capable of counteracting those which tend to destroy, the mountains; and perhaps the late discovery concerning the attraction of mountains may some time or other throw some light on the nature of these powers. See *MOUNTAIN*.

Earth.

The like may be said of the isthmuses or narrow necks of land which in some parts of the world join different countries together; such as the isthmus of Darien, of Suez, the Morea, &c. Though the ocean seems to beat on these with great violence, they are never diminished in bulk, or washed away, as, according to Buffon's theory, they ought to be. It is plain, therefore, that there is in nature some power by which these narrow necks of land are preserved from the fury of the ocean; for history does not afford one instance of any neck of land of this kind being broken down by the sea. — The difficulties with regard to the strata and shells seem insolvable by any other means than supposing that there are in the terrestrial matter several distinct powers, by which the strata of any particular kind are occasionally transformed into others; and that the shells and other marine bodies were originally deposited on the surface by the deluge. The volcanic hypothesis, by which some attempt to account for the appearance of these bodies, will in no shape answer the purpose. By the explosions of a volcano, shells, mud, sand, &c. might be indiscriminately thrown up, and scattered irregularly about; but we could never find the large beds of shells which are frequently to be met with of a considerable extent, in different parts of the earth.

With regard to any degree of certainty, it is scarcely to be hoped for on this subject. The common notion of the earth's being originally a chaos, seems neither to have a foundation in reason, nor in the Mosaic account of the creation. It is surely inconsistent with the wisdom ascribed to the Deity, to think that he would create this visible system in confusion, and then employ it to put itself in order. It seems more probable, that the earth was originally created with the inequalities of surface we see it have, and that the natural powers for preserving it were afterwards superadded. Thus, according to Moses, the first natural agent created, or produced, by directing matter to move in a certain manner, was *light*. This, we know, was absolutely necessary for the evaporation of the water which took place on the second day. Moses tells us, that the earth was originally covered with water: and we see a natural reason why it should be so; namely, that the evaporation by the atmosphere might more easily take place. When this was done, there being then no more occasion for the waters in that diffused state, they were commanded to retire into the place appointed for them, and thus formed the ocean. Whether this was done by the action of gravity then first taking place, or by any other means, we have it not in our power to know, nor will our speculations on this subject probably be attended with much benefit. We see, however, that the Mosaic account of the creation is perfectly consistent with itself, and free from those difficulties with which other systems are clogged. It is impossible to shew, how, by any natural power, a confused mass of matter, such as the chaos of the ancient poets, of Drs Burnet and Woodward, the hollow globe of Mr Hutchinson, the comet of Mr Whiston, or the vitrified.

30
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31
Notion of
chaos
ought not
to be adopt-
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Earth. vitrified matter of Mr Buffon, could put itself in the order in which we see it. The sacred historian simply tells us, that God created the heavens and the earth; that the heavens gave no light, and the earth was covered with water. He first commanded the light to shine, then the air to take up what quantity of water he thought proper for the purposes of vegetation. After this, the dry land was made to appear; and the different powers of vegetation already taken notice of, were given to it. Next the sun and moon were created as subordinate agents, to do what we are told the deity had done before by his own immediate action, namely, to *divide the light from the darkness*, &c. Then followed the formation of animals and of man.

32
Mosaic account of the creation perfectly consistent.

According to this account, it would appear, that what we call the *laws of nature*, were given to preserve the earth in that shape which the Deity thought proper to give it originally by his own power; and by no means to form it in any particular way, much less to put it out of the form which he had already given it: and thus the world, according to the best accounts we have, is very little altered in its appearance; and, according to what we can judge, will continue unaltered for ever, unless the Creator thinks proper to interpolate in such a manner as to supersede all the laws he hath given it, and change it into some other form.

33
Objections to the Mosaic chronology.

From some observations of Mr Hamilton and others, objections have been drawn, as hath been already mentioned, to the Mosaic chronology. These objections are in substance as follows. In pits, and other natural and artificial openings of the ground, in the neighbourhood of Vesuvius and Ætna, several beds of lava have been discovered at considerable depths below each other. These beds of lava in some places are covered with successive strata of vegetable mould. From this disposition of materials, Sir William concludes that the world must have been created at a much more remote period than is generally believed. The different strata of lava found below ground, he observes, must have proceeded from an equal number of eruptions from the mountain; and, such of them as are covered with vegetable soil must have remained at least 1000 years on the surface before they could acquire a soil sufficient for the purposes of vegetation. Ten or twelve successive strata overlaid with soil, have already been discovered in the bowels of the earth; and it has been strongly asserted, that, by digging deeper, many more might have been found. Now, allowing 1000 years for each stratum of lava, which the supporters of this theory affirm to be too little, the antiquity of the earth cannot be less than 12,000 years, which is more than double its age according to the Mosaic account.

The principal fact in this theory is, that 1000 years are necessary to the production of a soil sufficient for the nourishment and growth of vegetables upon volcanic lavas. This notion is confirmed by a conjecture of the Canonico Recupero, that streams of lava in Sicily have lain for centuries without acquiring a vegetable mould; and by some obscure accounts, that these lavas have proceeded from eruptions of Ætna above 1000 years ago. The following considerations, however, will render this theory at least extremely dubious.

34
Answered.

Sir William informs us, that some lavas are very solid, and resist the operation of time much longer than another kind, which, he says, "is farinaceous, the par-

ticles separating as they force their way out, just like meal coming from under the grindstones. A stream of lava of this sort, (he justly observes) being less compact, and containing more earthy particles, would certainly be much sooner fit for vegetation than one composed of the more perfect vitrified matter." He has not, however, ventured to determine whether these lavas found below ground were of the former or latter quality; a circumstance which materially affects the justness of his calculation.

That soil gradually increases by decayed vegetables, and the sediment deposited by snow and rain, is an undeniable fact. The thickness or thinness of soil indicates a greater or less time of accumulation. But Sir William has not informed us of the dimensions of his subterraneous vegetable strata; a circumstance of great moment in instituting a calculation of their different eras.

Besides, eruptions of volcanoes are often accompanied with incredible quantities of ashes, which fall thick upon all the ground for many miles round, intended by nature, it would appear, quickly to repair the barrenness occasioned by the lava. The muddy water sometimes thrown out may co-operate powerfully with the ashes in producing the same happy effect.

But Sir William has furnished us with facts of a more important nature. The town of Herculaneum was destroyed by an eruption in the 97th year of the Christian æra. There are evident marks, says he, that the matter of six eruptions has taken its course over Herculaneum; for each of the six strata of lava is covered with a vein of good soil. Here we have Sir William's own authority for six strata of *good soil*, accumulated in less than 1700 years; which, supposing them to be all of equal thickness, instead of 1000 years, leaves not 300 to the production of each.

From the same authority we learn, that the crater on the top of the Monte Nuovo, or New Mountain, which was thrown up by subterraneous fire no farther back than the year 1538, is now covered with shrubs.

There is not on record any eruption from the great crater of Vesuvius from the year 1139 to 1631, a period of only 492 years. But, Bracini, who descended into it not long before the 1631, tells us, "that the crater was five miles in circumference, and about 1000 paces deep. Its sides were covered with brushwood, and at the bottom there was a plain on which cattle grazed. In the woody parts, boars frequently harboured," &c.

The correspondence of these facts, related by Sir William himself, with his favourite notion that 1000 years are necessary for the production of a vegetable soil, we leave the reader to determine; and shall conclude with a few remarks of a different kind.

The appearance of a stratum of lava below ground, though not covered with vegetable soil, our author considers as demonstrative evidence, that such stratum formerly lay above the surface, and was thrown out by an eruption. This inference, however, seems not altogether just. Nothing, with propriety, receives the denomination of an eruption, unless when lava or other matter is vomited from the crater, or from some new opening made in the mountain. But it deserves notice, that, in the environs of volcanoes, earthquakes are frequent.

Earth.

quent. That these violent concussions are the genuine produce of subterranean fire expanding itself in every direction, and making strong efforts against every substance which resists the natural tendency of its course, is a fact that cannot admit of doubt. It is no less certain, that these frequent concussions shake and dislocate the internal parts of the earth. They cannot fail to shatter and disarrange the natural direction of the original strata; and, of course, they must give rise to many subterraneous cavities and fissures. The nearer the great furnace, which confines the fury of the flames, the greater and more frequent will be the cavities. Every earthquake occasioned by a volcano is nothing else than an effort of the burning matter to enlarge the boundaries by which it is usually limited. If the quantity of matter and degree of inflammation require a space greatly superior to the internal cavities, an eruption above the surface is an infallible consequence. But, when the quantity of matter, or the expansive force occasioned by the degree of inflammation, is insufficient to raise the lava to the top of the mountain, an earthquake may be produced; and the lava, without ever appearing above the surface, may run below ground in plentiful streams, and fill up all the subterraneous cavities and channels. These internal strata of lava may often lie so deep as to be below the level of the sea. In this manner, we conceive it to be not only possible, but extremely probable, that beds of lava, having no covering of vegetable soil, may be found at great depths, although they never were above the surface.

It is much more reasonable to conclude, that lavas with a layer of soil were produced by eruptions, and once lay above the surface, till covered by the operation of time, or subsequent streams from the mouth of the volcano. But, even in this case, the argument is not altogether complete; for, as above remarked, earthquakes, with which countries adjacent to volcanoes are perpetually infested, often sink large tracts of land to great depths.

The other parts of the theory of the earth regard the situation of the different parts of its surface with respect to each other; its annual motion round the sun as a planet; its diurnal motion round its axis; and the different strata whereof it is composed, as far as it hath been hitherto found practicable to penetrate into it: for all which, see the articles GEOGRAPHY, ASTRONOMY, MINES, STRATA, &c.

Smell and Bath of the EARTH. See AGRICULTURE, n° 11.

Bread made of EARTH. See BREAD.

EARTH-FLAX. See AMIANTHUS.

EARTH-Nuts, or Ground-Nuts, the roots of the *ARACHIS hypogæa* of LINNÆUS. They are composed of several small round bulbs or knobs; whence they were termed by *Dodonæus, terre glandes*, or *earth-nuts*. They are esteemed an excellent food by the Siberians. In Holland likewise, they are sold in the markets and used for food. The native country of this plant seems to be Africa; though, at present, all the American settlements abound with it; but many persons who have resided in that country affirm that they were originally brought by the slaves from Africa. The plant multiplies very fast in a warm country; but being very impatient of cold, it cannot be propagated in the open air in Britain. The seeds must therefore be planted in

a hot-bed in the spring of the year; and when the weather proves warm, they may be exposed to the open air by degrees. The branches of the plant trail upon the ground; and the flowers, which are yellow, are produced single upon long footstalks; and as soon as the flower begins to decay, the germ is thrust under ground, where the pod is formed and ripened; so that unless the ground is opened, they never appear: the roots are annual, but the nuts or seeds sufficiently stock the ground in a warm country where they are not carefully taken up.

EARTH-Nuts, or Pig-nuts. See BUNIVM.

EARTH-Pucerons, in natural history, a name given by authors to a species of puceron very singular in its place of abode. In the month of March, if the turf be raised in several places in any dry pasture, there will be found, under some parts of it, clusters of ants; and, on a farther search, it will be usually found, that these animals are gathered about some pucerons of a peculiar species. These are large, and of a greyish colour, and are usually found in the midst of the clusters of ants.

The common abode of the several other species of pucerons is on the young branches or leaves of trees; as their only food is the sap or juice of vegetables, probably these *earth* kinds draw out those juices from the roots of the grasses, and other plants, in the same manner that the others do from the other parts. The ants that conduct us to these, are also our guides where to find the greater part of the others: the reason of which is, that as these creatures feed on the saccharine juices of plants, they are evacuated from their bodies in a liquid form, very little altered from their original state; and the ants, who love such food, find it ready prepared for them, in the excrements which these little animals are continually voiding *. It has been supposed by some, that these were the common pucerons of other kinds, which had crept into the earth to preserve themselves from the rigour of the winter. But this does not appear to be the case; for they are usually met with in places very distant from trees or plants, on which they should be supposed before to have fed; and it is very certain, that though many of these insects are killed by the cold, yet many escape, and are found very early in the spring, sucking the buds of the peach-tree. There is no doubt of these creatures being in a feeding condition when underground; because otherwise the ants would have no temptation to follow them: and it is equally certain, that the several species of the pucerons, like those of the caterpillar kinds, have each their peculiar herbs on which they feed, as many of them will die of hunger rather than feed on any others; and it is not at all likely, that these *earth* pucerons had been used to feed on leaves of trees and plants, and had left that food for the roots of grass.

EARTH-Worms. See LUMBRICUS.

EARTHQUAKE, in natural history, a sudden and violent concussion of the earth, generally attended with strange noises under-ground or in the air; often destroying whole cities at once, throwing down rocks, altering the course of rivers, and producing the most terrible devastations.

Though there is hardly any country known in which shocks of an earthquake have not at some time or other been felt, yet there are some much more subject to them

* See *Aphis*, and *Honey-dew*.

Earth-

quake.

What countries are most subject to earthquakes.

them than others. It hath been observed, that northern countries in general are less subject to earthquakes than those situated near the equator, or in the southern latitudes; but this does not hold universally. The islands of Japan, which are situated pretty far north, are nevertheless exceedingly liable to these destructive phenomena. Islands, in general, are also more subject to earthquakes than continents; but neither does this hold without exceptions. Some particular parts of continents, and some particular islands, are more subject to them than others lying in the neighbourhood, and differing very little from them in external appearance. Thus, Portugal is more subject to earthquakes than Spain, and the latter much more than France; Mexico and Peru more than the other countries of America, and Jamaica more than the other Caribbee Islands. Earthquakes are frequent, tho' not often violent, in Italy; but in Sicily they are often terribly destructive. Asia Minor hath been remarkably subject to them from the remotest antiquity, and the city of Antioch in particular hath suffered more from earthquakes than any other in that country. The same phenomena are said also to occur very frequently in the north-eastern extremities of Asia, even in very high latitudes.

History of the phenomena incomplete.

Though there are no phenomena in nature more calculated to impress the human mind with terror, and consequently to be well remembered and taken notice of, than earthquakes, yet the philosophy of them is but lately arrived at any degree of perfection; and even at this day, the history of earthquakes is very incomplete. The destruction occasioned by them engrosses the mind too much to admit of philosophical speculations at the time they happen: the same thing prevents the attentive consideration of the alterations that take place in the atmosphere after the earthquake is over, and which might probably throw some light on the causes which produced it; and the suddenness of its coming on prevents an exact attention to those slight appearances in the earth or air, which, if carefully observed, might serve as warnings to avoid the destruction.—From what observations have been made, however, the following phenomena may be deduced, and reckoned pretty certain.

Account of the phenomena as far as yet ascertained.

1. Where there are any volcanoes or burning mountains, earthquakes may reasonably be expected more frequently than in other countries.

2. If the volcano hath been for a long time quiet, a violent earthquake is to be feared, & *vice versa*. But to this there are many exceptions.

3. Earthquakes are generally preceded by long droughts; but they do not always come on as soon as the drought ceases.

4. They are also preceded by electrical appearances in the air; such as the aurora borealis, falling stars, &c.: but this does not hold universally.

5. A short time before the shock, the sea swells up and makes a great noise; fountains are troubled, and send forth muddy water; and the beasts seem frightened, as if sensible of an approaching calamity.

6. The air at the time of the shock is generally calm and serene; but afterwards commonly becomes obscure and cloudy.

7. The shock comes on with a rumbling noise, sometimes like that of carriages; sometimes a rushing noise

like wind, and sometimes explosions like the firing of cannon are heard. Sometimes the ground heaves perpendicularly upwards, and sometimes rolls from side to side. Sometimes the shock begins with a perpendicular heave, after which the other kind of motion commences. A single shock is but of very short duration, the longest scarcely lasting a minute; but they frequently succeed each other at short intervals for a considerable length of time.

8. During the shock, chasms are made in the earth; from which sometimes flames, but oftener great quantities of water, are discharged. Flame and smoke are also emitted from places of the earth where no chasms can be perceived. Sometimes these chasms are but small; but, in violent earthquakes, they are not unfrequently so large, that whole cities sink down into them at once.

9. The water of the ocean is affected even more than the dry-land. The sea swells to a prodigious height; much more than we could suppose it raised by the mere elevation of its bottom by the shock. Sometimes it is divided to a considerable depth; and great quantities of air, flame, and smoke, are discharged from it. The like irregular agitations happen to the waters of ponds, lakes, and even rivers.

10. The shock is felt at sea as well as on land. Ships are affected by a sudden stroke, as if they run aground or struck upon a rock.

11. The effects of earthquakes are not confined to one particular district or country, but often extend to very distant regions; though no earthquake hath yet been known extensive enough to affect the whole world at one time. In those places also where the shock is not felt on dry land, the irregular agitation of the waters abovementioned is perceived very remarkably.

All these positions are verified by the accounts of those earthquakes which have been particularly described by witnesses of the best character. In 1692, an earthquake happened in Jamaica, attended with almost all the terrible circumstances above mentioned. In two minutes, it destroyed the town of Port Royal, at that time the capital of the island; and sunk the houses in a gulph 40 fathoms deep. It was attended with an hollow rumbling noise like that of thunder: the streets rose like the waves of the sea; first lifting up the houses, and then immediately throwing them down into deep pits. All the wells discharged their waters with the most violent agitation. The sea burst over its bounds, and deluged all that stood in its way. The fissures of the earth were in some places so great, that one of the streets appeared twice as broad as formerly. In many places it opened and closed again; and continued this agitation for some time. Of these openings, great numbers might be seen at once. In some of them, the people were swallowed up at once; in others, the earth caught them by the middle, and crushed them to death; while others, more fortunate, were swallowed up in one chasm, and thrown out alive by another. Other chasms were large enough to swallow up whole streets; and others, still more formidable, spouted up immense quantities of water, drowning such as the earthquake had spared. The whole was attended with stench and offensive smells, the noise of falling mountains at a distance, &c.; and the sky, in a minute's time, was turned dull and reddish, like a glowing oven. Yet, as great a sufferer as Port-Royal was, more houses were left

Earth-quake.

Account of the earthquake in Jamaica in 1692.

Earth-
quake.

left standing therein, than on the whole island beside. Scarce a planting-house, or sugar-house, was left standing in all Jamaica. A great part of them were swallowed up, houses, people, trees, and all, in one gap: in lieu of which, afterwards appeared great pools of water; which, when dried up, left nothing but sand, without any mark that ever tree or plant had grown thereon. The shock was so violent, that it threw people down on their knees or their faces as they were running about for shelter. Several houses were flung some yards out of their places, and yet continued standing. One Hopkins had his plantation removed half a mile from the place where it stood, without any considerable alteration. All the wells in the island, as well as those of Port-Royal, from one fathom to six or seven deep, threw their water out at the top with great violence. Above 12 miles from the sea, the earth gaped and spouted out, with a prodigious force, vast quantities of water into the air: yet the greatest violences were among the mountains and rocks; and it is a general opinion, that the nearer the mountains, the greater the shock; and that the cause thereof lay among them. Most of the rivers were stopped up for 24 hours, by the falling of the mountains; till, swelling up, they made themselves new tracks and channels; tearing up, in their passage, trees, &c. After the great shock, those people who escaped got on board ships in the harbour, where many continued above two months; the shocks all that time being so violent, and coming so thick, sometimes two or three in an hour, accompanied with frightful noises like a rushing wind, or a hollow rumbling thunder, with brimstone-blasts, that they durst not come ashore. The consequence of the earthquake was a general sickness, from the noisome vapours belched forth, which swept away above 3000 persons.

5
Of the
earthquake
in Calabria
in 1638.

A still more terrible account, if possible, is that given by Kircher, of the earthquake which happened in Calabria in the year 1638. This instance is an exception to the second general position above laid down. In Italy, there had been an eruption of Mount Vesuvius, five years before; and in Sicily there had been an eruption of Ætna, only two years before this earthquake. The event, however, plainly shewed, that the cause of the earthquake, whatever it was, had a connection not only with Mount Ætna, which lies in the neighbourhood, but also with the volcano of Stromboli, which is 60 miles distant. "On the 24th of March, (says Kircher,) we lunched (in a small boat) from the harbour of Messina in Sicily, and arrived the same day at the promontory of Pelorus. Our destination was for the city of Euphemia in Calabria; but on account of the weather, we were obliged to continue three days at Pelorus. At length, wearied with the delay, we resolved to prosecute our voyage; and, although the sea seemed more than usually agitated, yet we ventured forward. The gulf of Charybdis, which we approached, seemed whirled round in such a manner as to form a vast hollow, verging to a point in the centre. Proceeding onward, and turning my eyes to mount Ætna, I saw it cast forth large volumes of smoke, of mountainous sizes, which entirely covered the island, and blotted out even the shores from my view. This, together with the dreadful noise, and the sulphureous stench, which was strongly perceived, filled me with

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quake.

apprehensions that some more dreadful calamity was impending. The sea itself seemed to wear a very unusual appearance; those who have seen a lake in a violent shower of rain all covered over with bubbles, will have some idea of its agitations. My surprise was still increased by the calmness and serenity of the weather; not a breeze, not a cloud, which might be supposed to put all nature thus into motion. I therefore warned my companions, that an earthquake was approaching; and, after some time, making for the shore with all possible diligence, we landed at Tropæa. But we had scarce arrived at the Jesuits college in that city, when our ears were stunned with an horrid sound, resembling that of an infinite number of chariots driven fiercely forward, the wheels rattling, and the thongs cracking. Soon after this, a most dreadful earthquake ensued; so that the whole track upon which we stood seemed to vibrate, as if we were in the scale of a balance that continued wavering. This motion, however, soon grew more violent; and being no longer able to keep my legs, I was thrown prostrate upon the ground. After some time, however, finding that I remained unhurt amidst the general concussion, I resolved to venture for safety; and running as fast as I could, reached the shore. I did not search long here, till I found the boat in which I had landed, and my companions also. Leaving this seat of desolation, we prosecuted our voyage along the coasts; and the next day came to Rouchetta, where we landed, although the earth still continued in violent agitations. But we were scarce arrived at our inn, when we were once more obliged to return to our boat; and in about half an hour, we saw the greatest part of the town, and the inn at which we had set up, dashed to the ground, and burying all its inhabitants beneath its ruins. Proceeding onward in our little vessel, we at length landed at Lopizium, a castle mid-way between Tropæa and Euphemia the city to which we were bound. Here, wherever I turned my eyes, nothing but scenes of ruin and horror appeared; towns and castles levelled to the ground; Stromboli, though at 60 miles distance, belching forth flames in an unusual manner, and with a noise which I could distinctly hear. But my attention was quickly turned from more remote, to contiguous, danger. The rumbling found of an approaching earthquake, which by this time we were grown acquainted with, alarmed us for the consequences. It every moment seemed to grow louder, and to approach more near. The place on which we stood now began to shake most dreadfully; so that, being unable to stand, my companions and I caught hold of whatever shrub grew next us, and supported ourselves in that manner. After some time, the violent paroxysm ceasing, we again stood up, in order to prosecute our voyage to Euphemia, which lay within sight. In the mean time, while we were preparing for this purpose, I turned my eyes towards the city; but could see only a frightful dark cloud, that seemed to rest upon the place. This the more surprised us, as the weather was so very serene. We waited, therefore, till the cloud was passed away: then turning to look for the city, it was totally sunk; and nothing but a dismal and putrid lake was to be seen where it stood."

In 1693 an earthquake happened in Sicily, which may justly be accounted one of the most terrible of

Earth-
quake.6
Of the
earthquake
in Sicily in
1693.

which we have any account. It shook the whole island: and not only that, but Naples and Malta shared in the shock. It was impossible for any body, in this country, to keep on their legs on the dancing earth; nay, those that lay on the ground were tossed from side to side, as on a rolling billow: high walls leaped from their foundations several paces, &c. The mischief it did is amazing: almost all the buildings in the countries were thrown down. Fifty-four cities and towns, beside an incredible number of villages, were either destroyed or greatly damaged. We shall only instance the fate of Catania, one of the most famous, ancient, and flourishing cities in the kingdom; the residence of several monarchs, and an university. This once famous city had the greatest share in the tragedy. Father Anthon. Serrovita, being on his way thither, and at the distance of a few miles, observed a black cloud like night hovering over the city; and there arose from the mouth of Montgibello, great spires of flame, which spread all around. The sea all of a sudden began to roar, and rise in billows; and there was a blow, as if all the artillery in the world had been at once discharged. The birds flew about alighted; the cattle in the fields ran crying, &c. His and his companions horses stopped short, trembling; so that they were forced to alight. They were no sooner off, but they were lifted from the ground above two palms; when, casting his eyes towards Catania, he with amazement saw nothing but a thick cloud of dust in the air. This was the scene of their calamity: for of the magnificent Catania, there was not the least footstep to be seen. S. Bonajutus assure us, that of 18900 inhabitants, 18000 perished therein.

7
Phenomena
of the great
earthquake
Novem. 1.
1755.8
At Lisbon.

The great earthquake, however, which happened on the 1st of November 1755, affords the clearest example of all the phenomena above-mentioned; having been felt violently in many places both on land and at sea, and extended its effects to the waters in many other places where the shocks were not perceived. At Lisbon in Portugal, its effects were most severe. In 1750, there had been a sensible trembling of the earth felt in this city: for four years afterwards, there had been an excessive drought; inasmuch, that some springs, formerly very plentiful of water, were dried, and totally lost: the predominant winds were north and north-east, accompanied with various, though very small, tremors of the earth. The year 1755 proved very wet and rainy, the summer cooler than usual; and for 40 days before the earthquake, the weather was clear, but not remarkably so. The last day of October, the sun was obscured, with a remarkable gloominess in the atmosphere. The first of November, early in the morning, a thick fog arose, which was soon dissipated by the heat of the sun; no wind was stirring, the sea was calm, and the weather as warm as in June or July in this country. At 35 minutes after nine, without the least warning, except a rumbling noise not unlike the artificial thunder in our theatres, a most dreadful earthquake shook, by short but quick vibrations, the foundations of all the city, so that many buildings instantly fell. Then, with a scarce perceptible pause, the nature of the motion was changed, and the houses were tossed from side to side, with a motion like that of a waggon violently driven over rough stones. This second shock laid almost the whole city in ruins, with prodigious slaughter

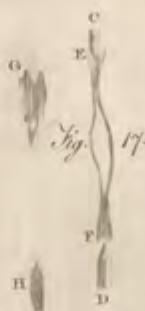
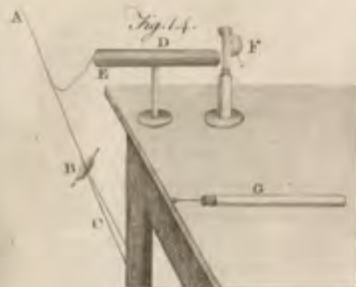
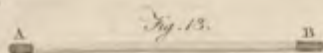
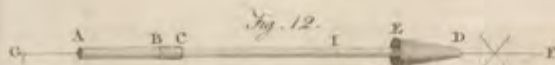
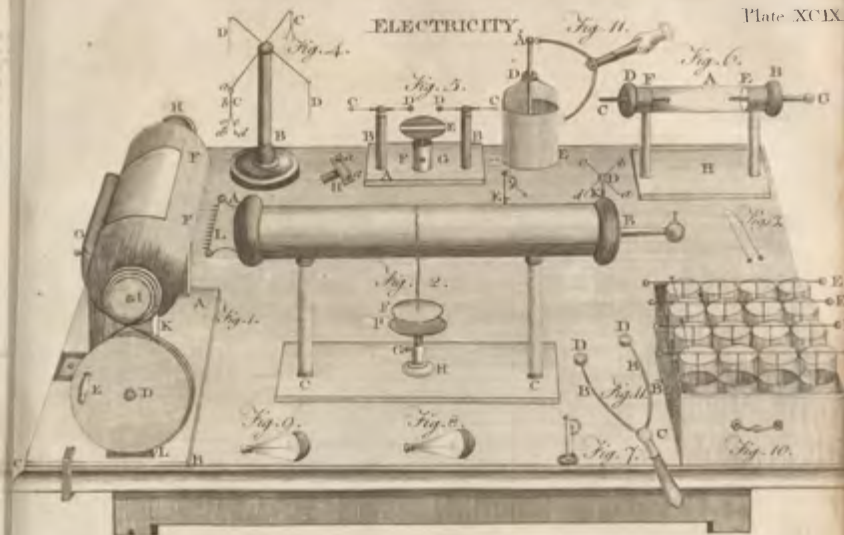
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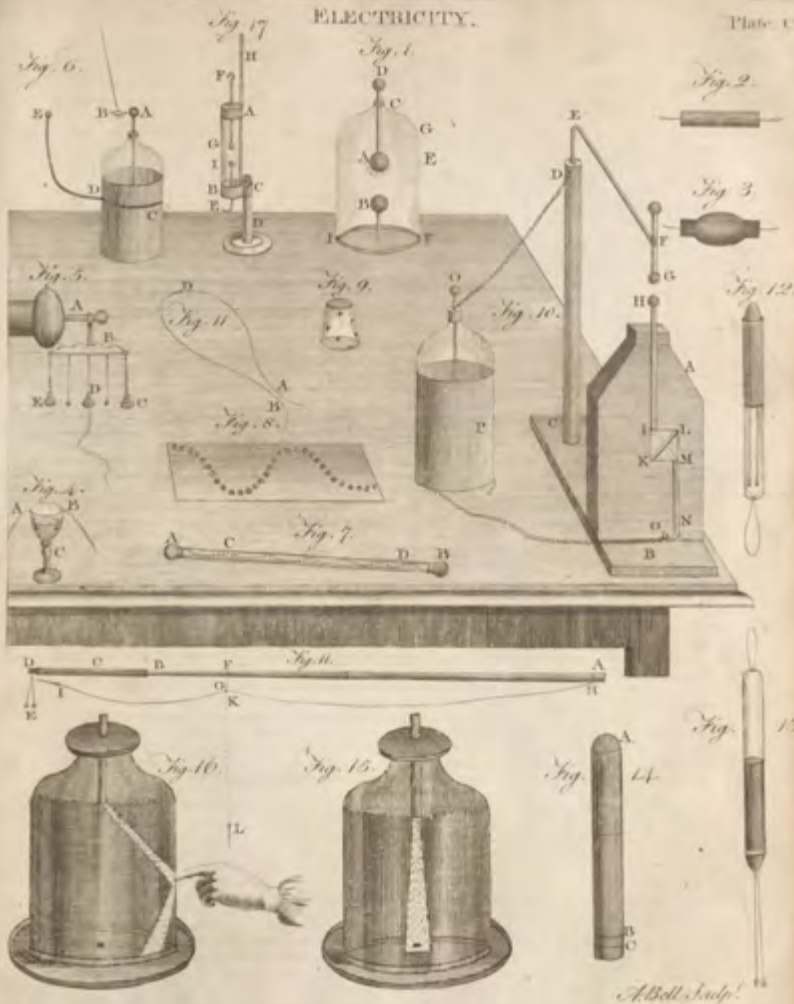
of the people. The earthquake lasted in all about six minutes. At the moment of its beginning, some persons on the river, near a mile from the city, heard their boat make a noise as if it had run aground, though they were then in deep water; and at the same time they saw the houses falling on both sides of the river. The bed of the river Tagus was, in many places, raised to its surface. Ships were drove from their anchors, and jostled together with great violence; nor did their masters know whether they were afloat or aground. A large new quay sunk to an unfathomable depth, with several hundreds of people who were upon it; nor was one of the dead bodies ever found. The bar was at first seen dry from shore to shore: but suddenly the sea came rolling in like a mountain; and about Belem Castle, the water rose 50 feet almost in an instant. About noon, there was another shock; when the walls of several houses that yet remained, were seen to open from top to bottom more than a quarter of a yard, and afterwards closed again so exactly that scarce any mark of the injury was left.

At Colares, about 20 miles from Lisbon, and two miles from the sea, on the last day of October, the weather was clear, and uncommonly warm for the season: about four o'clock in the afternoon there arose a fog, which came from the sea, and covered the valleys; a thing very unusual at that season of the year. Soon after, the wind changing to the east, the fog returned to the sea, collecting itself, and becoming exceeding thick. As the fog retired, the sea rose with a prodigious roaring.—The first of November, the day broke with a serene sky, the wind continuing at east: but, about nine o'clock, the sun began to grow dim; and about half an hour after was heard a rumbling noise like that of chariots, which increased to such a degree, that it became equal to the explosions of the largest cannon. Immediately a shock of an earthquake was felt, which was quickly succeeded by a second and third; and at the same time several light flames of fire issued from the mountains, resembling the kindling of charcoal. In these three shocks, the walls of the buildings moved from east to west. In another situation, from whence the sea-coast could be discovered, there issued from one of the hills called the *Fojo*, a great quantity of smoke, very thick, but not very black. This still increased with the fourth shock, and afterwards continued to issue in a greater or less degree. Just as the subterraneous rumblings were heard, the smoke was observed to burst forth at the *Fojo*; and the quantity of smoke was always proportioned to the noise. On visiting the place from whence the smoke was seen to arise, no signs of fire could be perceived near it.

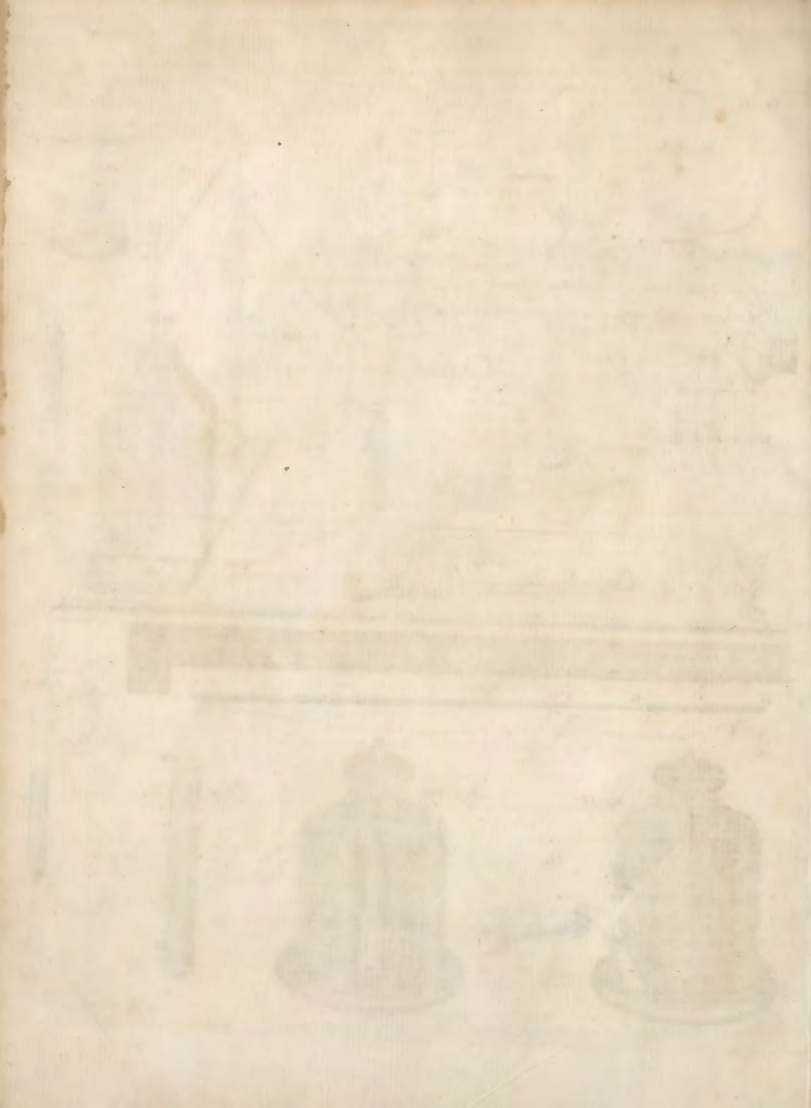
At Oporto (near the mouth of the river Douro), the earthquake began about 40 minutes past nine. The sky was very serene; when a dreadful hollow noise like thunder, or the rattling of coaches at a distance, was heard, and almost at the same instant the earth began to shake. In the space of a minute or two, the river rose and fell five or six feet, and continued to do so for four hours. It ran up at first with so much violence, that it broke a ship's hawser. In some parts the river opened, and seemed to discharge vast quantities of air; and the agitation in the sea was so great about a league beyond the bar, that air was supposed to have been discharged there also.

ELECTRICITY





A. Bell, Sculp.



Earth-
quake.11
At St Ubes

St Ubes, a sea-port town, about 20 miles south of Lisbon, was entirely swallowed up by the repeated shocks, and the vast surf the sea. Huge pieces of rock were detached at the same time from the promontory at the west end of the town, which consists of a chain of mountains containing fine Jasper of different colours.

12
At Ayamonte in Spain.

The same earthquake was felt all over Spain, except in Catalonia, Arragon, and Valencia.—At Ayamonte, (near where the Guadiana falls into the Bay of Cadiz), a little before 10 o'clock on the first of November, the earthquake was felt; having been immediately preceded by a hollow rushing noise. Here the shocks continued for 14 or 15 minutes, damaged almost all the buildings, throwing down some, and leaving others irreparably shattered. In little more than half an hour after, the sea and river, with all the canals, overflowed their banks with great violence, laying under water all the coasts of the islands adjacent to the city and its neighbourhood, and flowing into the very streets. The water came on in vast black mountains, white with foam at the top, and demolished more than one half of a tower at the bar named *de Canala*. In the adjacent strands every thing was irrecoverably lost; for all that was overflowed sunk, and the beach became a sea, without the least resemblance of what it was before. Many persons perished: for, although they got aboard some vessels, yet part of these foundered; and others being forced out to sea, the unhappy passengers were so terrified, that they threw themselves over board. The day was serene, and not a breath of wind stirring.

13
At Cadiz.

At Cadiz, some minutes after nine in the morning the earthquake began, and lasted about five minutes. The water of the cisterns under ground washed backwards and forwards, so that a great froth arose. At ten minutes after eleven, a wave was seen coming from the sea, at eight miles distance, at least 60 feet higher than usual. It dashed against the west part of the town, which is very rocky. Though these rocks broke a good deal of its force, it at last came upon the city walls, beat in the breast-work, and carried pieces of the building of eight or ten ton weight to the distance of 40 or 50 yards.—When the wave was gone, some parts that are deep at low water, were left quite dry; for the water returned with the same violence with which it came. At half an hour after 11 came a second wave, and after that four other remarkable ones; the first at ten minutes before twelve; the second, half an hour before one; the third, ten minutes after one; and the fourth, ten minutes before two. Similar waves, but smaller, and gradually lessening, continued with uncertain intervals till the evening.

14
At Gibraltar.

At Gibraltar, the earthquake was not felt till after ten. It began with a tremulous motion of the earth, which lasted about half a minute. Then followed a violent shock; after that, a trembling of the earth for five or six seconds; then another shock not so violent as the first, which went off gradually as it began. The whole lasted about two minutes. Some of the guns on the battery were seen to rife, others to sink, the earth having an undulating motion. Most people were seized with giddiness and sickness; and some fell down: others were stupified; and many that were walking or riding felt no motion in the earth, but were sick. The sea rose six feet every 15 minutes; and then fell so low, that boats, and all the small craft near the shore, were left a-

ground, as were also numbers of small fish. The flux and reflux lasted till next morning, having decreased gradually from two in the afternoon.

Earth-
quake.

At Madrid the earthquake came on at the same time as at Gibraltar, and lasted about six minutes. At first every body thought they were seized with a swimming in their heads; and afterwards, that the houses were falling. It was not felt in coaches, nor by those who walked on foot, except very slightly; and no accident happened, except that two lads were killed by the fall of a stone-crook from the porch of a church.

Malaga (a sea-port on the Mediterranean) felt a violent shock; the bells rung in the steeples; the water of a well overflowed, and as suddenly retired.

Saint Lucar (at the mouth of the Guadalquivir) was violently shocked, and the sea broke in and did a great deal of mischief.

At Seville, (16 leagues above the mouth of the Guadalquivir), several houses were shaken down; the famous tower of the cathedral called *la Giralda* opened in the four sides; and the waters were so violently agitated, that all the vessels in the river were driven ashore.

In Africa, the earthquake was felt almost as severely as it had been in Europe. Great part of the town of Algiers was destroyed. At Arzilla, (a town in the kingdom of Fez), about ten in the morning, the sea suddenly rose with such impetuosity, that it lifted up a vessel in the bay, and dropped it with such force on the land, that it was broke to pieces; and a boat was found two musket-shot within land from the sea. At Fez, and Mequinez, great numbers of houses fell down, and a multitude of people were buried in the ruins.

16
At Arzilla in Africa.

At Morocco, by the falling down of a great number of houses, many people lost their lives: and about eight leagues from the city, the earth opened and swallowed up a village with all the inhabitants, who were known by the name of the *sons of Besumba*, to the number of about 8000 or 10,000 persons, together with all their cattle, &c.; and, soon after, the earth closed again in the same manner as before.

17
At Morocco.

At Salle, a great deal of damage was done. Near a third part of the houses were overthrown; the waters rushed into the city with great rapidity, and left behind them great quantities of fish.

18
At other places on the African coast.

At Tangier, the earthquake began at ten in the morning, and lasted 10 or 12 minutes. The sea came up to the walls (a thing never heard of before); and went down immediately with the same rapidity with which it arose, leaving a great quantity of fish behind it: these commotions were repeated 18 times, and lasted till six in the evening.

At Tetuan, the earthquake began at the same time it did at Tangier, but lasted only seven or eight minutes. There were three shocks, so extremely violent, that it was feared the whole city would be destroyed.

In the city of Funchal, in the island of Madeira, a shock of this earthquake was first perceived at 38 minutes past nine in the morning. It was preceded by a rumbling noise in the air, like that of empty carriages passing hastily over a stone pavement. The observer felt the floor immediately to move with a tremulous motion, vibrating very quickly. The shock continued more than a minute; during which space, the vibrations, though continual, were weakened and increased

19
In the island of Madeira.

in

Earth-quake.

Earth-quake.

in force twice very sensibly. The increase after the first remission of the shock, was the most intense. The noise in the air accompanied the shock during the whole of its continuance, and lasted some seconds after the motion of the earth had ceased; dying away like a peal of distant thunder rolling through the air. At three quarters past eleven, the sea, which was quite calm, it being a fine day, and no wind stirring, retired suddenly some paces; then rising with a great swell without the least noise, and as suddenly advancing, overflowed the shore, and entered the city. It rose 15 feet perpendicular above the high-water mark, although the tide, which flows there seven feet, was then at half ebb. The water immediately receded; and after having fluctuated four or five times between high and low water mark, it subsided, and the sea remained calm as before. In the northern part of the island the inundation was more violent, the sea there retiring above 100 paces at first, and suddenly returning, overflowed the shore, forcing open doors, breaking down the walls of several magazines and storehouses, leaving great quantities of fish ashore and in the streets of the village of Machico. All this was the effect of one rising of the sea, for it never afterwards flowed high enough to reach the high-water mark. It continued, however, to fluctuate here much longer before it subsided than at Funchal; and in some places farther to the westward, it was hardly, if it all, perceptible.

These were the phenomena with which this remarkable earthquake was attended in those places where it was violent. The effects of it, however, reached to an immense distance; and were perceived chiefly by the agitations of the waters, or some slight motion of the earth. The utmost boundaries of this earthquake to the south are unknown; the barbarity of the African nations rendering it impossible to procure any intelligence from them, except where the effects were dreadful. On the north, however, we are assured, that it

20
Effects of it
in Norway
and Sweden.

reached as far as Norway and Sweden. In the former, the waters of several rivers and lakes were violently agitated. In the latter, shocks were felt in several provinces, and all the rivers and lakes were strongly agitated, especially in Dalecarlia. The river Dala suddenly overflowed its banks, and as suddenly retired. At the same time a lake at the distance of a league from it, and which had no manner of communication with it, bubbled up with great violence. At Fahlun, a town in Dalecarlia, several strong shocks were felt.

21
In Germany.

In many places of Germany the effects of the earthquake were very perceptible. Throughout the duchy of Holstein, the waters were violently agitated, particularly those of the Elbe and Trave. In Brandenburg, the water of a lake called *Lilsee*, ebbed and flowed six times in half an hour, with a dreadful noise, the weather being then perfectly calm. The same agitation was observed in the waters of the lakes called *Muplgeß* and *Netzo*; but at this last place they also emitted an intolerable stench.

22
In Holland.

In Holland, the agitations were more remarkable. At Alphen on the Rhine between Leyden and Woerden, in the afternoon of the first of November, the waters were agitated to such a violent degree, that buoys were broken from their chains, large vessels snapped their cables, smaller ones were thrown out of the wa-

ter upon the land, and others lying on land were set afloat. At Amsterdam, about eleven in the forenoon, the air being perfectly calm, the waters were suddenly agitated in their canals, so that several boats broke loose; chandeliers were observed to vibrate in the churches; but no motion of the earth, or concussion of any building, was observed. At Harlem, in the forenoon, for near four minutes together, not only the water in the rivers, canals, &c. but also all kinds of fluids in smaller quantities, as in coolers, tubs, backs, &c. were surprisingly agitated, and dashed over the sides, though no motion was perceptible in the vessels themselves. In these small quantities also the fluid apparently ascended prior to its turbulent motion; and in many places, even the rivers and canals rose 12 inches perpendicular. At Leyden, between half an hour after 10 and 11 in the forenoon, the waters rose suddenly in some of the canals, and made several very sensible undulations, so that the boats were strongly agitated. The same motion was perceived in the water of the backs of two brew-houses.

Round the island of Corfica, the sea was violently agitated, and most of the rivers of the island overflowed their banks.—In the city of Milan in Italy, and throughout that district, shocks were felt. At Turin in Savoy, there was felt a very violent shock.

23
In Italy and
Switzerland.

In Switzerland, many rivers turned suddenly muddly without rain. The lake of Neuchâtel swelled to the height of near two feet above its natural level, for the space of a few hours.—An agitation was also perceived in the waters of the lake of Zurich.

24
At Antigua
and Barbadoes.

At the island of Antigua, there was such a sea without the bar as had not been known in the memory of man; and after it, all the water at the wharfs, which used to be six feet deep, was not two inches.—At Barbadoes, about two in the afternoon, the sea ebbed and flowed in a surprising manner. It ran over the wharfs and streets into the houses, and continued thus ebbing and flowing till ten at night.

The agitation of the waters was perceived in great numbers of places in Great Britain and Ireland.—Accounts of the most remarkable of them follow. At Barlborough in Derbyshire, between 11 and 12 in the forenoon, in a boat-house on the west side of a large body of water called *Pibley Dam*, supposed to cover at least 30 acres of land, was heard a surprising and terrible noise; a large swell of water came in a current from the south, and rose two feet on the sloped dam-head at the north end of the water. It then subsided; but returned again immediately, though with less violence. The water was thus agitated for three quarters of an hour; but the current grew every time weaker and weaker, till at last it entirely ceased.

25
In England.

At Busbridge in Surrey, at half an hour after ten in the morning, the weather being remarkably still, without the least wind, in a canal near 700 feet long and 58 feet broad, with a small spring constantly running through it, a very unusual noise was heard at the east end, and the water there observed to be in great agitation. It raised itself in a heap or ridge in the middle; and this heap extended lengthwise about 30 yards, rising between two or three feet above the usual level. After this, the ridge heeled or vibrated towards the north side of the canal with great force, and flowed above eight feet over the grass walk on that side. On

its

Earth-
quake.

its return back into the canal, it again ridged in the middle, and then heeled with yet greater force to the fourth side, and flowed over its grass walk. During this latter motion, the bottom on the north side was left dry for several feet. This appearance lasted for about a quarter of an hour, after which the water became smooth and quiet as before. During the whole time, the sand at the bottom was thrown up and mixed with the water; and there was a continual noise like that of water turning a mill.

At Cobham in Surrey, between 10 and 11 o'clock, a person was watering a horse at a pond fed by springs. Whilst the animal was drinking, the water suddenly ran away from him, and moved towards the fouth with such swiftness, that the bottom of the pond was left bare. It returned again with such impetuosity, that the man leaped backwards to secure himself from its sudden approach. The ducks were alarmed at the first agitation, and instantly flew all out of the pond.

At Dunfall in Suffolk, the water of a pond rose gradually for several minutes in the form of a pyramid, and fell down like a water-spout. Other ponds in the neighbourhood had a smooth flux and reflux from one end to the other.

Near the city of Durham, about half an hour after ten, a gardener was alarmed by a sudden rushing noise from a pond, as if the head of the pond had been broken down: when, casting his eye on the water, he saw it gradually rise up, without any fluctuating motion, till it reached a grate which stood some inches higher than the common water level. After this it subsided, and then swelled again; thus continuing to rise and fall during the space of six or seven minutes, making four or five returns in the space of one minute. The pond was about 40 yards long, and 10 broad.

At Early Court, Berks, about 11 o'clock, as a gardener was standing by a fish pond, he felt a violent trembling of the earth, which lasted about a minute. Immediately after, he observed a motion of the water from the south to the north end of the pond, leaving the bottom at the south end altogether dry for about six feet. It then returned, and flowed at the south end, rising three feet up the slope bank; and immediately after returned to the north bank, rising there also about three feet. In the time between the flux and reflux, the water swelled up in the middle of the pond, collected in a ridge about 20 inches higher than the level on each side, and boiled like a pot. This agitation from south to north lasted about four minutes.

At Eaton-bridge, Kent, in a pond about an acre in size, a dead calm, and no wind stirring, some persons heard a noise, and imagining something had been tumbling in, ran to see what was the matter. On their arrival at the pond, to their surprise they saw the water open in the middle, so that they could see a post a good way down, almost to the bottom. The water in the mean time dashed up over a bank two feet high, and perpendicular to the pond. This was repeated several times with a great noise.

At Eyam bridge, Derbyshire, (in the Peak), the overseer of the lead-mines sitting in his writing-room about 11 o'clock, felt a sudden shock, which very sensibly raised him up in his chair, and caused several pieces of plaster to drop from the sides of the room. The roof was so violently shaken, that he imagined the

engine shaft had been falling in. Upon this he immediately ran to see what was the matter, but found every thing in perfect safety. At this time two miners were employed in carting, or drawing along the drifts of the mines, the ore, and other materials, to be raised up at the shafts. The drift in which they were working was about 120 yards deep, and the space from one end to the other 50 yards or upwards. The miner at the end of the drift had just loaded his cart, and was drawing it along; but he was suddenly surprised by a shock, which so terrified him, that he immediately quitted his employment, and ran to the west end of the drift to his partner, who was no less terrified than himself. They durst not attempt to climb the shaft, lest that should be running in upon them: but while they were consulting what means they should take for their safety, they were surprised by a second shock more violent than the first; which frightened them so much, that they both ran precipitately to the other end of the drift. They then went down to another miner who worked about 12 yards below them. He told them that the violence of the second shock had been so great, that it caused the rocks grind upon one another. His account was interrupted by a third shock, which, after an interval of four or five minutes, was succeeded by a fourth; and, about the same space of time after, by a fifth; none of which were so violent as the second. They heard, after every shock, a loud rumbling in the bowels of the earth, which continued about half a minute, gradually decreasing, or seeming to remove to a greater distance.

At Shireburn castle, Oxfordshire, at a little after ten in the morning, a very strange motion was observed in the water of a moat which encompasses the house. There was a pretty thick fog, not a breath of air, and the surface of the water all over the moat as smooth as a looking-glass, except at one corner, where it flowed into the shore, and retired again successively, in a surprising manner. In what manner it began to move is uncertain, as nobody observed the beginning of its motion. The flux and reflux, when seen, were quite regular. Every flood began gently; its velocity increased by degrees, when at last it rushed in with great impetuosity, till it had attained its full height. Having remained for a little time stationary, it then retired, ebbing gently at first, but afterwards sinking away with great swiftness. At every flux, the whole body of water seemed to be violently thrown against the bank; but neither during the time of the flux nor that of the reflux, did there appear even the least wrinkle of a wave on the other parts of the moat. Lord Viscount Parker, who had observed this motion, being desirous to know whether it was universal over the moat, sent a person to the other corner of it, at the same time that he himself stood about 25 yards from him, to examine whether the water moved there or not. He could perceive no motion there, or hardly any: but another, who went to the north-east corner of the moat, diagonally opposite to his lordship, found it as considerable there as where he was. His lordship imagining, that in all probability the water at the corner diagonally opposite to where he was would sink as that by him rose, he ordered the person to signify by calling out, when the water by him began to sink, and when to rise. This he did; but, to his lordship's great

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quake.

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quake.

great surprize, immediately after the water began to rise at his own end, he heard his voice calling that it began to rise with him also; and in the same manner he heard that it was sinking at his end, soon after he perceived it to sink by himself. A pond just below was agitated in a similar manner; but the risings and sinkings of it happened at different times from those at the pond where lord Parker stood.

At White Rock in Glamorganshire, about two hours ebb of the tide, and near three quarters after six in the evening, a vast quantity of water rushed up with a prodigious noise; floated two large vessels, the least of them above 200 tons; broke their moorings, drove them across the river, and had like to have overtaken them. The whole rise and fall of this extraordinary body of water did not last above ten minutes, nor was it felt in any other part of the river, so that it seemed to have gushed out of the earth at that place.

26
In Scot-
land.

At Loch Lomond in Scotland, about half an hour after nine in the morning, all of a sudden, without the least gust of wind, the water rose against its banks with great rapidity, but immediately subsided, till it was as low in appearance as any body then present had ever seen it in the greatest summer-drought. Instantly it returned towards the shore, and in five minutes time rose again as high as before. The agitation continued at the same rate till 15 minutes after ten the same morning; taking five minutes to rise, and as many to subside. From 15 minutes after 10 till 11, the height of every rise came somewhat short of that immediately preceding, taking five minutes to flow, and as many to ebb, till the water was entirely settled. The greatest perpendicular height of this swell was two feet four inches.

In Loch Nefs, about half an hour after nine, a very great agitation was observed in the water. About ten the river Oich, which runs on the north side of Fort Augustus, into the head of the loch, was observed to swell very much, and run upwards from the loch with a pretty high wave, about two or three feet higher than the ordinary surface. The motion of the wave was against the wind, and it proceeded rapidly for about 200 yards up the river. It then broke on a shallow, and flowed three or four feet on the banks, after which it returned gently to the loch. It continued ebbing and flowing in this manner for about an hour, without any such remarkable waves as the first; but about 11 o'clock, a wave higher than any of the rest came up, and broke with so much force on the low ground on the north side of the river, that it run up on the grafs upwards of 30 feet from the river's bank.

27
In Ireland.

At Cork, in Ireland, about 36 minutes after nine, shocks of an earthquake were plainly felt, at about half a minute's interval. At Kinsale, between two and three in the afternoon, the weather being very calm, and the tide near full, a large body of water suddenly poured into the harbour with such rapidity, that it broke the cables of two floops, each moored with two anchors, and of several boats lying between Sicily and the town. They were driven up and down the harbour with prodigious velocity. But, just at the time that a great deal of mischief was apprehended by all the vessels running foul of each other, an eddy whirled them round several times, and then hurried them back again with the same rapidity as before. This was se-

Earth-
quake.

veral times repeated; and while the current rushed up at one side of the harbour, it poured down with equal violence at the other. A vessel that lay all this time in the pool did not seem to be any ways affected by it; nor was the violence of the currents much perceived in the deeper parts of the harbour, but raged with most violence on the flats. The bottom of the harbour, which is muddy, was much altered; the mud being washed from some places, and deposited in others. The perpendicular rise of the water at one quay was measured, and found to be five feet and an half; and is said to have been much higher at another, where it overflowed, and poured into the market-place with such rapidity, that some people who were on the quay immediately ran off, and yet could not prevent themselves from being overtaken and innerfed knee-deep in the water. The agitations extended several miles up the river; but, as in the harbour, were most perceived in the shallowest places. The successive risings and fallings of the water continued about ten minutes, and then the tide returned to its natural course. Between six and seven in the evening, the water rose again, tho' not with so great violence as before, and it continued to ebb and flow alternately till three in the morning. The waters did not rise gradually at first; but, with a hollow and horrid noise, rushed in like a deluge, rising six or seven feet in a minute, and as suddenly subsiding. They were as thick as puddle, very black, and stank intolerably.—From different accounts it appeared, that the water was affected in a similar manner all along the coast to the westward of Kinsale.

29

In France, shocks were perceived in several places; In France as at Bayonne, Bourdeaux, and Lyons. Commotions of the waters also were observed at Angoulême, Blesville, Havre de Grace, &c. but not attended with the remarkable circumstances above-mentioned.

These are the most striking phenomena with which the earthquake of Nov. 1. 1755 was attended on the surface of the earth. Those which happened below ground cannot be known but by the changes observed in springs, &c. which were in many places very remarkable.—At Colares, on the afternoon of the 31st of October, the water of a fountain was greatly decreased: on the morning of the first of November it ran very muddy; and, after the earthquake, returned to its usual state both as to quantity and clearness. On the hills, numbers of rocks were split; and there were several rents in the ground, but none considerable. In some places where formerly there had been no water, springs burst forth, which continued to run.—Some of the largest mountains in Portugal were impetuously shaken as it were from their foundation; most of them opened at their summits, split and rent in a wonderful manner, and huge masses of them were thrown down into the subjacent valleys.—From the rock called *Pedra de Alvidar*, near the hill Fojo, a kind of parapet was broken off, which was thrown up from its foundation in the sea.—At Varge, on the river Macaas, at the time of the earthquake, many springs of water burst forth, some spouted to the height of 18 or 20 feet, throwing up sand of various colours, which remained on the ground. A mountainous point, seven or eight leagues from St Ubes, cleft asunder, and threw off several vast masses of rock.—In Barbary, a large hill was rent in two; the two halves fell different ways, and buried two large towns.

20
Its effect
on firing
and on the
earth itself.

Earth-
quake.

towns. In another place, a mountain burst open, and a stream issued from it as red as blood. At Tangier, all the fountains were dried up, so that there was no water to be had till night.—A very remarkable change was observed on the medicinal waters of Toplitz, a village in Bohemia famous for its baths. These waters were discovered in the year 762; from which time the principal spring of them had constantly thrown out hot water in the same quantity, and of the same quality. On the morning of the earthquake, between 11 and 12 in the forenoon, the principal spring cast forth such a quantity of water, that in the space of half an hour all the baths ran over. About half an hour before this great increase of the water, the spring flowed turbid and muddy; then having stopped entirely for a minute, it broke forth again with prodigious violence, driving before it a considerable quantity of reddish ocher. After this it became clear, and flowed as pure as before. It still continues to do so; but the water is in greater quantity, and hotter, than before the earthquake. At Angoulême in France, a subterraneous noise like thunder was heard; and presently after, the earth opened, and discharged a torrent of water mixed with red sand. Most of the springs in the neighbourhood sunk in such a manner, that for some time they were thought to be quite dry. In Britain, no considerable alteration was observed in the earth, except that, near the lead mine abovementioned in Derbyshire, a cleft was observed about a foot deep, six inches wide, and 150 yards in length.

Effects of
the earth-
quake at
sea.

At sea, the shocks of this earthquake were felt most violently.—Off St Lucar, the captain of the Nancy frigate felt his ship so violently shaken, that he thought she had struck the ground; but, on heaving the lead, found he was in a great depth of water. Captain Clark from Denia, in Lat. 36. 24. between nine and ten in the morning, had his ship shaken and strained as if she had struck upon a rock, so that the seams of the deck opened, and the compass was overturned in the binnacle. The master of a vessel bound to the American islands, being in N. Lat. 25°, W. Long. 40°, and writing in his cabin, heard a violent noise, as he imagined, in the steerage; and while he was asking what the matter was, the ship was put into a strange agitation, and seemed as if he had been suddenly jerked up and suspended by a rope fastened to the mast-head. He immediately started up with great terror and astonishment; and looking out at the cabin-window, saw land, as he took it to be, at the distance of about a mile. But, coming upon the deck, the land was no more to be seen, but he perceived a violent current cross the ship's way to the leeward. In about a minute, this current returned with great impetuosity, and at a league's distance he saw three craggy-pointed rocks throwing up water of various colours resembling fire. This phenomenon, in about two minutes, ended in a black cloud, which ascended very heavily. After it had risen above the horizon, no rocks were to be seen; though the cloud, still ascending, was long visible, the weather being extremely clear.—Between nine and ten in the morning, another ship, 40 leagues west of St Vincent, was so strongly agitated, that the anchors, which were lashed, bounced up, and the men were thrown a foot and an half perpendicularly up from the deck. Immediately after this, the ship sunk in the water as

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low as the main chains. The lead shewed a great depth of water, and the line was tinged of a yellow colour and smelt of sulphur. The shock lasted about ten minutes, but they felt smaller ones for the space of 24 hours.

These are the phenomena which attended this most remarkable earthquake in many parts of the world. We have accounts of its effects over the space of 4,000,000 square miles, and undoubtedly it would be felt in a small degree much farther to the southward than we can have any account of.—To explain the phenomena of earthquakes, various hypotheses have been invented. Till lately, the hypothesis of the modern philosophers was much the same with that of the ancients. Anaxagoras supposed the cause of earthquakes to be subterraneous clouds bursting out into lightning, which shook the vaults that confined them. Others imagined, that the arches, which had been weakened by continual subterraneous fires, at length fell in: Others derived these accidents from the rarefied steam of waters, heated by some neighbouring fires; and some, among whom was Epicurus, and several of the Peripatetic school, ascribed these terrible accidents to the ignition of certain inflammable exhalations.

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concerning
the cause of
earth-
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This last hypothesis has been adopted by many of the most celebrated moderns, as Gassendus, Kircher, Schottus, Varenus, Des Cartes, Du Hamel, Honorius Fabri, &c. The philosopher last mentioned indeed supposed, that waters prodigiously rarefied by heat might sometimes occasion earthquakes. The others supposed, as their hypothesis necessarily requires, that there are many and vast cavities underground which have a communication with one another; some of which abound with waters; others with vapours and exhalations, arising from inflammable substances, as nitre, bitumen, sulphur, &c. These combustible exhalations they supposed to be kindled by a subterraneous spark, or by some active flame gliding through a narrow fissure from without, or by the fermentation of some mixture; and when this happened, they must necessarily produce pulses, tremors, and ruptures at the surface, according to the number and diversity of the cavities, and the quantity and activity of the inflammable matter. This hypothesis is illustrated by a variety of experiments, such as mixtures of iron-slings and brimstone buried in the earth, gun-powder confined in pits, &c. by all which a shaking of the earth will be produced.

Dr Woodward suggests another hypothesis. He supposes that the subterraneous heat or fire, which is continually elevating water out of the abyss, which, according to him, occupies the centre of the earth, to furnish rain, dew, springs, and rivers, may be stopped in some particular part. When this obstruction happens, the heat causes a great swelling and commotion in the waters of the abyss: and at the same time, making the like effort against the superincumbent earth, that agitation and concussion of it is occasioned which we call an earthquake.

Mr Amontons of the Royal Academy of Sciences suggests an hypothesis entirely different from any of the abovementioned ones. According to the received philosophical principles, which suppose the atmosphere to be about 45 miles high, and that the den-

Hypothesis
of Dr
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ty of the air increases in proportion to the absolute height of the superincumbent column of fluid; it is shewn, that at the depth of 43,528 fathoms below the surface of the earth, air is but one fourth lighter than mercury. Now, this depth of 43,528 fathoms is only a 74th part of the semi-diameter of the earth. And the vast sphere beyond this depth, in diameter 6,451,538 fathoms, may probably be only filled with air; which will be here greatly condensed, and much heavier than the heaviest bodies we know of in nature. But it is found by experiment, that the more air is compressed, the more does the same degree of heat increase its spring, and the more capable does it render it of a violent effect; and that, for instance, the degree of heat of boiling water increases the spring of the air above what it has in its natural state, in our climate, by a quantity equal to a third of the weight wherewith it is pressed. Whence we may conclude, that a degree of heat, which on the surface of the earth will only have a moderate effect, may be capable of a very violent one below. And as we are assured, that there are in nature degrees of heat much more considerable than that of boiling water, it is very possible there may be some, whose violence, further assisted by the exceeding weight of the air, may be more than sufficient to break and overturn this solid orb of 43,528 fathoms; whose weight, compared to that of the included air, would be but a trifle.

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All these
hypotheses
rejected by
Dr Stukely.

Though none of these hypotheses were sufficient for explaining the phenomena of earthquakes in a satisfactory manner, one or other of them continued to be adopted by almost all philosophers, till the year 1749. In the month of March that year, an earthquake was felt at London and several other places in Britain. Dr Stukely, who had been much engaged in electrical experiments, began to suspect that phenomena of this kind ought to be attributed not to vapours or fermentations generated in the bowels of the earth, but to electricity. In a paper published by him on this subject, he rejects all the above-mentioned hypotheses for the following reasons.

1. That there is no evidence of any remarkable cavernous structure of the earth; but that, on the contrary, there is rather reason to presume that it is in a great measure solid, so as to leave little room for internal changes and fermentations within its substance; nor do coal-pits, he says, when on fire, ever produce any thing resembling an earthquake.

2. In the earthquake at London, in March 1749, there was no such thing as fire, vapour, smoke, smell, or an eruption of any kind observed, though the shock affected a circuit of 30 miles in diameter. This consideration alone of the extent of surface shaken by an earthquake, he thought sufficient to overthrow the supposition of its being owing to the expansion of any subterraneous vapours. For as small fire-balls bursting in the air propagate a sulphureous smell to the distance of several miles, it cannot be supposed, that so immense a force acting instantaneously on that compass of ground should never break the surface of it, nor become discoverable either to the sight or the smell: besides, that the operation of such a fermentation would be many days in continuance, and the evaporation of so much inflammable matter would require a long space of time. That such an effect, therefore, should be produced in-

stantaneously, can be accounted for by electricity only; which acknowledges no sensible transition of time, no bounds.

3. If vapours, and subterraneous fermentations, explosions, and eruptions, were the cause of earthquakes, they would absolutely ruin the whole system of springs and fountains, wherever they had once been; which is contrary to fact, even when they have been frequently repeated. Even in the earthquake in Asia Minor, A. D. 17, which destroyed 13 great cities, and shook a mass of earth 300 miles in diameter, nothing suffered but the cities; neither the springs nor the face of the country being injured, which indeed remains the same to this day.

4. That any subterraneous power sufficient to move 30 miles in diameter, as in the earthquake which happened at London, must be lodged at least 15 or 20 miles below the surface; and therefore must move an inverted cone of solid earth, the base of which is 30 miles in diameter, and the axis 15 or 20; an effect impossible to any natural power whatever, except electricity. So in Asia Minor, such a cone must have been 300 miles in the diameter of the base, and 200 in the axis; which not all the gun-powder that has been made since the invention of it, much less any vapours generated so far below the surface, could possibly effect.

5. A subterraneous explosion will not account for the manner in which ships, far from land, are affected during an earthquake: which seem as if they struck upon a rock, or as if something thumped against their bottoms. Even the fishes are affected. A subterraneous explosion could only produce a gradual swell, and not give so quick an impulse to the water as would make it feel like a stone.

From comparing these circumstances, the Doctor says, he had always thought that an earthquake was a shock of the same kind as those which commonly occur in electrical experiments. And this hypothesis was confirmed by the phenomena attending earthquakes; particularly those of 1749 and 1750, which gave rise to his publication.

The weather, for five or six months before, had been uncommonly warm; the wind south and south-west, without rain; so that the earth must have been in a state peculiarly ready for an electrical shock. The flat country of Lincolnshire had been under an exceeding great drought. The uncommonness of the first of these circumstances, he remarks, is the reason why earthquakes are less frequently experienced in the northern than in the southern regions of the world, where the warmth and dryness of the air, so necessary to electricity, are more usual: And the latter shows how fit the dry surface was for an electrical vibration; and (which is of great importance) that earthquakes reach but little below the surface of the earth.

Before the earthquake at London, all vegetables had been uncommonly forward. And electricity is well known to quicken vegetation. The aurora borealis had been frequent about that time; and, just before the earthquake, had been twice repeated in such colours as had never been seen before. It had also removed southerly, contrary to what is common in England; so that the Italians, and those among whom earthquakes were frequent, actually foretold the earthquake. The year had been remarkable for fire-balls,

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lightning, and coruscations; and these are rightly judged to be meteors of an electrical nature.

In these circumstances of the earth and air, nothing, he says, is wanting to produce an earthquake, but the touch of some non-electric body; which must necessarily be had *ab extra*, from the region of the air or atmosphere. Hence he infers, that, if a non-electric cloud discharge its contents upon any part of the earth, in that highly electrical state, an earthquake must necessarily ensue. As the discharge from an excited tube produces a commotion in the human body, so the discharge of electric matter from the compass of many miles of solid earth, must needs be an earthquake; and the snap from the contact, the horrid uncouth noise attending it.

The Doctor had been informed, by those who were up and abroad the night preceding the earthquake, and early in the morning, that coruscations in the air were extremely frequent; and that a little before the earthquake, a large and black cloud suddenly covered the atmosphere, which probably occasioned the shock by the discharge of a shower.

A sound was observed to roll from the Thames towards Temple Bar before the houses ceased to nod, just as the electrical snap precedes the shock. This noise (which generally precedes earthquakes) the Doctor thought could be accounted for only on electrical principles: for, in a subterraneous eruption, the direct contrary would happen.

The flames and sulphureous smells, which are sometimes observed in earthquakes, might, he thought, be more easily accounted for, on the supposition of their being electrical phenomena, than from their being occasioned by eruptions from the bowels of the earth.

So also the suddenness and expedition of the concussion, it being felt at the same instant over a surface of 4000 square miles; and the little damage also which earthquakes generally occasion; sufficiently point out what sort of a motion it is: not a convulsion of the bowels of the earth; but an uniform vibration along its surface, like that of a musical string or a glass when rubbed on the edge with one's finger.

The circumstance of earthquakes chiefly affecting the sea-coast, places along rivers, (and, adds Doctor Priestley, eminences) is a farther argument of their being electrical phenomena. This is illustrated by a particular account of the direction in which the earthquake was conveyed.

The last argument he uses is taken from the effects which it had on persons of weak constitutions, who were, for a day or two after it happened, troubled with pains in the back, rheumatisms, hysterics, and nervous disorders; just in the same manner as they would have been after an actual electrification: to some these disorders proved fatal.

As to the manner in which the earth and atmosphere are put into this state, which prepares them to receive such a shock, and whence the electric matter comes, the Doctor does not pretend to determine; but thinks it as difficult to be accounted for, as magnetism, gravitation, and many other secrets of nature.

The same hypothesis was advanced by Signior Beccaria, without knowing any thing of Doctor Stukeley's discoveries. But this learned Italian imagined the electric matter which occasions earthquakes, to be

lodged deep in the bowels of the earth, agreeably to his hypothesis concerning lightning.

Now, as it appears that the quantity of electric matter in the simplest thunder-forms is so inconceivably great, that it is impossible to be contained by any cloud or number of clouds; and as, during the progress of a thunder-form which he observed, though the lightning frequently struck to the earth, the same clouds were the next moment ready to make a still greater discharge; it was evident, that they must have received at one place, the moment a discharge was made from them in another. Let us suppose these clouds ever so great, if the lightning proceeded only from them, the quantity must be lessened by every discharge; and no recruits that any new clouds might bring can bear any proportion to the discharge which must ensue from the collision of so great a number as combine to form a thunder-form. It seems therefore most likely, that the electric matter is continually darting from the clouds in one place, at the same time that it is discharged from the earth in another; and, consequently, that the clouds serve as conductors to convey the electric fluid from those places of the earth which are overloaded with it, to those which are exhausted.

This theory being admitted, there will, he thinks, be little difficulty in attributing earthquakes to the same cause. For if the equilibrium of the electric matter be by any means lost in the bowels of the earth; so that the best method of restoring it shall be by the fluid bursting into the air, and traversing several miles of the atmosphere, to come at the place where it is wanted; it may be easily imagined, that violent concussions will be given to the earth by the sudden passage of so powerful an agent. This, in his opinion, was confirmed by the flashes of light, exactly resembling lightning, which have been frequently seen to rush from the top of Mount Vesuvius, at the time that ashes and other light matters have been carried out of it into the air, and dispersed uniformly over a large tract of country. And it is well known, that volcanoes have a near connexion with earthquakes.

A rumbling noise like thunder, and flashes of light rising from the ground, have been generally observed to attend earthquakes. And lightning itself has been known to be attended with small shakings of the earth. So also *ignes fatui*, in mines, he looked upon as an argument that the electric fluid was sometimes collected in the bowels of the earth.

Dr Priestley, in his *Hist. of Electricity*, observes upon these theories, that a more probable hypothesis may perhaps be formed out of both of them. "Suppose (says he) "the electric matter to be, some way or other, accumulated on one part of the surface of the earth, and, "on account of the dryness of the season, not easily to "diffuse itself; it may, as Signior Beccaria supposes, "force its way into the higher regions of the air, "forming clouds in its passage, out of the vapours "which float in the atmosphere, and occasion a sudden "shower, which may further promote the passage "of the fluid. The whole surface, thus unloaded, will "receive a concussion, like any other conducting substance, on parting with, or receiving, a quantity of "the electric fluid. The rushing noise will likewise "sweep over the whole extent of the country. And, "upon this supposition also, the fluid, in its discharge

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Of Dr Priestley.36
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of S. Beccaria.

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"from the country, will naturally follow the course of the rivers, and also take the advantage of any eminences to facilitate its ascent into the higher regions of the air."

The Doctor, making experiments with a battery on the passage of the electrical fluid over different conducting substances, and, among these, over water;—and remarking a resemblance between its passage over the surface of the water, and that which Doctor Stukeley supposed to sweep the surface of the earth, when a considerable quantity of it is discharged to the clouds during an earthquake; immediately suspected that the water over which it passed, and which was visibly thrown into a tremulous motion, must receive a concussion resembling that which is given to the waves of the sea on such an occasion.

To try this, he himself and others present put their hands into the water at the time that the electrical flash passed over its surface; and they felt a sudden concussion given to them, exactly like that which is supposed to affect ships at sea during an earthquake. This percussion was felt in various parts of the water, but was strongest near the place where the explosion was made. The same experiment, with a little variation, being afterwards made with a single jar, at some distance below the surface of the water, produced the like effect, though in a weaker degree. "This similarity in the effect," the Doctor observes, "is a considerable evidence of a similarity in the cause."

"Pleased with this resemblance of the earthquake, (says he) I endeavoured to imitate that great natural phenomenon in other respects: and, it being frosty weather, I took a plate of ice, and placed two sticks, about three inches high, on their ends, so that they would just stand with ease; and upon another part of the ice, I placed a bottle, from the cork of which was suspended a brass ball with a fine thread. Then, making the electrical flash pass over the surface of the ice, which it did with a very loud report, the nearer pillar fell down, while the more remote stood; and the ball, which had hung nearly still, immediately began to make vibrations about an inch in length, and nearly in a right line from the place of the flash."

"I afterwards diversified this apparatus, erecting more pillars, and suspending more pendulums, &c. sometimes upon bladders stretched on the mouth of open vessels, and at other times on wet boards swimming in a vessel of water. This last method seemed to answer the best of any: for the board representing the earth, and the water the sea, the phenomena of them both during an earthquake may be imitated at the same time; pillars, &c. being erected on the board, and the electric flash being made to pass either over the board, over the water, or over them both."

Deficiency of all these hypotheses. These three hypotheses concerning the cause of earthquakes, tho' somewhat differing from one another, yet agree in the main; but, if a particular solution of the phenomena is required, every one of them will be found deficient.

If, according to Dr Stukeley's hypothesis, the electric matter is lodged only on the surface of the earth, or but at a small depth below; how are we to account for those violent effects which often take place in the

bowels of the earth. In the earthquake at Lisbon, a large quay sunk to an unfathomable depth. We are certain, that the cause of the earthquake must have been below this depth however great it was, and have opened the earth for an immense way downwards. At the same time an hill in Barbary clave asunder, and the two halves of it fell different ways. This shews, that the cause of the earthquake operated not on the surface of the hill, but on the solid foundation and contents of it; nor can it be explained by any superficial action whatever. From what the miners at Eyam bridge in Derbyshire observed, it is also evident, that the shock was felt at the depth of 396 feet below the surface of the ground more than at the surface itself; and consequently there is all the reason in the world to think that the cause lay at a depth vastly greater.

Again, tho' the earthquake at London was supposed to begin with a black cloud and shower; yet in that of 1755, the effects of which were incomparably greater, the air was calm and serene almost in every place where it was felt. It doth not appear that there is at any time a considerable difference between the electricity of the atmosphere and that of the earth, or indeed that there can be so. For, if the earth is electrified *plus*, and the atmosphere *minus*, there are innumerable points on the surface of the earth which must be imperceptibly drawing off the superfluous electric matter into the air. The vapours also, with which the atmosphere abounds, would always be ready in the same service; and thus thunder and lightning might indeed sometimes be produced, but not earthquakes. But lastly, neither the air nor the earth does always show any remarkable signs of electricity before earthquakes happen. For, the summer before the earthquake at Manchester in 1777, there had scarce been any thunder, lightning, or other signs of electricity in the atmosphere, and vegetation had been extremely backward; and, according to the best accounts, the weather continued remarkably fine.

For these reasons, Dr Stukeley's hypothesis seems not to be satisfactory. That of Signior Beccaria is not indeed liable to the above-mentioned objections; but seems highly improbable, on another account. The atmosphere is known to be a substance through which the electric matter makes its way with the utmost difficulty. It is a vastly worse conductor than water, or than moist earth. If therefore the equilibrium of this fluid is lost in the bowels of the earth, it is impossible to give a reason why it should not rather go to the places where it is wanted through the earth itself, than through the atmosphere. Besides, if this was the case, the shock of an earthquake could only be felt at those places where the electric fluid issued from the earth, and where it entered. All the intermediate places ought to be free from any shock, and to be sensible only of a violent concussion in the atmosphere; but of this we have no example in any history of earthquakes whatever.

Dr Priestley's hypothesis is liable to the same objections with that of Dr Stukeley; for any superficial operation will never account for those effects above mentioned, which take take at great depths below the surface. His experiment cannot be admitted as any way conclusive with regard to the cause of earthquakes, because no quantity of electric fire is seen to pass

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pass over the earth and sea, like the flash attending the explosion of an electric battery; and the force of his earthquake, (being but just able to throw down a tick that could hardly stand by itself) seems by far too little. The utmost force of electricity which man can raise, is indeed very trifling, when compared with the great operations of nature: but it is certain, that the force of an electric battery is by no means contemptible; and was its whole power to be employed in producing an imitation of an earthquake, it certainly would do much more than throw down a small tick. The bad success of this experiment therefore shows, that the Doctor's theory is erroneous: for, almost the whole of his electric power was spent another way; and we cannot suppose, that any considerable part of the force which produces earthquakes is spent any other way than in the very production of the earthquake itself.

If it is attempted to give an explanation of the phenomena of earthquakes, which shall be free from the objections abovementioned, and from all others, it will be necessary, in the first place, to consider those parts of the system of nature which seem to be most affected during the terrible phenomena we treat of. These parts are, the air, the solid earth, and the water. Of these the two former are electric *per se*; the latter is a conductor, though a bad one *. Hence it follows,

1. That in proportion to the quantity of earth which is mixed with any quantity of water, that mixture will approach nearer to the nature of an electric *per se*, and *vice versa*.

2. It also follows, that whatever quantity of electricity is communicated to the solid earth, will be quickly taken off from it by the water which is mixed with it, in the same manner that the electric matter is carried off from an excited globe by a metallic conductor.

3. The whole earth is moist, and therefore in some degree a conductor. Nevertheless, as earth of all kinds, when perfectly dry, is found to be an electric capable of receiving a charge like glass, it is therefore possible, that the electric power of the earth may be excited to such a degree, that the moisture of the solid parts cannot easily contain the quantity of electricity communicated.

4. In this case, the earth must either give undoubted signs of its being excited in the same manner that other excited electrics do, or the electricity must be discharged somewhere else.

5. To receive any superfluous quantity of electric matter that may be communicated to the solid earth, the waters of the ocean are always ready. These, being a much better conductor than earth, must be a principal mean of preserving the equilibrium of electricity in the different parts of the earth; and hence we see a natural reason why the waters of the ocean should cover so large a proportion of the globe as they are known to do. See OCEAN.

6. It is known, that fire is also a conductor of electricity. Therefore, wherever a quantity of electric matter is collected in any part of the solid earth, if it can neither be conveniently received by the moisture which the earth naturally contains, nor by the ocean in its neighbourhood, it will discharge itself by any volcano that happens to be in an active state, near the place where that collection of electric matter is.

7. It is also found, that the electric fluid, being violently resisted by the superincumbent atmosphere, hath always a tendency to discharge itself in those places where that resistance is least. The tops of very high mountains, therefore, where the weight of the atmosphere is greatly diminished, will also afford a ready passage for the electric fluid when it is collected in very great quantity in the bowels of the earth.

8. If, from some natural causes, the electric matter shall happen to be collected in the bowels of the earth in any particular place; and at the same time such obstacles are thrown in its way, that it can neither discharge itself into the ocean, nor into the atmosphere, by the tops of high mountains, nor by the more open passages of volcanoes; the most terrible consequences must ensue: the matter being pent up, and the cause by which it is collected continuing still to act, its impulse becomes at last irresistible. It then flies against every obstacle with inconceivable violence. It breaks out in all those places where there is the least resistance, and therefore the shock is directed a great number of different ways at once. Houses, steeples, trees, &c. by their height take off somewhat of the pressure of the atmosphere; and therefore the electric matter flies against them very violently. The houses and other buildings being bad conductors, are thrown down; the trees affording a readier passage to the fluid are not hurt, though even they also are sometimes split. The height of the mountains renders them the objects of the destructive force of this fluid much more than any buildings whatever. Hence they are often rent, and rocks thrown down from them. The water contained in the solid parts of the earth, being a conductor of electricity, becomes overloaded with it; and, when it can receive no more, is forced to yield to the impulse of the rest, and therefore is thrown out of the earth in great quantities. For the same reason, the waters on the surface of the earth are most violently agitated. The small quantities contained in wells are thrown out at the tops of them: The rivers and lakes, which contain too great a quantity of water to be thrown off from the earth, rise in billows: The ocean itself, receiving more electric matter than can immediately be dispersed through the whole body of water, or evaporate into the atmosphere, retreats from the land, and is raised in vast mountains. The solid earth itself, being unable either to conduct the fluid quietly to those parts where it is wanted, or to retain it, is violently shaken, or rent in multitudes of places; and this not only on the surface, but to great depths. The electricity being now in some measure discharged from the earth, the ocean rushes forward with fury to discharge in its turn the excess of electric matter it just before received from the earth. If there are volcanoes in the neighbourhood, the violent discharge of electricity is sure to manifest itself by setting them in a flame; and thus, till the equilibrium is restored, all nature seems to be threatened with dissolution.—Even in those places where the force of the electric fluid is not able to shake the solid parts of the earth, it manifests its power by agitating the waters in the manner above described. Water being a much better conductor of electricity than earth, this subtle fluid, as soon as it can get out from the solid earth, flies to the water. The consequence is, that the water immediately swells up, and

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and is attracted by whatever part of the earth has less electricity than itself. Hence those strange irregular motions of the waters in different places, so particularly observed at the time of the earthquake at Lisbon; and which it seems impossible to account for from any other cause than an immediate discharge of electric matter from the earth into them.

9. As it is impossible that any part of the earth can be electrified without communicating a proportionable share of electricity to the animals that live upon it, and have a constant communication with it, it thence follows, that there can be no considerable commotion in the electric matter lodged in the bowels of the earth, without affecting that which is contained in the bodies of the animals. Hence the brutes, who seem to be more sensible of such commotions than we, run about, and shew signs of fear, before the earthquake comes on; and hence the giddiness, sickness, &c. which the human race are subject to during the time of the shock, even though they do not feel it, as was the case at Gibraltar.

10. As the atmosphere hath a communication with the earth, it is scarce to be supposed that the earth can, for any length of time, contain a considerable quantity of electric matter, without communicating to the atmosphere a proportionable quantity. Before an earthquake, therefore, we must suppose the electricity of the earth and air to be in perfect equilibrio. Hence the weather is serene, there is no wind, nor any other sign in the atmosphere, of the terrible catastrophe that is about to ensue. But the moment the discharge is made from the earth, the equilibrium between the terrestrial and atmospherical electricity is broken; the air either begins to receive the fluid from the earth, or the earth from the air. As there is not then time for the collection of thunder-clouds by which the electricity may be brought down in sudden flashes of lightning, the fluid breaks through the substance of the air itself with dismal and horrid noises, which always accompany an earthquake. That this is the case, seems highly probable from an experiment of M. de Romas, when, having brought down a vast quantity of electric matter from the clouds by means of a kite, he heard the noise it made in the air, like the continual blowing of a small forge bellows. In general, there is a considerable change of weather takes place at the time of an earthquake, tho' not always. In the earthquake which happened in England in 1777, there was no remarkable change of weather there; but, soon after, there was a great deal of thunder and lightning in the southern parts of Scotland: which seems to indicate, that the electric fluid discharged from the earth in England had taken its course northward, and produced the phenomena before mentioned in Scotland.

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Having thus explained all the phenomena attending earthquakes, it remains only to shew by what means the equilibrium of electricity can be broken in the bowels of the earth in such a manner as to produce these phenomena. The ultimate cause of this is mentioned under the article *AURORA BOREALIS*, n° 5. It is there shown, that the warmth of the sun must necessarily bring down to the earth much greater quantities of electric matter in the regions within the tropics, than in the northern and southern climates. It is impossible,

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as is there also observed, that there can be a perpetual accumulation of electricity in one part of the earth, unless there is a passage for it into the atmosphere through some other. Hence, if the electric matter descends from the air into one place of the earth, it must necessarily ascend from the earth into the air in some other place. There must be therefore a continual current of electricity through the bowels of the earth, beginning at the equator, and extending northward and southward to both poles. While this current has a free passage from the earth in the northern and southern regions, every thing goes on quietly; and whatever storms may happen in the atmosphere, the solid earth cannot be affected. Innumerable circumstances, however, may tend to hinder this discharge, and consequently to accumulate the electric matter in particular places. One very obvious cause of this kind, is an excessive frost taking place in any part of the earth whence the electric matter was wont to be discharged. This renders the air itself so electric, that it cannot receive the fluid; at the same time that the water on the surface of the earth, being hard frozen, becomes electric also, and incapable of conducting. Very dry seasons likewise contribute to produce the same effect; and thus the accumulation of electricity in the warmer climates becomes prodigiously great.

It must here be observed, that, with regard to the operations of nature, we cannot always reason analogically from our electric experiments.—If a quantity of electricity is collected in any substance by artificial means, that quantity is taken off in a moment by the touch of any metallic substance, or other good conductor. As the whole earth, therefore, is filled with a conducting substance, namely water, it may very naturally be asked, Why does not the superfluous quantity of electric matter collected in one place, immediately disperse itself through all other parts of the earth by means of the water with which it abounds?—To obviate this difficulty, however, it needs only be remembered, that as the earth is quite full of electric matter all round, no quantity can enter any particular part, without being resisted by the rest which is diffused through the whole globe. This resistance will be proportioned to the facility with which it can escape at other places; and this it never can do, unless the earth is in a proper condition for emitting, and the atmosphere for receiving, it. The pressure, therefore, upon the accumulated quantity of electric matter soon becomes exceedingly great, and its disposition to burst out with violence is every day increased. At last, as the sun still continues to occasion the descent of more and more of the electric fluid, that particular part of the earth becomes fully charged. The consequence of this is, that the waters of fountains become foul; the electric matter being lodged in great quantity in the water, forces it into unusual agitations, by which the earth is mixed with it. The ocean, for the same reason, is raised in huge billows, &c.; and these appearances prognosticate the shock, in the same manner that slight flashes from the knob of an electrified bottle pronounce a discharge of all the electricity contained in it.

Besides the earthquakes above described, whose cause seems to depend entirely on a collection of electric matter in the bowels of the earth, there are others frequently felt in the neighbourhood of volcanoes, which

which are plainly owing to the efforts of the burning matter to discharge itself. These, however, are but slight, and seldom extend to any considerable distance from the burning mountain. For a particular account of them, see the article *VOLCANO*.

EASEL, PIECES, a denomination given by painters to such pieces as are contained in frames, in contradistinction from those painted on ceilings, &c.

EASEMENT, in law, a privilege or convenience which one neighbour has of another, whether by charter or prescription, without profit: such are a way through his lands, a sink, or the like. These, in many cases, may be claimed.

EASING, in the sea-language, signifies the slackening a rope, or the like: thus, to ease the bow-line or sheet, is to let them go slack; to ease the helm, is to let the ship go more large, more before the wind, or more larboard.

EAST, one of the four cardinal points of the world; being that point of the horizon, where the sun is seen to rise when in the equinoctial.

EASTER, a festival of the Christian church, observed in memory of our Saviour's resurrection.

The Greeks call it *pascha*, the Latins *pascha*, an Hebrew word signifying *passage*, applied to the Jewish feast of the passover. It is called *easter* in English, from the goddess Eostre, worshipped by the Saxons with peculiar ceremonies in the month of April.

The Asiatic churches kept their easter upon the very same day the Jews observed their passover; and others, on the first Sunday after the first full moon in the new year. This controversy was determined in the council of Nice; when it was ordained, that easter should be kept upon one and the same day, which should always be a Sunday, in all Christian churches in the world. For the method of finding easter by calculation, see *ASTRONOMY*, n° 308.

EASTER Island, an island in the South Sea, lying in N. Lat. 27. 5. W. Long. 109. 46. It is thought to have been first discovered in 1686 by one DAVIS an Englishman, who called it Davis's Land. It was next visited by Commodore Roggewein, a Dutchman, in 1722; who gave it the name of *Easter Island*, and published many fabulous accounts concerning the country and its inhabitants. It was also visited by a Spanish ship in 1770, the captain of which gave it the name of *St Carlos*. The only authentic accounts of this island, however, which have yet appeared, are those published by Captain Cook and Mr Forster, who visited it in the month of March 1774.—According to these accounts, the island is about 10 or 12 leagues in circumference, and of a triangular figure; its greatest length from north-west to south-east is about four leagues, and its greatest breadth two. The hills are so high, that they may be seen at the distance of 15 or 16 leagues. The north and east points of the island are of a considerable height; between them, on the south-east side, the shore forms an open bay, in which Captain Cook thinks the Dutch anchored in 1722. He himself anchored on the west side of the island, three miles northward from the fourth point. This, he says, is a good road with easterly winds; but a dangerous one when the wind blows from the contrary quarter, as the other on the south-east side must be with easterly winds: so that there is no good accommodation to be had for

shipping round the whole island.

The island itself is extremely barren; and bears evident marks not only of a volcanic origin, but of having been not very long ago entirely ruined by an eruption. As they approached the fourth point, Mr Forster informs us, that they observed the shore to rise perpendicularly. It consisted of broken rocks, whose cavernous appearance, and black or ferruginous colour, seemed to indicate that they had been thrown up by subterraneous fire. Two detached rocks lie about a quarter of a mile off this point: one of them is singular on account of its shape, and represents a huge column or obelisk; and both these rocks were inhabited by multitudes of sea-fowls. On landing and walking into the country, they found the ground covered with rocks and stones of all sizes, which appeared to have been exposed to a great fire, where they seemed to have acquired a black colour and porous texture. Two or three shrivelled species of grasses grew among these stones, and in some measure softened the desolate appearance of the country. The farther they advanced, the more ruinous the face of the country seemed to be. The roads were intolerably rugged, and filled with heaps of volcanic stones, among which the Europeans could not make their way but with the greatest difficulty; but the natives leaped from one stone to another with surprising agility and ease. As they went northward along the island, they found the ground hill of the same nature; till at last they met with a large rock of black melted lava, which seemed to contain some iron, and on which was neither soil nor grass, nor any mark of vegetation. Notwithstanding this general barrenness, however, there are several large tracts covered with cultivated soil, which produces potatoes of a gold yellow colour, as sweet as carrots, plantains, and sugar-canes. The soil is a dry hard clay; and the inhabitants use the grass which grows between the stones in other parts of the island as a manure, and for preserving their vegetables when young, from the heat of the sun.

The most remarkable curiosity belonging to this island is, a number of Colossal statues; of which, however, very few remain entire. These statues are placed only on the sea-coast. On the east side of the island were seen the ruins of three platforms of stonework, on each of which had stood four of these large statues; but they were all fallen down from two of them, and one from the third: they were broken or defaced by the fall. Mr Wales measured one that had fallen, which was 15 feet in length, and six broad over the shoulders: each statue had on its head a large cylindric stone of a red colour, wrought perfectly round. Others were found that measured near 27 feet, and upwards of eight feet over the shoulders; and a still larger one was seen standing, the shade of which was sufficient to shelter all the party, consisting of near 30 persons, from the rays of the sun. The workmanship is rude, but not bad, nor are the features of the face ill formed; the ears are long, according to the distortion practised in the country, and the bodies have hardly any thing of a human figure about them. How these islanders, wholly unacquainted with any mechanical power, could raise such stupendous figures, and afterwards place the large cylindric stones upon their heads, is truly wonderful! The most probable conjecture seems to be, that the stone is facitious; and that each

EsAes.

each figure was gradually erected, by forming a temporary platform round it, and raising it as the work advanced: but they are at any rate very strong proofs of the ingenuity and perseverance of the islanders in the age when they were built, as well as that the ancestors of the present race had seen better days than their descendants enjoy. The water of this island is in general brackish, there being only one well that is perfectly fresh, which is at the east end of the island: and whenever the natives repair to it to slake their thirst, they wash themselves all over; and if there is a large company, the first leaps into the middle of the hole, drinks, and washes himself without ceremony; after which another takes his place, and so on in succession. This custom was much disapproved by their new friends, who stood greatly in need of this valuable article, and did not wish to have it contaminated by such ablutions.

The people are of a middle size. In general, they are rather thin; go entirely naked; and have punctures on their bodies, a custom common to all the inhabitants of the South-Sea Islands. Their greatest singularity is the size of their ears, the lobe of which is stretched out so that it almost rests on their shoulder; and is pierced with a very large hole, capable of admitting four or five fingers with ease. The chief ornaments for their ears are the white down of feathers and rings which they wear in the inside of the hole, made of the leaf of the sugar-cane, which is very elastic, and for this purpose is rolled up like a watch-spring. Some were seen clothed in the same cloth used in the island of Otaheite, tinged of a bright orange-colour with turmeric; and these our voyagers supposed to be chiefs. Their colour is a chestnut-brown; their hair black, curling, and remarkably strong; and that on the head as well as the face is cut short. The women are small, and slender-limbed: they have punctures on the face, resembling the patches sometimes used by European ladies; they paint their face all over with a reddish brown ruddle, and above this they lay a fine orange-colour extracted from turmeric-root; the whole is then variegated with streaks of white shell-lime. But the most surprising circumstance of all with regard to these people, is the apparent scarcity of women among them. The nicest calculation that could be made, never brought the number of inhabitants in this island to above 700, and of these the females bore no proportion in number to the males. Either they have but few females; or else their women were restrained from appearing during the stay of the ship, notwithstanding, the men shewed no signs of a jealous disposition, or the women any scruples of appearing in public: in fact, they seemed to be neither reserved nor chaste; and the large pointed cap which they wore, gave them the appearance of professed wantons: but as all the women who were seen were liberal of their favours, it is more than probable, that all the married and modest ones had concealed themselves from their impetuous visitors, in some inscrutable parts of the island; and what further strengthens this supposition is, that heaps of stones were seen piled up into little hillocks, which had one steep perpendicular side, where a hole went under ground. The space within, says Mr Forster, could be but small; and yet it is probable, that these cavities served, together with their miserable huts, to give shel-

ter to the people at night; and they may communicate with natural caverns, which are very common in the lava currents of volcanic countries. The few women that appeared, were the most lascivious of their sex that perhaps have been ever noticed in any country, and shame seemed to be entirely unknown to them.

EATON, a town of Buckinghamshire, situated on the north side of the Thames, opposite to Windsor, and famous for its collegiate school, founded by king Henry VI. being a seminary for king's college Cambridge, the fellows of which are all from this school.

EAU DE CARMES. See PHARMACY, n° 571.

EAU DE LUCE. See CHEMISTRY, n° 335. and PHARMACY, n° 671.

EAVES, in architecture, the margin or edge of the roof of an house; being the lowest tiles, slates, or the like, that hang over the walls, to throw off water to a distance from the wall.

EAVES-DROPPERS, are such persons as stand under the eaves, or walls, and windows of a house, by night or day, to hearken after news, and carry it to others, and thereby cause strife and contention in the neighbourhood. They are called *evil members of the commonwealth*, by the stat. of West. 1. c. 33. They may be punished, either in the court-leet, by way of presentment and fine; or in the quarter-sessions, by indictment, and binding to good behaviour.

EBBING of the TIDES. See TIDE.

EBDOMARIUS, in ecclesiastical writers, an officer formerly appointed weekly to superintend the performance of divine service in cathedrals, and prescribe the duties of each person attending in the choir, as to reading, singing, praying, &c.

EBENUS, the EBONY-TREE; a genus of the decandria order, belonging to the diadelphia class of plants. There is but one species, the cretica, a native of the island of Crete, and some others in the Archipelago. It rises with a shrubby stalk three or four feet high; which puts out several side-branches garnished with hoary leaves at each joint, composed of five narrow spear-shaped lobes, which join at their tails to the footstalk, and spread out like the fingers of a hand. The branches are terminated by thick spikes of large purple flowers, which are of the butterfly or peabloom kind. The plants may be propagated from seeds sown in the autumn. In this country, the plants must be protected during the winter, as they are unable to bear the cold.

EBION, the author of the heresy of the EBIONITES, was a disciple of Cerinthus, and his successor. He improved upon the errors of his master, and added to them new opinions of his own. He began his preaching in Judea: he taught in Asia, and even at Rome: his tenets infected the isle of Cyprus. St John opposed both Cerinthus and Ebion in Asia; and it is thought, that this apostle wrote his gospel, in the year 97, particularly against this heresy.

EBIONITES, in church history, heretics of the first century, so called from their leader EBION. They, as well as the Nazarenes, had their origin from the circumcised Christians, who had retired from Jerusalem to Pella during the war between the Jews and Romans; and made their first appearance, after the destruction of Jerusalem, about the time of Domitian, or a little before.

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They held the fame ceremonies with the Nazarenes, united the ceremonies of the Mosaic institution with the precepts of the gospel, observed both the Jewish sabbath and Christian Sunday, and in celebrating the eucharist made use of unleavened bread. They abstained from the flesh of animals, and even from milk. In relation to Jesus Christ, some of them held that he was born like other men, of Joseph and Mary, and acquired sanctification only by his good works. Others of them allowed, that he was born of a virgin; but denied that he was the Word of God, or had any existence before his human generation. They said, he was indeed the only true Prophet; but yet a mere man, who, by his virtue, had arrived at being called *Christ*, and the *Son of God*. They also supposed, that Christ and the devil were two principles, which God had opposed to each other. Of the New Testament they only received the gospel of St Matthew, which they called the *gospel according to the Hebrews*.

EBONY. See **EBENUS**.—This wood is exceedingly hard, heavy, and susceptible of a very fine polish; on which account it is used in Mosaic and inlaid works, toys, &c. The best is of a jet black, free of veins and rind, very massive, astringent, and of a sharp pungent taste.

The cabinet-makers, inlayers, &c. make pear-tree and other woods pass for ebony, by ebonying, or giving it the black colour. This some do by a few washes of a hot decoction of galls, and when dry adding writing ink thereon, and polishing it with a stiff brush and a little hot wax. Others heat, or burn their wood black.

EBRO, anciently **IBERUS**, a large river of Spain, which, taking its rise in Old Castile, runs thro' Biscay and Arragon, passes by Saragosa, and, continuing its course thro' Catalonia, discharges itself with great rapidity into the Mediterranean, about 20 miles below the city of Tortosa.

EBULLITION, the same with **BOILING**. The word is also used in a synonymous sense with **EFFERVESCENCE**.

ECHELLENSIS (Abraham), a learned Maronite, whom the president le Jai employed in the edition of his Polyglott Bible. Gabriel Sionita, his countryman, drew him to Paris, in order to make him his fellow-labourer in publishing that bible. They fell out: Gabriel complained to the parliament, and cruelly defamed his associate; their quarrel made a great noise. The congregation de *propaganda fide* associated him, 1536, with those whom they employed in making an Arabic translation of the scripture. They recalled him from Paris, and he laboured in that translation at Rome in the year 1652. While he was professor of the Oriental languages at Rome, he was pitched upon by the great duke Ferdinand II. to translate from Arabic into Latin the 5th, 6th, and 7th books of Apollonius's Conics; in which he was assisted by John Alphonso Borelli, who added commentaries to them. He died at Rome in 1664.

ECCHYMOISIS, from εκχυω, to pour out, or from εκς, out of, and χυμα, juice. It is an effusion of humours from their respective vessels, under the integuments; or, as Paulus Aegineta says, "When the flesh is bruised by the violent collision of any object, and its small veins broken, the blood is gradually discharged

from them." This blood, when collected under the skin, is called an *ecchymosis*, the skin in the mean time remaining entire; sometimes a tumour is formed by it, which is soft and livid, and generally without pain. If the quantity of blood is not considerable, it is usually resorbed; if much, it suppurates; it rarely happens that any further inconvenience follows; though, in case of a very bad habit of body, a mortification may be the result, and in such a case regard must be had thereto.

ESCLAIRCISSEMENT. See **ESCLAIRCISSEMENT**.

ECCLESIASTES, a canonical book of the Old Testament, the design of which is to shew the vanity of all sublunary things.

It was composed by Solomon; who enumerates the several objects on which men place their happiness, and then shews the insufficiency of all worldly enjoyments.

The Talmudists make king Hezekiah to be the author of it; Grotius ascribes it to Zorobabel, and others to Isaiah; but the generality of commentators believe this book to be the produce of Solomon's repentance, after having experienced all the follies and pleasures of life.

ECCLESIASTICAL, an appellation given to whatever belongs to the church: thus we say, ecclesiastical polity, jurisdiction, history, &c.

ECCLESIASTICAL Courts. In the time of the Anglo-Saxons there was no sort of distinction between the lay and the ecclesiastical jurisdiction: the county-court was as much a spiritual as a temporal tribunal: the rights of the church were ascertained and asserted at the same time, and by the same judges, as the rights of the laity. For this purpose the bishop of the diocese, and the alderman, or in his absence the sheriff of the county, used to sit together in the county-court, and had there the cognizance of all causes as well ecclesiastical as civil; a superior deference being paid to the bishop's opinion in spiritual matters, and to that of the lay-judges in temporal. This union of power was very advantageous to them both: the presence of the bishop added weight and reverence to the sheriff's proceedings; and the authority of the sheriff was equally useful to the bishop, by enforcing obedience to his decrees in such refractory offenders as would otherwise have despised the thunder of mere ecclesiastical censures.

But so moderate and rational a plan was wholly inconsistent with those views of ambition that were then forming by the court of Rome. It soon became an established maxim in the papal system of policy, that all ecclesiastical persons and all ecclesiastical causes should be solely and entirely subject to ecclesiastical jurisdiction only: which jurisdiction was supposed to be lodged in the first place and immediately in the Pope, by divine indefeasible right and investiture from Christ himself, and derived from the Pope to all inferior tribunals. Hence the canon law lays it down as a rule, that "*sacerdotes a regibus honorandi sunt, non judicandi*"; and places an emphatical reliance on a fabulous tale which it tells of the emperor Constantine. That when some petitions were brought to him, imploring the aid of his authority against certain of his bishops accused of oppression and injustice, he caused (says the holy canon)

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the petitions to be burnt in their presence, dismissing them with this validation; "*Ite, et inter vos causas vestras discutite, quia dignum non est ut nos judicemus Deos.*"

It was not, however, till after the Norman conquest, that this doctrine was received in England; when William I. (whose title was warmly espoused by the monasteries which he liberally endowed, and by the foreign clergy, whom he brought over in shoals from France and Italy, and planted in the best preferments of the English church), was at length prevailed upon to establish this fatal encroachment, and separate the ecclesiastical court from the civil: whether actuated by principles of bigotry, or by those of a more refined policy, in order to discountenance the laws of king Edward abounding with the spirit of Saxon liberty, is not altogether certain. But the latter, if not the cause, was undoubtedly the consequence, of this separation: for the Saxon laws were soon overborne by the Norman justiciaries, when the county-court fell into disrepute by the bishop's withdrawing his presence, in obedience to the charter of the conqueror; which prohibited any spiritual cause from being tried in the secular courts, and commanded the suitors to appear before the bishop only, whose decisions were directed to conform to the canon law.

King Henry the first, at his accession, among other restorations of the laws of king Edward the Confessor, revived this of the union of the civil and ecclesiastical courts. Which was, according to Sir Edward Coke, after the great heat of the conquest was past, only a restitution of the ancient law of England. This however was ill relished by the Popish clergy, who, under the guidance of that arrogant prelate archbishop Anselm, very early disapproved of a measure that put them on a level with the profane laity, and subjected spiritual men and causes to the inspection of the secular magistrates: and therefore, in their synod at Westminster, 3 Hen. I. they ordained, that no bishop should attend the discussion of temporal causes; which soon dissolved this newly effected union. And when, upon the death of king Henry the first, the usurper Stephen was brought in and supported by the clergy, we find one article of the oath which they imposed upon him was, that ecclesiastical persons and ecclesiastical causes should be subject only to the bishop's jurisdiction. And as it was about that time that the contest and emulation began between the laws of England and those of Rome, the temporal courts adhering to the former, and the spiritual adopting the latter, as their rule of proceeding; this widened the breach between them, and made a coalition afterwards impracticable; which probably would else have been effected at the general reformation of the church.

Ecclesiastical Courts are various; as the ARCHDEACON'S, the CONSISTORY, the COURT of ARCHES, the PECULIARS, the PREROGATIVE, and the great court of appeal in all ecclesiastical causes, viz. the Court of DELEGATES. See these articles.

As to the method of proceeding in the spiritual courts, it must (in the first place) be acknowledged to their honour, that though they continue to this day to decide many questions which are properly of temporal cognizance, yet justice is in general so ably and impartially administered in those tribunals, (especially of

the superior kind,) and the boundaries of their power are now so well known and established, that no material inconvenience at present arises from this jurisdiction still continuing in the ancient channel. And, should any alteration be attempted, great confusion would probably arise, in overturning long established forms, and new-modelling a course of proceedings that has now prevailed for seven centuries.

The establishment of the civil-law process in all the ecclesiastical courts was indeed a masterpiece of papal discernment, as it made a coalition impracticable between them and the national tribunals, without manifest inconvenience and hazard. And this consideration had undoubtedly its weight in causing this measure to be adopted, though many other causes concurred. In particular, it may be here remarked, that the pandects, or collections of civil law, being written in the Latin tongue, and referring so much to the will of the prince and his delegated officers of justice, sufficiently recommended them to the court of Rome, exclusive of their intrinsic merit. To keep the laity in the darkest ignorance, and to monopolize the little science which then existed entirely among the monkish clergy, were deep-rooted principles of papal policy. And, as the bishops of Rome affected in all points to mimic the imperial grandeur, as the spiritual prerogatives were moulded on the pattern of the temporal, so the canon-law process was formed on the model of the civil law; the prelates embracing, with the utmost ardor, a method of judicial proceedings, which was carried on in a language unknown to the bulk of the people, which banished the intervention of a jury (that bulwark of Gothic liberty), and which placed an arbitrary power of decision in the breast of a single man.

The proceedings in the ecclesiastical courts are therefore regulated according to the practice of the civil and canon laws; or rather to a mixture of both, corrected and new-modelled by their own particular usages, and the interposition of the courts of common law. For, if the proceedings in the spiritual court be ever so regularly consonant to the rules of the Roman law, yet if they be manifestly repugnant to the fundamental maxims of the municipal laws, to which, upon principles of sound policy, the ecclesiastical process ought in every state to conform; (as if they require two witnesses to prove a fact, where one will suffice at common law); in such cases, a prohibition will be awarded against them. But, under these restrictions, their ordinary course of proceeding is, first, by *citation*, to call the party injuring before them. Then by *libel*, (*libellus*, a little book,) or by articles drawn out in a formal *allegation*, to set forth the complainant's ground of complaint. To this succeeds the *defendant's answer* upon oath; when, if he denies or extenuates the charge, they proceed to *proofs* by witnesses examined, and their depositions taken down in writing by an officer of the court. If the defendant has any circumstances to offer in his defence, he must also propound them in what is called his *defensive allegation*, to which he is entitled in his turn to the *plaintiff's answer* upon oath, and may from thence proceed to *proofs* as well as his antagonist. The canonical doctrine of *purgation*, whereby the parties were obliged to answer upon oath to any matter, however criminal, that might be objected against them, (though long ago over-ruled in the court of

chancery, the genius of the English law having broken through the bondage imposed on it by its clerical chancellors, and asserted the doctrines of judicial as well as civil liberty) continued till the middle of the last century, to be upheld by the spiritual courts; when the legislature was obliged to interpose, to teach them a lesson of similar moderation. By the statute of 13 Car. II. c. 12. it is enacted, that it shall not be lawful for any bishop, or ecclesiastical judge, to tender or administer to any person whatsoever, the oath usually called the oath *ex officio*, or any other oath whereby he may be compelled to confess, accuse, or purge himself of any criminal matter or thing, whereby he may be liable to any censure or punishment. When all the pleadings and proofs are concluded, they are referred to the consideration, not of a jury, but of a single judge; who takes information by hearing advocates on both sides, and thereupon forms his *interlocutory decree* or *definitive sentence*, at his own discretion: from which there generally lies an *appeal*, in the several stages mentioned in the articles above referred to; tho' if the same be not appealed from him in 15 days, it is final, by the statute 25 Hen. VIII. c. 19.

But the point in which these jurisdictions are the most defective, is that of enforcing their sentences when pronounced; for which they have no other process, but that of *excommunication*; which would be often despised by obdurate or profligate men, did not the civil law step in with its aid. See EXCOMMUNICATION.

ECCLESIASTICAL Corporations, are where the members that compose them are *spiritual* persons. They were erected for the furtherance of religion and perpetuating the rights of the church. See CORPORATIONS.

ECCLESIASTICAL State. See CLERGY.

ECCLESIASTICUS, an apocryphal book, generally bound up with the scriptures, so called, from its being read in the church, *ecclesia*, as a book of piety and instruction, but not of infallible authority.

The author of this book was a Jew, called *Jesús the son of Sirach*. The Greeks call it the *Wisdom of the son of Sirach*.

ECCOPROTICS, in pharmacy. See CATHARTICS, and EVACUANTS.

ECHAPE, in the menage, a horse begot between a stallion and a mare of different breeds and countries.

ECHAPER, in the menage, a gallicism used in the academies, implying to give a horse head, or to put on at full speed.

ECHENEIS, in ichthyology, a genus belonging to the order of thoracici. The head is fat, naked, depressed, and marked with a number of transverse ridges; it has ten rays in the branchiostegic membrane; and the body is naked. There are two species, viz. 1. The remora, or sucking-fish, with a forked tail, and 18 friz on the head. It is found in the Indian ocean. 2. The neureutes, with an undivided tail, and 24 friz on the head. It is likewise a native of the Indian ocean. See Plate CII.

ECHVIN, in the French and Dutch polity, a magistrate elected by the inhabitants of a city or town, to take care of their common concerns, and the decoration and cleanliness of the city.

At Paris, there is a prévôt, and four echevins; in other towns, a mayor and echevins. At Amsterdam, there are nine echevins; and, at Rotterdam, seven.

In France, the echevins take cognizance of rents, taxes, and the navigation of rivers, &c. In Holland, they judge of civil and criminal causes; and if the criminal confesses himself guilty, they can see their sentence executed without appeal.

ECHINATE, or ECHINATED, an appellation given to whatever is prickly, thereby resembling the hedgehog.

ECHINITES, in natural history, the name by which authors call the fossil centronia, frequently found in our chalk-pits. See CENTRONIA.

ECHINI MARINI. See ECHINUS.

ECHINUS, in zoology, a genus of insects belonging to the order of vermes mollusca. The body is roundish, covered with a bony crust, and often beset with moveable prickles; and the mouth is below, and consists of five valves. 1. The specimen on Plate CI. is the esculentus, or eatable echinus. It is of a hemispherical form, covered with sharp strong spines, above half an inch long; commonly of a violet colour; moveable; adherent to small tubercles elegantly disposed in rows. These are their instruments of motion by which they change their place. This species is taken in dredging, and often lodges in cavities of rocks just within low water mark. They are eaten by the poor in many parts of England, and by the better sort abroad. In old times they were a favourite dish. They were dressed with vinegar, honied wine or mead, parsley or mint; and thought to agree with the stomach. They were the first dish in the famous supper of Lentulus, when he was made *flamen Martialis*, or priest of Mars. By some of the concomitant dishes, they seem designed as a whet for the second course, to the holy peronages, priests and vestals invited on that occasion. Many species of shell-fish made part of that entertainment. 2. The lacunosus, or oval echinus, is of an oval depressed form; on the top it is of a purple colour, marked with a quadrefoil, and the spaces between tuberculated in waved rows; the lower side fluted, and divided by two smooth spaces. Length, four inches. When clothed, it is covered with short thickset bristles mixed with very long ones.—There are 15 other species, all natives of the sea.

ECHINUS, in architecture, a member or ornament near the bottom of the Ionic, Corinthian, and Composite capitals.

ECHIU, VIPER'S BUGLOSS; a genus of the monogynia order, belonging to the pentandria class of plants. There are seven species, three of which are natives of Britain. None of them have any remarkable property, except that the flowers of one species (the vulgar) are very grateful to bees. It is a native of many parts of Britain. The stem is rough with hairs and tubercles. The leaves are spear-shaped, and rough with hair. The flowers come out in lateral spikes. They are first red, afterwards blue; sometimes purple or white.—Cows and sheep are not fond of the plant; horses and goats refuse it.

ECHO, or ЕСНО, a sound reflected or reverberated, from a solid, concave, body, and so repeated to the ear*. The word is formed from the Greek *ἠχώ*, * See Acoustic, n° 27.
sound, which comes from the verb *ἠχάω*, *sona*.

The ancients being wholly unacquainted with the true cause of the echo, ascribed it to several causes sufficiently whimsical. The poets, who were not the

worst of their philosophers, imagined it to be a person of that name metamorphosed, and that she affected to take up her abode in particular places; for they found by experience, that she was not to be met with in all. (See below, *ЕCHO* in *fabulous history*.) But the moderns, who know found to consist in a certain tremor or vibration in the sonorous body communicated to the contiguous air, and by that means to the ear, give a more consistent account of echo.

For a tremulous body, striking on another solid body, it is evident, may be repelled without destroying or diminishing its tremor; and consequently a sound may be redoubled by the reflection of the tremulous body, or air.

But a simple reflexion of the sonorous air, is not enough to solve the echo: for then every plain surface of a solid hard body, as being fit to reflect a voice or sound, would redouble it; which we find does not hold.

To produce an echo, therefore, it should seem that a kind of concameration or vaulting were necessary, in order to collect, and by collecting to heighten and increase, and afterwards reflect, the sound; as we find is the case in reflecting the rays of light, where a concave mirror is required.

In effect, as often as a sound strikes perpendicularly on a wall, behind which is any thing of a vault or arch, or even another parallel wall; so often will it be reverberated in the same line, or other adjacent ones.

For an echo to be heard, therefore, it is necessary the ear be in the line of reflection: for the person who made the sound to hear its echo, it is necessary he be perpendicular to the place which reflects it: and for a manifold or tautological echo, it is necessary there be a number of walls, and vaults or cavities, either placed behind or fronting each other.

A single arch or concavity, &c. can scarce ever stop and reflect all the sound; but if there be a convenient disposition behind it, part of the sound propagated thither, being collected and reflected as before, will present another echo: or, if there be another concavity, opposed at a due distance to the former, the sound reflected from the one upon the other will be tossed back again by this latter, &c.

Many of the phenomena of echos, are well considered by the bishop of Leighs, &c. who remarks, that any sound, falling either directly or obliquely on any dense body of a smooth, whether plain or arched, superficies, is reflected, or echos, more or less. The surface, says he, must be smooth; otherwise the air, by reverberation, will be put out of its regular motion, and the sound thereby broken and extinguished. He adds, that it echos more or less, to show, that when all things are as before described, there is still an echoing, tho' it be not always heard; either because the direct sound is too weak to beat quite back again to him that made it; or that it does return to him, but so weak, that it cannot be discerned; or that he stands in a wrong place to receive the reflected sound, which passes over his head, under his feet, or on one side of him; and which therefore may be heard by a man standing in the place where the reflected sound does come, provided no interrupted body intercepts it, but not by him that first made it.

Echos may be produced with different circumstan-

ces. For, 1. A *plane* obstacle reflects the sound back in its due tone and loudness; allowance being made for the proportionable decrease of the sound, according to its distance.

2. A *convex* obstacle reflects the sound somewhat smaller and somewhat quicker, though weaker, than otherwise it would be.

3. A *concave* obstacle echos back the sound, bigger, slower, and also inverted; but never according to the order of words.

Nor does it seem possible to contrive any single echo, that shall invert the sound, and repeat backwards; because, in such case, the word last spoken, that is, which last occurs to the obstacle, must be repelled first; which cannot be. For where in the mean time should the first words hang and be concealed; or how, after such a pause, be revived, and animated again into motion?

From the determinate concavity or arches of the reflecting bodies, it may happen that some of them shall only echo back one determinate note, and only from one place.

4. The echoing body being removed farther off, it reflects more of the sound than when nearer; which is the reason why some echos repeat but one syllable, some one word, and some many.

5. Echoing bodies may be so contrived and placed, as that reflecting the sound from one to the other, either directly and mutually, or obliquely and by succession, out of one sound, a multiple echo or many echos shall arise.

Add, that a multiple echo may be made, by so placing the echoing bodies at unequal distances, that they may reflect all one way, and not one on the other; by which means, a manifold successive sound will be heard: one clap of the hands, like many; or *ha*, like a laughter; one single word, like many of the same tone and accent; and so one viol, like many of the same kind, imitating each other.

Lastly, echoing bodies may be so ordered, that, from any one sound given, they shall produce many echos different both as to tone and intention. By which means a musical room may be so contrived, that not only one instrument playing therein, shall seem many of the same fort and size, but even a concert of different ones, only by placing certain echoing bodies fo, that any note played, shall be returned by them in 3ds, 5ths, and 8ths.

Echo, is also used for the place where the repetition of the sound is produced or heard.

Echos are distinguished into divers kinds, viz.

1. *Singles*, which return the voice but once. Whereof some are *tonical*, which only return a voice when modulated into some particular musical tone: Others, *polysyllabical*, which return many syllables, words, and sentences. Of this last kind is that fine echo in Woodstock-park, which Doctor Plot assures us, in the day-time, will return very distinctly seventeen syllables, and in the night twenty.

2. *Multiple, or tautological*; which return syllables and words the same oftentimes repeated.

In echos, the place where the speaker stands is called the *centrum phonicum*; and the object or place that returns the voice, the *centrum phonocampiticum*.

At the sepulchre of Metella, wife of Crassus, was an echo, which repeated what a man said, five times.

Authors

Echo
||
Eclectics.

Authors mention a tower at Cyzicus, where the echo repeated seven times. One of the finest echoes we read of is that mentioned by Barthius, in his notes on Statius's *Thebais*, lib. vi. 30. which repeated the words a man uttered 17 times: it was on the banks of the Naba, between Coblentz and Bingen. Barthius assures us, he had proved what he writes; and had told 17 repetitions. And whereas, in common echoes, the repetition is not heard till some time after hearing the word spoke, or the notes sung; in this, the person who speaks, or sings, is scarce heard at all; but the repetition most clearly, and always in surprising varieties; the echo seeming sometimes to approach nearer, and sometimes to be further off. Sometimes the voice is heard very distinctly, and sometimes scarce at all. One hears only one voice, and another several: one hears the echo on the right, and the other on the left, &c. At Milan in Italy, is an echo which reiterates the report of a pistol 56 times; and if the report is very loud, upwards of 60 reiterations may be counted. The first 20 echoes are pretty distinct; but as the noise seems to fly away, and answer at a greater distance, the reiterations are so doubled, that they can scarce be counted.

ECHO, in architecture, a term applied to certain kinds of vaults and arches, most commonly of the elliptic and parabolic figures, used to redouble sounds, and produce artificial echoes.

ECHO, in poetry, a kind of composition wherein the last words or syllables of each verse contain some meaning, which, being repeated apart, answers to some question or other matter contained in the verse; as in this beautiful one from Virgil:

*Cruclis mater magis, an puer improbus ille?
Improbus ille puer, crudelis in quoque mater.*

The elegance of an echo consists in giving a new sense to the last words; which reverberate, as it were, the motions of the mind, and by that means affect it with surprise and admiration.

ECHO, in fabulous history, a nymph in love with Narcissus; but being despised by him, pined herself to death, having nothing but her voice left.

ECHOMETER, among musicians, a kind of scale or rule, with several lines thereon, serving to measure the duration and length of sounds, and to find their intervals and ratios.

ECKIUS (John), an eminent and learned divine, professor in the university of Ingoldstadt, memorable for the opposition he gave to Luther, Melancthon, Caralotadius, and other leading Protestants in Germany. He wrote many polemical tracts; and among the rest, a *Manual of Controversies*, printed in 1535, in which he discourses upon most of the heads contested between the Protestants and Papists. He was a man of uncommon learning, parts, and zeal, and died in 1543.

ECLECTICS, ancient philosophers, who, without attaching themselves to any particular sect, selected whatever appeared to them the best and most rational, from each.

Potamon of Alexandria was the first of the eclectics: he lived in the reigns of Augustus and Tiberius; and being tired with the scepticism of the Pyrrhonians, he resolved upon a scheme that would allow him to believe something, but without being so implicit as to swallow

any entire hypothesis.

ECLIPSE, in astronomy, the deprivation of the light of the sun, or of some heavenly body, by the interposition of another heavenly body between our sight and it. See ASTRONOMY, n^o 227.

ECLIPTIC, in astronomy, a great circle of the sphere, supposed to be drawn through the middle of the zodiac, making an angle with the equinoctial of about 23° 30', which is the sun's greatest declination; or, more strictly speaking, it is that path or way among the fixed stars, that the earth appears to describe to an eye placed in the sun. See ASTRONOMY.

Some call it *via Solis*, "the way of the sun;" because the sun in his apparent annual motion never deviates from it, as all the other planets do more or less. It is called *ecliptic*, by reason 'all eclipses happen when the planets are in, or near, its Node.

ECLIPTIC, in geography, a great circle on the terrestrial globe, not only answering to, but falling within, the plane of the celestial ecliptic. See GEOGRAPHY.

ECLOGUE, in poetry, a kind of pastoral composition, wherein shepherds are introduced conversing together.

The word is formed from the Greek *εχλον*, choice; so that, according to the etymology, *eclogue* should be no more than a select or choice piece; but custom has determined it to a farther signification, viz. a little elegant composition in a simple, natural style and manner.

Idyllion and eclogue, in their primary intention, are the same thing: thus, the idyllia, *ιδυλλια*, of Theocritus, are pieces wrote perfectly in the same vein with the *eclogæ* of Virgil. But custom has made a difference between them, and appropriated the name *eclogue*, to pieces wherein shepherds are introduced speaking; *idyllion*, to those wrote like the eclogue, in a simple natural style, but without any shepherds in them.

ECLUSE, a small but strong town of the Dutch Low Countries, in the county of Flanders, with a good harbour and sluices. The English besieged it in vain in 1405, and the people of Bruges in 1436. But the Dutch, commanded by Count Maurice of Nassau, took it in 1644. It is defended by several forts, and stands near the sea. E. Long. 3. 10. N. Lat. 50. 25.

ECPHRACTICS, in medicine, remedies which attenuate and remove obstructions. See ATTENUANTS, and DEOBSTRUENTS.

ECTHESIS, in church-history, a confession of faith, in the form of an edict, published in the year 639, by the emperor Heraclius, with a view to pacify the troubles occasioned by the Eutychian heresy in the eastern church. However, the same prince revoked it, on being informed that pope Severinus had condemned it, as favouring the Monothelites; declaring at the same time, that Sergius, patriarch of Constantinople, was the author of it.

ECTHILIPSIS, among Latin grammarians, a figure of prosody whereby the *m* at the end of a word, when the following word begins with a vowel, is elided, or cut off, together with the vowel preceding it, for the sake of the measure of the verse: thus they read *muli'* *ille*, for *multum ille*.

ECTROPIUM, in surgery, is when the eye-lids are inverted, or retracted, so that they show their internal or red surface, and cannot sufficiently cover the eye.

ECTYLOTICS, in pharmacy, remedies proper for

Eclipse
||
Ectropium.

^{Edin.} confuming callosities.
^{Edinburgh.} ECU, or ESCU, a French crown; for the value of which, see MONEY.

EDDISH, or EADISH, the latter pasture, or grags that comes after mowing or reaping; otherwise called *eagragh*, or *earsh*, and *etch*.

EDDOES, or EDDERS, in botany; the American name of the ARUM perigrinum.

EDDY TIDE, or EDDY WATER, among seamen, is where the water runs back contrary to the tide; or that which hinders the free passage of the stream, and so causes it to return again.

EDDY-Wind is that which returns or is beat back from a sail, mountain, or any thing that may hinder its passage.

EDELINCK (Gerard), a famous engraver, born at Antwerp, where he was instructed in drawing and engraving. He settled at Paris, in the reign of Lewis XIV. who made him his engraver in ordinary. Edelinck was also counsellor in the Royal Academy of Painting. His print of the Holy Family, copied from Raphael, those of Alexander visiting the family of Darius, and the Penitent Magdalen, from le Brun, are particularly admired. His works are particularly esteemed for the neatness of the engraving, the brilliant cast, and the prodigious ease apparent in the execution; and to this facility is owing the great number of plates we have of his, among which are excellent portraits of a great number of illustrious men of his time. He died in 1707, in an advanced age, at the Hotel Royal at the Gobelins, where he had an apartment. He had a brother named John, who was a skilful engraver, but died young.

EDGINGS, in gardening, the series of small but durable plants, set round the edges or borders of flowerbeds, &c. The best and most durable of all plants for this use, is box; which, if well planted, and rightly managed, will continue in strength and beauty for many years. The seasons for planting this, are the autumn, and very early in the spring; and the best species for this purpose is the dwarf Dutch box.

Formerly, it was also a very common practice to plant borders, or edgings, of aromatic herbs; as thyme, favory, hyssop, lavender, and the like: but these are all apt to grow woody, and to be in part, or wholly, destroyed in hard winters. Daisies, thrift, or sea july-flower, and chamomile, are also used by some for this purpose: but they require yearly transplanting, and a great deal of trouble, else they grow out of form; and they are also subject to perish in very hard seasons.

EDICT, in matters of polity, an order or instrument, signed and sealed by a prince, to serve as a law to his subjects. We find frequent mention of the edicts of the prætor, the ordinances of that officer in the Roman law. In the French law, the edicts are of several kinds: some importing a new law or regulation; others, the erection of new offices; establishments of duties, rents, &c.; and sometimes articles of pacification. In France, edicts are much the same as a proclamation is with us: but with this difference, that the former have the authority of a law in themselves, from the power which issues them forth; whereas the latter are only declarations of a law, to which they refer, and have no power in themselves.

EDINBURGH, a city of Mid-Lothian in Scot-

land, and capital of the whole kingdom; situated in ^{Edinburgh.} W. Long. 3°. N. Lat. 56°.

The origin of the name of *Edinburgh*, like that of most other cities, is obscure and uncertain. Some think it is derived from *Edh*, supposed to be a king of the Picts; others from *Edwin*, a Saxon prince of Northumberland, who, about the year 617, over-ran great part of the Pictish territories: others chose to derive it from two Gaelic words, *Dun Edin*, which signify the face of a hill.—The name *Edinburgh* itself, however, seems to have been unknown in the time of the Romans. The most ancient title by which we find this city distinguished, is that of *Castell Mynydd Agned*; which, in the British language, signifies “the fortress of the hill of St Agnes.” Afterwards it was named *Castrum Puellarum*, because the Pictish princesses were educated in the castle (a necessary protection in those barbarous ages) till they were married.—The ages in which these names were given, cannot indeed now be exactly ascertained; but the town certainly cannot boast of very great antiquity, since, as Mr Whitaker informs us, the celebrated king Arthur fought a battle on the spot where it is situated, towards the end of the fifth century.

The Romans, during the time they held the dominion of part of this island, divided their possessions into six provinces. The most northerly of these was called *Valentia*, which comprehended all the space between the walls of ADRIAN and SEVERUS. Thus, Edinburgh, lying on the very out-skirts of that province which was most exposed to the ravages of the barbarians, became perpetually subject to wars and devastations; by means of which, the time of its first foundation cannot now be guessed at.

The castle is certainly very ancient. It continued in the hands of the Saxons or English from the invasion of *Ola* and *Ebysa* in the year 452, till the defeat of Egfrid king of Northumberland in 685 by the Picts, who then repossessed themselves of it. The Saxon kings of Northumberland reconquered it in the 9th century, and it was retained by their successors till the year 956, when it was given up to Indulphus king of Scotland. In 1093 it was unsuccessfully besieged by the usurper Donald Bane. Whether the city was at that time founded or not, is uncertain. Most probably it was: for as protection from violence was necessary in those barbarous ages, the castle of Edinburgh could not fail of being an inducement to many people to settle in its neighbourhood; and thus the city would gradually be founded, and increase.—In 1128, king David I. founded the Abbey of Holyroodhouse, for certain canons regular; and granted them a charter, in which he styled the town, *Burgo meo de Edwinesburg*, “my borough of Edinburgh.” By the same charter he granted these canons 40 shillings yearly out of the town revenues; and likewise 48 shillings more, from the same, in case of the failure of certain duties payable from the king’s revenue; and likewise one half of the tallow, lard, and hides, of all the beasts killed in Edinburgh.

In 1174, the castle of Edinburgh was surrendered to Henry II. of England, in order to purchase the liberty of king William I. who had been defeated and taken prisoner by the English. But when William recovered his liberty, he entered into an alliance with Henry, and

¹ Origin of the name.

² Time of its foundation uncertain.

³ Castle surrendered to the English.

Edinburgh. and married his cousin Ermengarde; upon which the castle was refortified, as part of the queen's dowry.

In 1215, this city was first distinguished by having a parliament and provincial fynod held in it.—In 1296, the castle was besieged and taken by Edward I. of England; but was recovered from the English in 1313 by Randolph earl of Moray, who was afterwards regent of Scotland during the minority of king David II. At last king Robert destroyed this fortress, as well as all others in Scotland, lest they should afford shelter to the English in any of their after incursions into Scotland.—It lay in ruins for a considerable number of years; but was afterwards rebuilt by Edward III. of England, who placed a strong garrison in it. In 1341 it was retaken by stratagem, and the English were finally driven out of the kingdom.

⁴ Towards the end of the 14th century, the city of Scotland began to be considered as the capital of Scotland. King Robert I. in 1329, had bestowed upon the burghesses, the town of Edinburgh, with the harbour and mills of Leith. His great grandson, John earl of Carrick, who afterwards assumed the name of Robert III. conferred on all the burghesses of Edinburgh the singular privilege of building houses to themselves within the castle, without any other limitation than that they should be persons of good fame.—In 1461, the inhabitants received Henry VI. of England when exiled, with such humanity, that, in requital, he granted them liberty to trade in all the English ports, subject only to the duties which were paid by the citizens of London; but as Henry was never restored to the throne, this grant proved of no use.

⁵ Till the year 1542, nothing remarkable occurs in the history of Edinburgh. At that time a war was commenced with Henry VIII. of England through the treachery of cardinal Beaton. An English fleet of 200 sail entered the Forth; and having landed their forces, quickly made themselves masters of the towns of Leith and Edinburgh. They next attacked the castle, but were repulsed from it with loss; and by this they were so enraged, that they not only destroyed the towns of Edinburgh and Leith, but laid waste the country for a great way round.—These towns, however, speedily recovered from their ruinous state; and, in 1547, Leith was again burned by the English after the battle of Pinkie, but Edinburgh was spared.

Several disturbances happened in this capital at the time of the reformation; but nothing of consequence till the year 1570.—A civil war had commenced a few years before, on occasion of queen Mary's forced resignation. The regent, who was one of the contending parties, bought the castle from the perfidious governor for 5000*l.* and the priory of Pittenweem. He did not, however, long enjoy the fruits of this infamous bargain. Sir William Kirkcaldy, the new governor, a man of great integrity and bravery, declared for the queen. The city in the mean time was sometimes in the hands of one party, and sometimes of another; during which contentions, the inhabitants, as may easily be imagined, suffered extremely. In the year 1570 above-mentioned, queen Elizabeth sent a body of 1000 foot and 300 horse, under the command of Sir William Drury, to assist the king's party. The castle was summoned to surrender; and several skirmishes happened during the space of two years, in which a kind of pre-

datory war was carried on. At last a truce was agreed on till the month of January 1573; and this opportunity the earl of Morton, now regent, made use of to build two bulwarks across the high-street, nearly opposite to the tolbooth, to defend the city from the fire of the castle.

On the first of January, early in the morning, the governor began to cannonade the city. Some of the cannon were pointed against the fish-market; and the bullets falling among the fishes, scattered them about in a surprising manner; and even drove them up so high in the air, that they fell down upon the tops of the houses. This unusual spectacle having brought a number of people out of their houses, some of them were killed, and others dangerously wounded. Some little time afterwards, several houses were set on fire by shot from the castle, and burned to the ground; which greatly enraged the people against the governor.—A treaty was at last concluded between the leaders of the opposite factions; but Kirkcaldy refused to be comprehended in it. The regent therefore solicited the assistance of queen Elizabeth, and Sir William Drury was again sent into Scotland with 1500 foot, and a train of artillery. The castle was now besieged in form, and batteries raised against it in different places. The governor defended himself with great bravery for 33 days; but finding most of the fortifications demolished, the well choked up with rubbish, and all supplies of water cut off, he was obliged to surrender. The English general, in the name of his mistress, promised him honourable treatment; but the queen of England shamefully gave him up to the regent, by whom he was hanged.

Soon after this, the spirit of fanaticism which some how or other succeeded the reformation, produced violent commotions, not only in Edinburgh, but thro' the whole kingdom. The foundation of these disturbances, and indeed of most others which have ever happened in Christendom on account of religion, was that pernicious maxim of Popery, that the church is independent of the state. It is not to be supposed that this maxim was at all agreeable to the sovereign; but such was the attachment of the people to the doctrines of the clergy, that king James found himself obliged to compound matters with them. This, however, answered the purpose but very indifferently; and at last such furious uproars were excited, that the king thought proper to declare Edinburgh an unfit place of residence for the court, or the administration of justice. In consequence of this declaration, he commanded the college of justice, the inferior judges, and the nobility and barons, to retire from Edinburgh; and not to return without express license. This unexpected declaration threw the whole town into consternation, and brought back the magistrates and principal inhabitants to a sense of their duty. With the clergymen it was far otherwise. They rallied against the king in the most furious manner; and endeavouring to persuade the people to take up arms, the magistrates were ordered to imprison them; which, however, they escaped by a timely flight. A deputation of the most respectable burghesses was then sent to the king at Linlithgow, with a view to mitigate his resentment. But he refused to be pacified; and, on the last day of December 1596, entered the town between two rows of his soldiers.

Edinburgh.

⁶ The castle surrendered to them.

⁴ becomes the capital of Scotland.

⁵ Destroyed by the English.

⁷ The city incurs the displeasure of King James VI.

Edinburgh.

Edinburgh.

9.
Remark-
able execu-
tion of cap-
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teous.

diers who lined the streets, while the citizens were commanded to keep within their houses. A convention of the estates was held in the tolbooth, before whom the magistrates made the most abject submissions, but all in vain. The convention declared one of the late tumults, in which an attack had been made upon the king's person, to be high treason; and ordained that, if the magistrates did not find out the authors, the city itself should be subjected to all the penalties due to that crime. It was even proposed to raze the town to the foundation, and erect a pillar on the spot where it had stood, as a monument of its crimes. The inhabitants were now reduced to the utmost despair; but queen Elizabeth interposing in behalf of the city, the king thought proper to abate somewhat of his rigour. A criminal prosecution, however, was commenced, and the town council were commanded to appear at Perth by the first of February. On their petition, the time for their appearance was prolonged to the first of March; and the attendance of 13 of the common-council was declared sufficient, provided they had a proper commission from the rest. The trial commenced on the fifth day of the month; and one of the number having failed in his attendance, the cause was immediately decided against the council: they were declared rebels, and their revenues forfeited.

8
Received
again into
favour.

For 15 days the city continued in the utmost confusion; but at last, on their earnest supplication, and offering to submit entirely to the king's mercy, the community were restored, on the following conditions, which they had formerly proffered: That they should continue to make a most diligent search for the authors of the tumult, in order to bring them to condign punishment; that none of the seditious ministers should be allowed to return to their charges, and no others admitted without his majesty's consent; and that in the election of their magistrates, they should present a list of the candidates to the king and his lords of council and session, whom his majesty and their lordships might approve or reject at pleasure. To these conditions, the king now added some others; *viz.* that the houses which had been possessed by the ministers should be delivered up to the king; and that the clergymen should afterwards live dispersed through the town, every one in his own parish: That the town-council house should be appointed for accommodating the court of exchequer; and that the town should become bound for the safety of the lords of session from any attempts of the burghesses, under a penalty of 40,000 merks; and lastly, that the town should immediately pay 20,000 merks to his majesty.

Upon these terms a reconciliation took place. The king, in a short time, suffered the degraded ministers to be replaced, and nothing remarkable happened till the reign of king Charles I. It was in the city of Edinburgh that the disturbances about religion commenced; which ended not but with the death of that unhappy monarch, and the total subversion of the British constitution. Here the covenants were framed, and the rest of those violent and enthusiastical measures concerted, an account of which is given under the article BRITAIN, n° 76. *et seq.*

From this time, to the present, the history of Edinburgh scarce affords any thing worthy of notice, except the remarkable execution of John Porteous, captain of

the city-guard, in 1736. This was conducted in a tumultuous manner, but at the same with such impene- trable secrecy as must render it memorable to the latest posterity. The origin of the whole affair was the execution of a smuggler in the grays-market. Some dis- turbance being raised on this occasion, captain Porteous ordered his men to fire among the mob which usually assembles in such cases. By the discharge of their mus- kets six people were killed, and eleven dangerously wounded: and for this offence, Porteous was prosecuted at the city's expense; and after trial, sentenced to die. King George II. happening to be at that time in Hanover, queen Caroline was regent in his absence, who reprieved the criminal. This highly en- raged the people; who, considering the unprovoked cruelty of Porteous, (or perhaps for some other rea- sons), did not think him a proper object of mercy. On the night before that on which his execution should have taken place according to his sentence, a number of people assembled from different quarters variously disguised. They surprised and disarmed the town- guard, and took possession of the city-gates to prevent the entrance of troops who were quartered in the sub- urbs. They then proceeded to the prison; the doors of which, being too strong to be broke open, they burnt, and dismissed all the prisoners, Porteous alone excepted. The magistrates endeavoured to disperse them; but they were pelted with stones, and threaten- ed to be fired upon. General Moyle was requested by the member of parliament for the city, to send a body of troops to the assistance of the magistrates; but this he refused, because no written order could be procured for that purpose. In the mean time, Porteous was conducted to the Grays-market, near to the place where the people had been killed: there the ringleaders of the affair, having broke open a shop, and paid for a coil of ropes, hanged him upon a dyer's sign-post; after which, the whole body dispersed without committing any other disorder.

This was highly resented, and considered as an in- sult to government. A pardon was promised to the of- fenders provided they would discover their accomplices; and a reward of 200 l. was offered for every per- son so discovered: but notwithstanding all the inquiry that could be made, there hath not, to this day, trans- pired the least intelligence concerning the matter, nor even the name of a single person who had a hand in it. The vengeance of government then fell upon the magistrates of Edinburgh. The lord provost was taken into custody, and confined almost three weeks before he was admitted to bail. He was then ordered to at- tend the house of lords, along with four bailies of Edin- burgh, and three of the lords of judicatory. These last, after some debate, were ordered to attend the bar in their robes. The house first took into considera- tion the legality of the sentence by which Porteous had been condemned. Both the sentence of the court, and the verdict of the jury, were censured by some of the members, and a motion was made to declare them er- roneous; but, by a majority of voices, both the sen- tence and verdict were fully justified. A bill was then brought in for imprisoning the provost of Edinburgh for a full year, disabling him for ever from bearing any public office in that city, or any other in Great Britain; for abolishing the city-guard, and taking

19
Govern-
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ly incensed
on that ac-
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down

Edinburgh

Edinburgh

11
The city
punished.

down the gate at the Netherbow-port. This bill passed the house of lords without any amendment. When sent down to the house of commons, the imprisonment of the provost, the abolishing of the city-guard, and the taking down of the gate, were left out; and in place of these, a fine of 2000 l. was imposed on the city, to be applied to the use of Porteous's widow: and with this amendment the bill passed with the majority of a single voice.—To prevent such catastrophes in time coming, the town-council enacted, that, on the first appearance of an insurrection, the chief officers in the different societies and corporations should repair to the council, to receive the orders of the magistrates for the quelling of the tumult, under penalty of 8 l. 6 s. 8 d. for each omission.

13
Taken by
the High-
landers in
1745.

In 1745, the city was invested by the Pretender's army; and on the 17th of September, the Netherbow-gate being opened to let a coach pass, a party of Highlanders, who had reached the gate undiscovered, rushed in, and took possession of the city. The inhabitants were commanded to deliver up their arms at the palace of Holyroodhouse; a certain quantity of military stores were required from the city, under pain of military execution; and an assessment of 2 s. 6 d. upon the pound was imposed upon the *real* rents within the city and liberties, for defraying that expence.

The Pretender's army guarded all the avenues to the castle; but no signs of hostility ensued till the 25th of the month, when the garrison being alarmed from some unknown cause, a number of cannon were discharged at the guard placed at the West-port, but with very little effect. This gave occasion to an order to the guard at the weigh-house, to prevent all intercourse between the city and castle; and then the governor acquainted the provost by letter, that unless the communication was preserved, he would be obliged to dislodge the guard by means of artillery. A deputation was next sent to the Pretender; acquainting him with the danger the city was in, and intreating him to withdraw the guard. With this he refused to comply; and the Highland centinels firing at some people who were carrying provisions into the castle, a pretty smart cannonading ensued, which set on fire several houses, killed some people, and did other damage. The Pretender then consented to dismiss the guard, and the cannonading ceased.—After the battle of Culloden, the provost of Edinburgh was obliged to stand a very long and severe trial, first at London and then at Edinburgh, for not defending the city against the rebels; which, from the situation and extent of the walls, every one must have seen to be impossible. At last, however, he was exculpated; and, since that time, no other differences have happened between the government and magistrates of Edinburgh.

The rebellion in 1745 put a temporary stop to the existence of the city of Edinburgh as a body corporate. The time for electing magistrates happened while the town was in possession of the rebels, so that the election could not be held; and thus, for a whole year, Edinburgh was left destitute of any civil government.—Application, however, was made to the king for restoring the government. He was graciously pleased to grant their request, and the election of magistrates proceeded accordingly. The following year they addressed his majesty on the suppression of the re-

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New magi-
strates elec-
ted.

bellion, and presented the duke of Cumberland with the freedom of the city inclosed in a gold box.—Since that time, the city hath remained free from every kind of trouble; hath flourished in a remarkable manner; and been enlarged and embellished with many new and fine buildings, of which an account is given in the subsequent description.

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Description
of the
town.

Edinburgh is situated upon a steep hill, rising from east to west, and terminating in a high and inaccessible rock, upon which the castle stands. At the east end or lower extremity of this hill, stands the abbey of Holyrood-house, or king's palace, distant from the castle upwards of a mile; and betwixt which, along the top of the ridge, and almost in a straight line, runs the high-street. On each side, and parallel to this ridge or hill, is another ridge of ground lower than that in the middle, and which does not extend so far to the east; that on the south being intercepted by Salisbury-rocks, and Arthur's-seat, a hill of about 650 feet of perpendicular height; and that on the north by the Calton-hill, considerably lower than Arthur's-seat: so that the situation of this city is most singular and romantic; the east or lower part of the town lying between two hills; and the west or higher part rising up towards a third hill, little inferior in height to the highest of the other two, upon which, as has been observed, the castle is built, and overlooks the town.

The buildings of the town terminate at the distance of about 200 yards from the castle-gate; which space affords a most delightful as well as convenient and healthful walk to the inhabitants. The prospect from this spot is perhaps the finest any where to be met with, for extent, beauty, and variety.

In the valley or hollow betwixt the mid and south ridge, and nearly parallel to the high-street, is another street called the Cowgate; and the town has now extended itself over most part of that south ridge also. Betwixt the mid and north ridge was a loch, which, till of very late, terminated the town on that side. From the high-street towards the loch on the north, and Cowgate on the south, run narrow cross streets or lanes, called *wynds* and *cliffers*, which grow steeper and steeper the farther west or nearer the castle; so that, were it not for the closeness and great height of the buildings, this city, from its situation and plan, might naturally be expected to be the best aired, as well as the cleanliest, in Europe. The first, notwithstanding these disadvantages, it enjoys in an eminent degree; but we cannot compliment it upon the latter, notwithstanding every possible means has been used by the magistrates for that purpose.

The steepness of the ascent makes the access to the high-street from the north and south very difficult; and has no doubt greatly retarded the enlargement of this city. To remedy this inconvenience on the north, and with a view to extend the town on that quarter, a most elegant bridge has been thrown over the north loch, which joins the north ridge to the middle of the high-street, by so easy an ascent as one in sixteen; and in pursuance of the design, a plan of a new town to the north was fixed upon, and has for several years past been carrying into execution with an elegance and taste that does honour to this country.

The gradual increase of the city of Edinburgh may

in some degree be underflood from the traces of its ancient walls that still remain. James II. in 1450, first bestowed on the community the privilege of fortifying the city with a wall, and empowered them to levy a tax upon the inhabitants for defraying the expence. When the city was first fortified, the wall reached no farther than the present water-houfe, or refervoir, on the caſtle-hill: from thence to the foot of Halkerſton's wynd, juſt below the new-bridge, the city was defended by the north-loch; an inconfiderable morafs, which, being formerly overflowed, formed a ſmall lake, that hath ſince been drained. From this place to the foot of Leith-wynd, it doth not appear how the city was fortified, but from the foot of Leith-wynd to the netherbow-port, it was defended only by a range of houſes; and when theſe became ruinous, a wall was built in their place. The original wall of Edinburgh, therefore, began at the foot of the north-caſt rock of the caſtle. Here it was ſtrengthened by a ſmall fortrefs, the ruins of which are ſtill to be ſeen, and are called the *well-houſe tower*, from their having a ſpring in their neighbourhood. When it came oppoſite to the refervoir, it was carried quite acroſs the hill, having a gate on the top for making a communication between the town and caſtle. In going down the hill, it went ſlanting in an oblique direction to the firſt angle in going down the weſt-bow; where was a gate named the *Upper-bow port*, one of the hooks of which ſtill remains. Thence it proceeded eaſtward in ſuch a manner, as would have cut off not only all the Cowgate, but ſome part of the parliament-houſe; and being continued as far as the mint-cloſe, it turned to the north-eaſt, and connected itſelf with the buildings on the north-ſide of the high ſtreet, where was the original *Netherbow port*, about 50 yards weſt from that which afterwards went by the ſame name.

Soon after the building of this wall, a new ſtreet was formed on the outſide of it, named the *Cowgate*, which in the 16th century became the reſidence of the nobility, the ſenators of the college of juſtice, and other perſons of the firſt diſtinction. After the fatal battle of Flowden, however, the inhabitants of the Cowgate became very anxious to have themſelves defended by a wall as well as the reſt. The wall of the city was therefore extended to its preſent limits. This new wall begins on the ſouth-eaſt ſide of the rock on which the caſtle is built, and to which the town-wall comes quite cloſe. From thence it deſcends obliquely to the weſt port; then aſcends part of a hill on the other ſide, called the *High Riggs*; after which, it runs eaſtwards, with but little alteration in its courſe, to the Briſto and Potter-row ports, and from thence to the Pleaſance. Here it takes a northerly direction, which it keeps from thence to the Cowgate-port; after which the incloſure is completed to the Netherbow by the houſes of St Mary wynd. The original Netherbow-port being found not well adapted for defence was pulled down, and a new one built in 1571 by the adherents of queen Mary. In 1606, the late handſome building was erected about 50 yards below the place where the former ſtood. It was two ſtories high, and had an elegant ſpire in the middle; but being thought to encumber the ſtreet, and the whole building being in a crazy ſituation, it was pulled down

by order of the magiſtrates in 1764.

In the original wall of Edinburgh there was, as has been already obſerved, a port on the caſtle-hill. On the extension of the wall, after building the houſes in the Cowgate, this gate was pulled down. That in the upper or weſt bow, ſtood for a much longer time, and was pulled down within the memory of ſome perſons ſtill living. Beſides theſe, there was a third, about 50 yards above the head of the Canongate; but whether there were any more, is uncertain. The ports or gates of the new walls are, 1. The *Weſt-port*, which is ſituated at the extremity of the Graſs-market; beyond which lies a ſuburb of the town and a borough of regality, called *Portborough*. Next to this is a wicket, ſtruck out of the town-wall in 1744, for the purpoſe of making an eaſier communication between the town and the public walks in the meadows, than by Briſto-port. The next to this is *Briſto-port*, built in 1515; beyond which lies a ſuburb called *Briſto-ſtreet*. At a ſmall diſtance from Briſto, is the *Potterrow-port*, which took this name from a manuſactory of earthen ware in the neighbourhood. Formerly it was called *Kirk of Field Port*. Between this and the Cowgate port ſtood another, called *St Mary Wynd Port*, which extended from eaſt to weſt acroſs the foot of the Pleaſance, and which was demoliſhed only ſince the middle of the laſt century.—Cloſe to the place where this port was, ſtands the *Cowgate-port*; which opens a communication between the Cowgate and St Mary's Wynd, and the Pleaſance.—The *Netherbow-port* has been already ſpoke of.—At the foot of Leith-wynd was another gate, known by the name of *Leith-wynd port*; and within it was a wicket giving acceſs to the church of Trinity College, and which ſtill remains. At the foot of Halkerſton's wynd was another, which, as well as the former, was built about the year 1560. Both were pulled down ſome years ago.—Another ſtill remains at the foot of the Canongate, known by the name of the *Water-gate*.

For 250 years the city of Edinburgh occupied the ſame ſpace of ground, and it is but very lately that its limits have been ſo conſiderably enlarged. In the middle of the 16th century, it is deſcribed as extending in length about an Italian mile, and about half as much in breadth; which answers very nearly to its preſent limits, the late enlargements only excepted.—This ſpace of ground, however, was not at that time occupied in the manner it is at preſent. The houſes were neither ſo high nor ſo crowded upon each other as they are now. This was a conſequence of the number of inhabitants increaſing, which has occaſioned the railing of the houſes to ſuch an height as is perhaps not to be paralleled in any other part of the world. Till the time of the Reformation, the burying ground of the city extended over all the ſpace occupied by the Parliament-square, and from thence to the Cowgate. The lands lying to the ſouthward of the Cowgate were chiefly laid out in gardens belonging to the convent of Black-friars, and the church of St Mary in the Field. Theſe extended almoſt from the Pleaſance to the Potterrow-port. From the Briſto to the Weſt Port, the ground was laid out in gardens belonging to the Gray-friars. The magiſtrates, on their application to queen Mary, obtained a grant of the Gray-friars gardens for a burying place; for which it was given as a reaſon, that they

Edinburgh. they were somewhat distant from the town. Here, however, it must be understood, that these gardens were distant from the houses, and not without the walls; for they had been enclosed by them long before.—In the time of James I. the houses within the walls seem to have been in general, if not universally, covered with thatch or broom; and not above 20 feet high. Even in the year 1621, these roofs were so common, that they were prohibited by act of parliament, in order to prevent accidents from fire.—In the middle of the last century, there were neither courts nor squares in Edinburgh. The Parliament *close* or square is the oldest of this kind in the city. Milne's square, James's court, &c. were built long after; and Argyle's and Brown's squares within these 30 years.

New Town. The *New Town* was projected in the year 1752; but as the magistrates could not then procure an extension of the royalty, the execution of the design was suspended for some time. In 1767, an act was obtained, by which the royalty was extended over the fields to the northward of the city; upon which, advertisements were published by the magistrates, desiring proper plans to be given in. Plans were given in accordingly, and that designed by Mr James Craig architect was adopted. Immediately afterwards, people were invited to purchase lots from the town-council; and such as purchased, became bound to conform to the rules of the plan. In the mean time, however, the town-council had secretly reserved to themselves a privilege of departing from their own plan; which they afterwards made use of in such a manner as produced a law-suit. According to the plan held forth to the purchasers, a canal was to be made through that place where the north-loch had been, and the bank on the north side of it laid out in terraces: but, instead of this, by an act of council, liberty was reserved to the town to build upon this spot; and therefore, when many gentlemen had built genteel houses in the new town, on faith of the plan, they were surprised to find the spot appointed for terraces and a canal, beginning to be covered with mean irregular buildings, and work-houses for tradesmen. This deviation was immediately complained of; but as the magistrates shewed no inclination to grant any redress, a prosecution was commenced against them before the Lords of Session. In that court the cause was given against the pursuers, who thereupon appealed to the House of Lords. Here the sentence of the court of session was reversed, and the cause remitted to the consideration of their lordships. At last, after an expensive contest, matters were accommodated. The principal term of accommodation was, that some part of the ground was to be laid out in terraces and a canal; but the time of disposing it in that manner, was referred to the lord president of the court of session and the lord chief baron of the exchequer.—The fall of the bridge proved a very considerable disadvantage to the new town; as it necessarily induced a suspicion that the passage, by means of the bridge, could never be rendered safe. An oversight of the magistrates proved of more essential detriment. A piece of ground lay to the southward of the old town, in a situation very proper for building. This the magistrates had an opportunity of purchasing for 1200*l.*; which, however, they neglected, and it was bought by a private person, who

immediately feued it out in lots for building. The magistrates then foresaw the consequence, namely, that this spot being free from the duties to which the royalty of Edinburgh is subject, people would chuse to reside there rather than in the new town. Upon this they offered the purchaser 2000*l.* for the ground for which he had paid 1200*l.*; but as he demanded 20,000*l.* the bargain was not concluded.—Notwithstanding these discouragements, the new town hath made a very considerable progress; and from the advantages of its situation, and its being built according to a regular plan, it hath undoubtedly a superiority over any city in Britain. By its situation, however, it is remarkably exposed to storms of wind, which, at Edinburgh, sometimes rage with uncommon violence.

The most remarkable public buildings of Edinburgh are,

1. *The Castle.* This stands on a high rock, accessible only on the east side. On all others it is very steep, and in some places perpendicular. It is about 300 feet high from its base: so that, before the invention of artillery, it might well have been deemed impregnable; though the event showed that it was not.—The entry to this fortress is defended by an outer barrier of palliades; within this is a dry ditch, draw-bridge, and gate, defended by two batteries which flank it; and the whole is commanded by an half-moon mounted with brass cannon, carrying balls of 12 pounds. Beyond these are two gate-ways, the first of which is very strong, and has two portcullises. Immediately beyond the second gateway, on the right hand, is a battery mounted with brass cannon, carrying balls of 12 and 18 pounds weight. On the north side are a mortar and some gun batteries.—The upper part of the castle contains several half-moon batteries, a chapel, a parade for exercise, and a number of houses in the form of a square, which are laid out in barracks for the officers. Besides this there are other barracks, which are able to contain 1000 men; a powder-magazine bomb-proof; a grand arsenal, capable of containing 8000 stand of arms; and other apartments for the same use, which can contain 22,000 more: so that 30,000 stand of arms may be conveniently lodged in this castle.—On the east side of the square above-mentioned, were formerly royal apartments, in one of which king James VI. was born, and which is still shewn to those who visit the castle. In another, the regalia of Scotland were deposited on the 26th of March 1707, and are said to be still kept there; but they are never shewn to any body.

The castle is defended by a company of invalids, and four or five hundred men belonging to some marching regiment, though it can accommodate 1000, as above-mentioned; and this number has been sometimes kept in it. It hath a governor, fort-major, gunner, store-master, &c. &c.—Its natural strength of situation was not able to render it impregnable, even before the invention of artillery, as we have already observed. Much less would it be able to secure it against the attacks of a modern army well provided with cannon. It could not, in all probability, withstand, even for a few hours, a well directed bombardment; for no part but the powder-magazine is capable of resisting these destructive machines; and the splinters from the

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Account of
the public
buildings,
&c.

Edinburgh. rock on which the castle is built, could not fail to render them still more formidable. Besides, the water of the well, which is very bad, and drawn up from a depth of 100 feet, is apt to subside on the continued discharge of artillery, which produces a concussion in the rock.

2. *The palace of Holyrood-house* is of a quadrangular form, and bears some resemblance to that of Hampton court. In the centre is a court surrounded with piazzas. The front is two stories high; the roof flat; but at each end the front projects, and is ornamented with circular towers at the angles. Here the building is much higher, and the rest of the palace is three stories in height. Over the door of the front is a clock and small cupola, the roof of which is an imperial crown in stone-work. The north-west towers were built by James V. for his own residence: his name is still to be seen below a niche in one of these towers. During the minority of queen Mary, this palace was burned by the English; but soon after repaired, and enlarged beyond its present size. At that time it consisted of five courts, the most westerly of which was the largest. It was bounded on the east by the front of the palace, which occupied the same space it does at present; but the building itself extended further to the south. At the north-west corner was a strong gate, with Gothic pillars, arches, and towers, part of which was but lately pulled down.—Great part of the palace was burnt by Cromwell's soldiers; but it was repaired, and altered into the present form, after the Restoration. The fabric was planned by Sir William Bruce, a celebrated architect, and executed by Robert Mylne, mason.—The only apartments worthy of notice, are those now possessed by the duke of Hamilton, heritable keeper of the palace. In the second floor are queen Mary's apartments; in one of which her own bed remains. It is of crimson damask, bordered with silk tassels and fringes, but now almost reduced to rags. Close to the floor of this room is a piece of waincot which hangs upon hinges, and communicates with a trap-stair that goes down into the apartment below. Through this passage the conspirators rushed in who murdered David Rizzio; and towards the outer door are shewn some large dusky spots in the floor, said to be occasioned by his blood, which could not be washed out.—The environs of the palace afford an asylum for insolvent debtors; and adjoining to it is an extensive park, all of which is a sanctuary.

3. *Heriot's Hospital* owes its foundation to one George Heriot a goldsmith, who, in the days of James VI. acquired by his business (being goldsmith to the king and queen) a large fortune. At his death, he left the magistrates of Edinburgh 23,625 l. 10s. "for the maintenance, relief, and bringing up of so many poor and fatherless boys, freemens sons of the town of Edinburgh," as the above sum should be sufficient for. This hospital is finely situated on the west end of the fourth ridge, almost opposite to the castle, and is perhaps the most magnificent building of the

kind in Edinburgh. It was founded in July 1628, according to a plan (as is reported) of Inigo Jones; but the work being interrupted by the civil wars, it was not finished till the year 1650. The expense of the building is said to have been upwards of 30,000 l.*; and the hospital is still possessed of an income of about 1800 l. a-year; though this cannot be absolutely ascertained, as the rents are paid in grain, and of course must be fluctuating.—When Cromwell took possession of Edinburgh after the battle of Dunbar, he quartered his sick and wounded soldiers in this hospital. It was applied to the same purpose till the year 1658, when general Monk, at the request of the governors, removed the soldiers; and on the 11th of April 1659, it was opened for the reception of boys, 30 of whom were admitted into it. The August after, they were increased to 40; and in 1661, to 52. In 1753 they were raised to 130, and in 1763 to 140; but the number has since that time decreased.—In this hospital the boys are instructed in reading, writing, arithmetic, and a knowledge of the Latin tongue. With such as chuse to follow any kind of trade, an apprentice-fee of 30 l. is given when they leave the hospital; and those who chuse an academical education, have an annuity of 10 l. a-year bestowed on them for four years.

4. *Watson's Hospital* is an institution of the same kind with Heriot's; but the building is much less magnificent. The funds are also less. They were in all 12,000 l. left by George Watson in 1723 for endowing an hospital; which, however, was not carried into execution till the year 1738, when the above-mentioned sum, with the interest accumulated during that time, amounted to 20,000 l. About 60 boys are at present educated in Watson's hospital. On their being put out apprentices, 20 l. of apprentice-fee is paid with them; or if they chuse to go to college, they receive 10 l. for five years. On their attaining the age of 25 years, if they have behaved properly, and not contracted marriage without consent of the governors, they receive a bounty of 50 l. The funds of this hospital amount to 17000 l. a-year.

5. *The Orphan Hospital* was planned in 1732 by Andrew Gairdner merchant, and other inhabitants. It was promoted by the society for propagating Christian knowledge, by other societies, voluntary subscriptions, and a collection at the church-docks.—In 1733, the managers hired a house, took in 30 orphans, maintained them, gave them instructions in reading and writing, and taught them the weaving business. In 1735, they were erected into a body corporate by the town of Edinburgh; and, in 1742, obtained a charter of erection from his late majesty, appointing most of the great officers of state in Scotland, and the heads of the different societies in Edinburgh, members of this corporation; with powers to them to hold real property to the amount of 10000 l. a-year. The revenue is inconsiderable; but the institution is supported by the contributions of charitable persons, and

* It is to be observed, that money then bore 10 l. per cent. interest.—The above sums are taken from Mr Arnott's History of Edinburgh, who subjoins the following note. "Where Maitland had collected his most erroneous account of George Heriot's effects, we do not know. He makes the sum received, out of Heriot's effects, by the governors of the hospital, to be 43,608 l. 11 s. 3 d. being almost the double of what they really got. This blunder has been the cause of many unjust murmurings against the magistrates of Edinburgh, and even the means of spiriting up law-suits against them."

Edinburgh. and collections at the church-doors. Into this hospital orphans are received from any part of the kingdom. None are admitted under seven, nor continued in it after 14, years of age. About 100 orphans are maintained in it.

6. *The Merchants Maiden Hospital* was established by voluntary contribution about the end of the last century, for the maintenance of young girls, daughters of the merchants burghesses of Edinburgh. The governors were erected into a body corporate, by act of parliament, in 1707. The annual revenue amounts to 1350l. Seventy girls are maintained in it; who, upon leaving the house, receive 3l. 6s. 8d. excepting a few who are allowed 8l. 6s. 8d. out of the funds of the hospital. The profits arising from work done in the house are also divided among the girls, according to their industry.

7. *The Trades Maiden Hospital* was founded in the year 1704 by the incorporations of Edinburgh, for the maintenance of the daughters of decayed members, on a plan similar to that of the merchants hospital. To this, as well as to the former, one Mrs Mary Erskine, a widow gentlewoman, contributed so liberally, that she was by the governors styled *joint foundress* of the hospital. Fifty girls are maintained in the house, who pay of entry-money 1l. 13s. 4d.; and, when they leave it, receive a bounty of 5l. 11s. 1½d. The revenues are estimated at 600l. a-year.

8. *The Trinity Hospital*. This was originally founded and amply endowed by king James II's queen. At the Reformation, it was stripped of its revenues; but the regent afterwards bestowed them on the provost of Edinburgh, who gave them to the citizens for the use of the poor. In 1585, the town-council purchased from Robert Pont, at that time provost of Trinity college, his interest in these subjects; and the transaction was afterwards ratified by James VI. The hospital was then repaired, and appointed for the reception of poor old burghesses, their wives, and unmarried children, not under 50 years of age. In the year 1700, this hospital maintained 54 persons; but, since that time, the number has decreased.—The revenue consists in a real estate of lands and houses, the gross rent of which is 762l. a-year; and 5500l. lent out in bonds at 4 per cent.

Besides these charitable institutions, there are also three charity work-houses; one belonging to the town, another to the Canonage, and the third to the West-kirk parish. They maintain, in all, about 900 men, women, and children.

9. *The Royal Infirmary* was first thought of by the college of physicians in 1725. A filling company happening to be dissolved at that time, the partners contributed some of their stock towards the establishment of the infirmary. A subscription was also set on foot, and application made to the general assembly to recommend the same throughout their jurisdiction. This was readily complied with, and the assembly passed an act for that purpose; but very little regard was paid to it by the clergy. Notwithstanding this, however, 2000l. being procured, a small house was opened for the reception of the sick poor in August 1729. In 1736, the contributors towards the infirmary were erected into a body corporate by royal statute; and after this the contributions increased very considerably: by which

means, the managers were enabled to enlarge their scheme from time to time; and at last to undertake the present magnificent structure, the foundation of which was laid in 1738. During 25 years, when this institution was in its infancy, Lord Hopetoun bestowed upon it an annuity of 400l. In 1750, Doctor Archibald Ker bequeathed to this corporation an estate of 200l. a-year in the island of Jamaica. In 1755, the lords of the treasury made a donation to it of 8000l. which had been appointed for the support of invalids. In return for this, the managers of the infirmary constantly keep 60 beds in readiness for the reception of sick soldiers. This year also sick servants began to be admitted into the infirmary, and a ward was fitted up for their reception.

This institution, however, was more indebted to George Drummond, Esq; than to any other person. He was seven times chosen lord provost of Edinburgh, and always directed his attention to the improvement of the city, particularly to that of the royal infirmary. So sensible were the managers of their obligations to him, that, in their hall, they erected a bust of him with this inscription, "George Drummond, to whom this country is indebted for all the benefit which it derives from the Royal Infirmary."—In 1748, the stock of the infirmary amounted to 5000l.; in 1755, to 7076l. besides the estate left by Doctor Ker; in 1764, to 23,426l.; and in 1778, to 27,074l.

The royal infirmary is attended by two physicians chosen by the managers, who visit their patients daily in presence of the students. All the members of the college of surgeons are also obliged to attend in rotation, according to seniority. If any surgeon declines attendance, he is not allowed to appoint a deputy; but the patients are committed to the care of one of four assistant surgeons, chosen annually by the managers.—From the year 1762 to 1769, there were admitted 6261 patients; which number added to 109 who were in the hospital at the commencement of the year 1762, made, in all, 6370. Of these, 4394 were cured; 358 died; the rest were either relieved, dismissed incurable, for irregularities, or by their own desire, or remained in the hospital.—From 1770 to 1775, the patients annually admitted into the infirmary were, at an average, 1567; of whom 63 died. In 1776, there were admitted 1668, of whom 57 died; and in 1777, the number admitted was 1593, and of deaths 52.

The building consists of a body and two wings, each of them three stories high, with an attic story and garrets, and a very elegant front. The body is 210 feet long, and 36 broad in the middle, but at the ends only 24 feet broad. The wings are 70 feet long, and 24 broad. In the centre is a large stair-case, so wide that sedan chairs may be carried up. In the different wards, 228 patients may be accommodated, each in a different bed. There are cold and hot baths for the patients, and also for the citizens; and to these last the patients are never admitted.

10. *The Bridge*. The first stone of this building was laid by provost Drummond in 1763; but the contract for building it was not signed till August 21st 1765. The architect was Mr William Mylne, who agreed with the town-council of Edinburgh to finish the work for 10,140l. and to uphold it for 10 years. It was also to be finished before Martinmas 1769; but, on the 3d

Edinburgh.

of August that year, when the work was nearly completed, the vaults and side-walls on the south fell down, and five people were buried in the ruins. This misfortune was occasioned by the foundation having been laid, not upon the solid earth, but upon the rubbish of the houses which had long before been built on the north side of the high-street, and which had been thrown out into the hollow to the northward. Of this rubbish, there were no less than eight feet between the foundation of the bridge and the solid earth. Besides this deficiency in the foundation, an immense load of earth which had been laid over the vaults and arches in order to raise the bridge to a proper level, had no doubt contributed to produce the catastrophe above-mentioned.—The bridge was repaired, by pulling down some parts of the side-walls, and afterwards rebuilding them; strengthening them in others with chain-bars; removing the quantity of earth laid upon the vaults, and supplying its place with hollow arches, &c. The whole was supported at the south end by very strong buttresses and counterforts on each side; but on the north it has only a single support.—The whole length of the bridge, from the High-street in the Old Town, to Prince's-street in the New, is 1125 feet; the total length of the piers and arches is 310 feet. The width of the three great arches, is 72 feet each; the piers 13 feet and an half; the small arches, each 20 feet. The height of the great arches, from the top of the parapet to the base, 68 feet; the breadth of the bridge within wall over the arches, 40 feet; and the breadth at each end, 50 feet.

11. *The Register Office.* This work was first suggested by the late earl of Morton, lord-register of Scotland, with a view to prevent the danger which attended the usual method of keeping the public records. In former times, indeed, these suffered from a variety of accidents. Edward I. carried off or destroyed most of them, in order to prevent any marks of the former independency of the nation from remaining to posterity. Afterwards Cromwell spoiled this nation of its records, most of which were sent to the tower of London. At the time of the Restoration, many of them were sent down again by sea; but one of the vessels was shipwrecked, and the records brought by the other have ever since been left in the greatest confusion.—The earl of Morton, taking this into consideration, obtained from his majesty a grant of 12,000*l.* out of the forfeited estates, for the purpose of building a register-office, or house for keeping the records, and disposing them in proper order. The foundation was laid on the 27th of June 1774, by Lord Frederic Campbell, lord-register; Mr Montgomery of Stanhope, lord advocate; and Mr Miller of Barskimming, lord justice-clerk; three of the trustees appointed by his majesty for executing the work. The ceremony was performed under a discharge of artillery, in presence of the judges of the courts of session and exchequer, and in the sight of a multitude of spectators. A brass plate was put into the foundation-stone, with the following inscription: *CONSERVANDIS TABULIS PUBLICIS POSITUM EST, ANNO MDCC LXXIV, MUNIFICENTIA OPTIMI ET PIENTISSIMI PRINCIPIS GEORGI TERTII.* In a glass vase hermetically sealed, which is also placed in the foundation-stone, are deposited specimens of the different coins of his present majesty.

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The front of the building directly faces the bridge, extends from east to west 200 feet, and is 40 feet back from the line of Prince's-street. In the middle of the front is a small projection of three windows in breadth. Here is a pediment, having in its centre the arms of Great Britain, and the whole is supported by four Corinthian pilasters. At each end is a tower projecting beyond the rest of the building, having a Venetian window in front, and a cupola on the top. The front is ornamented from end to end with a beautiful Corinthian entablature. In the centre of the building is a dome of wooden work covered with lead. The inside forms a saloon 50 feet diameter, and 80 high, lighted at top by a copper window 15 feet in diameter. The whole number of apartments is 97; all of which are vaulted beneath, and warmed with fire-places. The building is executed according to a plan of Mr Adams architect; and when finished, may vie with any modern building whatsoever. The whole expence is estimated at 25,000*l.*

12. *The Theatre.* Entertainments of the dramatic kind came very early into fashion in this country. They were at first only representations of religious subjects, and peculiarly designed to advance the interests of religion; the clergy being the composers, and Sunday the principal time of exhibition. In the sixteenth century, the number of play-houses was so great, that it was complained of as a nuisance, not only in Edinburgh, but throughout the kingdom. They soon degenerated from their original institution; and the plays, instead of being calculated to inspire devotion, became filled with all manner of buffoonery and indecency.—After the reformation, the presbyterian clergy complained of these indecencies; and being actuated by a spirit of violent zeal, anathematized every kind of theatrical representation whatever. King James VI. compelled them to pass from their censures against the stage; but, in the time of Charles I. when fanaticism was carried to the utmost length at which perhaps it was possible for it to arrive, it cannot be supposed that stage-plays would be tolerated. On the Restoration, when people were ready to fall into the other extreme, stage-plays were not only revived, but many improvements made, among which that of introducing women on the stage was none of the least.—It seems, however, that amusements of this kind were again introduced at Edinburgh about the year 1684, when the duke of York kept his court there. His residence at Edinburgh drew off one half of the London company, and plays were acted in Edinburgh for some little time. The misfortunes attending the duke of York, however, and the establishment of the presbyterian religion (the genius of which is unfavourable to amusements of this kind), soon put a stop to the progress of the stage, and no theatrical exhibition was heard of in Edinburgh till after the year 1715. The first adventurer was Signora Violante, an Italian, remarkable for feats of strength, tumbling, &c. In this way the first exhibited in a house at the foot of Carrubber's close, which has since been employed by different sectaries for religious purposes. Meeting with good success, the soon invited a company of comedians from London; and these being also well received, Edinburgh continued for some years to be entertained with the performances of a strolling company, who visited it annually. Becoming at last, however,

Edinburgh. however, obnoxious to the clergy, they were, in 1727, prohibited by the magistrates from acting within their jurisdiction. But this interdict was suspended by the court of session, and the players continued to perform as usual.

Still, however, theatrical entertainments were but rare. The town was visited by itinerant companies only once in two or three years. They performed in the *Taylor's hall* in the Cowgate; which, when the house was full, would have drawn (at the rate of 2s. 6d. for pit and boxes, and rs. 6d. for the gallery) 40l. or 45l. a night. About this time an act of parliament was passed, prohibiting the exhibition of plays, except in a house licensed by the king. Of this the presbytery of Edinburgh immediately laid hold; and at their own expence brought an action on the statute against the players. The cause was, by the court of session, decided against the players; who thereupon applied to parliament for a bill to enable his majesty to license a theatre in Edinburgh. Against this bill, petitions were presented, in 1739, to the house of commons, by the magistrates and town-council, the principal and professors of the university, and the dean of guild and his council; in consequence of which, the affair was dropped. All this opposition, however, contributed in reality to the success of the players; for the spirit of party being excited, a way of evading the act was easily found out, and the house was frequented more than usual, inasmuch that Taylor's-hall was found insufficient to contain the number of spectators.

The comedians now fell out among themselves, and a new play-house was erected in the Canongate in the year 1746. The consequence of this was, that the old one in Taylor's-hall became entirely deserted, and through bad conduct the managers of the new theatre soon found themselves greatly involved: at last, a riot ensuing, through dissensions among the performers, the play-house was totally demolished.---When the extension of the royalty, over the spot where the new town is built, was obtained, a clause was likewise added to the bill, enabling his majesty to license a theatre in Edinburgh. This was obtained, and thus the opposition of the clergy for ever silenced: but the success of the theatre has not been great; nor is it at present on a respectable footing, mostly owing to the embarrassed circumstances of the managers; who, paying no less than 500 guineas per annum to Mr Ross the patentee, are unable to decorate the theatre as it ought to be, to retain good actors, or to provide a suitable wardrobe.---The Edinburgh theatre, internally, is simple, commodious, and elegant: externally, it hath neither beauty nor elegance; and is situated in such a manner as to obstruct the view of the register-office, which is, without exception, the handsomest building about Edinburgh.

13. *The Concert-Hall* is situated in Niddry's-wynd, a central part of the town, and was built in 1762. The plan was drawn by Sir Robert Mylne (architect of Blackfriars bridge), after the model of the great opera theatre at Parma. The musical room is of an oval form, the ceiling being a concave elliptical dome, lighted from the top by a lantern. The seats are ranged in the form of an amphitheatre; and are capable of containing 500 persons, besides leaving a large area in the middle of the room. The orchestra is at the upper end, and is terminated by an elegant organ.

The musical society was first instituted in the year 1728. Before that time, several gentlemen had formed a weekly club at a tavern kept by one Steil, a great lover of music, and a good singer of Scots songs. Here the common entertainment consisted in playing on the harpichord and violin the concertos and sonatas of Handel, just then published.---The meeting, however, soon becoming numerous, they instituted, in the year above-mentioned, a society of 70 members, for the purpose of holding a weekly concert. The affairs of the society are regulated by a governor, deputy-governor, treasurer, and five directors, who are annually chosen by the members. The meetings have been continued ever since that time on much the same footing as at first, and the number of members is now increased to 200.

14. *The Church of St Giles* is a beautiful Gothic building, measuring in length 206 feet. At the west end, its breadth is 110; in the middle, 129; and at the east end, 76 feet. It has a very elevated situation, and is adorned with a lofty square tower, encircled at top with ornaments of open figured stone-work, like those that adorn the circlet of an imperial crown. From the sides and corners of the tower, rich arches of stone-work; which, meeting with each other in the middle, complete the figure of an imperial crown, the top of which terminates in a pointed spire. The whole height of this tower is 161 feet.

This is the most ancient church in Edinburgh. From a passage in an old author called *Simeon Dunelmensis*, some conjecture it to have been built before the year 854; but we do not find express mention made of it before 1359. The tutelar saint of this church, and of Edinburgh, was St Giles, a native of Greece. He lived in the sixth century, and was descended of an illustrious family. On the death of his parents, he gave all his estate to the poor; and travelled into France, where he retired into a wilderness near the conflux of the Rhone with the sea, and continued there three years. Having obtained the reputation of extraordinary sanctity, various miracles were attributed to him; and he founded a monastery in Languedoc, known long after by the name of *St Giles's*.---In the reign of James II. Mr Preston of Gorton, a gentleman whose descendants still possess an estate in the county of Edinburgh, got possession of the arm of this saint; and the relique he bequeathed to the church of Edinburgh. In gratitude for this donation, the magistrates granted a charter in favour of Mr Preston's heirs, by which the nearest heir of the name of Preston was entitled to carry it in all processions. At the same time, the magistrates obliged themselves to found an altar in the church of St Giles's, and appoint a chaplain for celebrating an annual mass for the soul of Mr Preston; and likewise, that a tablet, containing his arms, and an account of his pious donation, should be put up in the chapel.---St Giles's was first simply a parish-church, of which the bishop of Lindisfarne, or Holy Island, in the county of Northumberland, was patron. He was succeeded in the patronage by the abbot and canons of Dunfermline, and they by the magistrates of Edinburgh. In 1466, it was erected into a collegiate church by James III.---At the Reformation, the church was, for the greater convenience, divided into several parts. The four principal ones are
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Edinburgh. appropriated to divine worship, the lesser ones to other purposes. The chief of these divisions is called the *New Church*. In it are the king's seat, those of the provost and magistrates, &c. At the same time also, the religious utensils belonging to this church were seized by the magistrates. They were,—St Giles's arm, enshrined in silver, weighing five pounds three ounces and an half; a silver chalice, or communion-cup, weighing 23 ounces; the great *eucharist* or communion cup, with *golden eweik and stones*; two cruets of 25 ounces; a golden bell, with a heart of four ounces and a half; a golden unicorn; a golden pix, to keep the host; a small golden heart, with two pearls; a diamond ring; a silver chalice, patine, and spoon, of 32 ounces and a half; a communion table-cloth of gold brocade; *St Giles's coat*, with a little piece of red velvet which hung at his feet; a round silver *eucharist*; two silver censers, of three pounds fifteen ounces; a silver ship for incense; a large silver cross, with its base, weighing sixteen pounds thirteen ounces and a half; a triangular silver lamp; two silver candlesticks, of seven pounds three ounces; other two, of eight pounds thirteen ounces; a silver chalice gilt, of 20½ ounces; a silver chalice and cross, of 75 ounces; besides the priests robes, and other vestments, of gold brocade, crimson velvet embroidered with gold, and green damask.—These were all sold, and part of the money applied to the repairs of the church; the rest was added to the funds of the corporation.—The other presbyterian churches in Edinburgh are, the Trinity-college church; the Old and New Gray-friars; the Tron-church; Lady Yester's; Canongate; St Cuthbert's; Chapel of Ease; Lady Glenorchy's; and the Earle church.

15. *The English Chapel*. This building stands near the Cowgate-port, and was begun on the 3d of April 1771. The foundation-stone was laid by general Oughton, with the following inscription: "E. difficili fac. Ecclesie Episc. Angliæ, primum posuit lapidem, J. Adolphus Oughton, in architectoni- cæ Scotiæ repub. Curio maximus, militum præfec- tus, regnante Georgio III. tertio Apr. die A. D. "MDCC LXXI."—It is a plain, handsome building, neatly fitted up in the inside, and resembling in form the church of St Martin's in the Fields, London. It is 90 feet long, 75 broad, and ornamented with a neat spire of a considerable height. The spire is furnished with an excellent bell, formerly belonging to the chapel-royal at Holyrood-house. This is permitted to be rung for assembling the congregation; an indulgence which is not granted to the presbyterians in England. This building has already cost 6000l. besides 800l. for the area: It still wants two porticoes; one of which, on the south, is meant to consist of lofty Corinthian pillars, supporting a pediment; and the expenses of these are estimated at 1000l. more.

Besides the above-mentioned places appointed for religious worship, there were formerly a number of others, which are now either disused, or entirely ruined. The principal of these are,

16. *Church of St Mary in the field, and Monastery of Black-friars*.—The church of St Mary was a large handsome building, in which a provost and ten prebendaries officiated. It is probable, that both the church and convent were founded in the reign of Alexander II. in 1230. The convent was built almost on the same

spot where the high-school stands at present. The Edinburgh church stood where the college does now. The convent and church, with the houses of the provost and prebendaries, occupied almost all the space between the Cowgate and Potterrow. The lane, now called *Black-friar's wynd*, was also the property of these ecclesiastics, and took its name from them. The monastery was burned down in 1528, but was rebuilt at the Reformation; soon after which, the ecclesiastics were stripped of all their possessions. The magistrates obtained them from James VI.; and were also empowered to dispose of them, and apply the feu-tenths towards building and endowing an hospital at Trinity-college church. The lands formerly belonging to this church of St Mary, and monastery of Black-friars, are now chiefly occupied by the college, high-school, church of Lady Yester, royal infirmary, and surgeons-hall.

17. *St Mary's Chapel*. This chapel was founded by Elizabeth countess of Rois in 1505, and stands near the middle of Niddry's wynd. It was dedicated "To God, and the Virgin Mary his mother." About the year 1600, one Chalmers, a macer before the court of session, acquired a right to this chapel; and, in 1618, the corporations of wrights and masons, now known by the name of the "United Incorporations of Mary's Chapel," purchased the subject which they still possess, and where they hold the meetings of the corporations.

18. *Hospital of our Lady*. This was founded, near the foot of Leith wynd, in 1479, by Thomas Spens bishop of Aberdeen, for the maintenance of 12 poor men. These poor men, however, must certainly have been maintained by the contributions of the public; for the rents with which the hospital was endowed, did not exceed 121. sterling. At the Reformation, the town-council of Edinburgh became proprietors of this hospital. In 1619, it was converted into a work-house, and had the name of *Paul's work* bestowed upon it, which name it still retains.—At the same time, the council brought five men from Holland to instruct indigent boys and girls in the manufacture of coarse woollen stuffs. The manufacture, however, did not succeed; upon which it was converted into a *correction-house*. At last it was sold to one Mr McDowal, who carries on in it a considerable manufacture of broad cloths.

19. *St Thomas's Hospital* was founded by George Creichton bishop of Dunkeld, in the reign of James V. The building joined immediately to the Water-gate upon the west. It was dedicated to God, the Virgin Mary, and all the saints. Among the charitable purposes for which it was instituted, one was, That prayers might be said in it for the soul of the founder, and of the king of the Scots, as well as some other persons mentioned in the institution. The patronage was vested in the founder himself, and a certain number of his heirs named by him. In 1617, the hospital was disposed of by the chaplains and beadmen, with consent of the patron, to the bailies of the Canongate, to be used as an hospital for the poor of that district. In 1634, the patronage was sold to the kirk-session; but still with a view to the same charitable purposes. By degrees, the revenues of it came to be entirely embezzled. In 1747, the building was converted into coach-houses; and, in 1778, having become ruinous, it was entirely pulled down, and rebuilt as private houses.

20. *Monastery of St Catherine of Sienna.* This lay on the south side of the meadows, and was founded by lady St Clair of Roslin. It was a monastery of Dominican nuns; but, at the Reformation, the magistrates seized the revenues of the monastery, and cruelly turned out the poor women to the wide world; nor would they, till compelled by queen Mary, allow them the smallest subsistence even out of their own funds. The neighbourhood of this monastery is now called the *Sheens*; probably a corruption of the word *Sienna*.

21. *Chapels of St Leonards, and St Mary of Placentia.* The first of these stood on the east side of the road to Dalkeith. The lands belonging to it were, by king James VI. granted to the magistrates of the Canongate for the support of Thomas's hospital. The land in its neighbourhood still bears the name of *St Leonard's hill*. A part of it belongs to the quakers, who use it for a burying ground; another part is used for burying children who have died without baptism, and persons who have put an end to their own life.—Nigher to the city, at a small distance from the south-east angle of the town-wall, stood a priory of nuns dedicated to *St Mary of Placentia*. This street still bears the name of the *Plasants*, or *Plasance*; probably corrupted from *Placentia*.

22. *Monastery of Holy-rood House.* This was founded by king David I. in 1128, and called *Holy-rood House*, in memory, as is said, of his deliverance from an enraged hart, by the miraculous interposition of a cross from heaven. This monastery he gave to the canons regular of St Augustine; on whom he also bestowed the church of Edinburgh castle, with those of St Cuthbert's, Corstorphin, and Libberton, in the shire of Mid-Lothian, and of Airth in Stirlingshire; the priories of St Mary's in Galloway, of Blantyre in Clydesdale, of Rowadill in Ross, and three others in the Western Isles. To them he also granted the privilege of erecting a borough between the town of Edinburgh and the church of Holy-rood House. From these canons it had the name of the *Canongate*, which it still retains. In this new borough they had a right to hold markets. They had also portions of land in different parts, with a most extensive jurisdiction, and right of trial by duel, and fire and water ordeal. They had also certain revenues payable out of the exchequer, and out of other funds, with fishings, and the privilege of erecting mills on the water of Leith, which still retain the name of *Canon-mills*. Other grants and privileges were bestowed by succeeding sovereigns; so that it was deemed the richest religious foundation in Scotland. At the Reformation, its annual revenues were, 442 bolls of wheat, 640 bolls of bear, 560 bolls of oats, 500 capons, two dozen of hens, as many salmon, 12 loads of salt; besides a great number of swine, and about 250*l.* sterling in money. At the Reformation, the superiority of North Leith, part of the Pleasance, the barony of Broughton, and the Canongate, was vested in the earl of Roxburgh; and were purchased from him by the town-council of Edinburgh in 1636. In 1544, the church suffered considerably by the invasion of the English; but was speedily repaired. At the Restoration, king Charles II. ordered the church to be set apart as a chapel-royal, and prohibited its use as a common parish-church for the future. It was then fitted up in a very elegant manner. A throne

was erected for the sovereign, and 12 stalls for the knights of the order of the thistle; but as mals had been celebrated in it in the reign of James VII. and it had an organ, the presbyterians, at the revolution, entirely destroyed its ornaments, and left nothing but the bare walls.—Through time, the roof of the church became ruinous; on which the duke of Hamilton represented its condition to the barons of exchequer, and craved that it might be repaired. This request was complied with: but the architect and mason who were employed, covered the roof with thick flag-stones, which soon impaired the fabric; and on the 2d of December 1768, the roof of the church fell in. Since that time, no attempt has been made to repair it, and it is now entirely fallen to ruin.

23. *The Observatory.* The scheme of building an observatory was first adopted in the year 1736; but the disturbance occasioned by the Porteous mob, prevented any thing from being done towards the execution of it at that time. The earl of Morton afterwards gave 100*l.* for the purpose of building an observatory, and appointed Mr M'Laurin professor of mathematics, together with the principal and some professors of the university, trustees for managing the sum. Mr M'Laurin added to the money above-mentioned, the profits arising from a course of lectures which he read on experimental philosophy, which, with some other small sums, amounted in all to 300*l.*; but Mr M'Laurin dying, the design was dropped.—Afterwards the money was put into the hands of two persons who became bankrupt; but a considerable dividend being obtained out of their effects, the principal and interest, about the year 1776, amounted to 400*l.* A plan of the building was made out by Mr Craig architect; and the foundation-stone was laid by Mr Stodart, lord provost of Edinburgh, on the 25th of August 1776. About this time, however, Mr Adam architect happening to come to Edinburgh, conceived the idea of giving the whole the appearance of a fortification, for which its situation on the top of the Calton-hill was very much adapted. Accordingly a line was marked out for inclosing the limits of the observatory with a wall constructed with buttresses and embrasures, and having Gothic towers at the angles. Thus the money designed for the work was totally exhausted, and the observatory still remains unfinished; nor is there any appearance of its being soon completed, either by voluntary subscription, or any other way.

24. *The College* was founded in 1581; the town-council having at that time got a legacy of 8000 merks, left for this purpose by Robert Reid bishop of Orkney. James VI. endowed it with certain church-lands in the counties of Lothian and Fife; and, considering himself as its patron, ordered it to be called *King James's college*. From time to time it has received many donations from well disposed people.—In this university all the different branches of medicine, as well as of theology, law, &c. are taught in the most perfect manner. The first medical professors instituted at Edinburgh, were Sir Robert Sibbald and Doctor Archibald Pitcairn, in the year 1685 *. These, however, were only titular professors. The college of physicians, although they possessed an exclusive right of practising, were debarred from teaching in Edinburgh; and for 30 years afterwards, a summer-lecture

* See Cor.
LEGE of
Physicians.

Edinburgh. on the official plants, and the dissection of a human body once in two or three years, completed the whole course of medical education at Edinburgh.---In 1720, an attempt was made to teach the different branches of physic regularly; which succeeded so well, that, ever since, the reputation of the university, as a school for medicine, hath been constantly increasing, both in the island of Britain, and even among distant nations.---The medical classes are opened on the last Wednesday of November; and from that time to the beginning of May, five lectures are given weekly by each professor, Christmas week only excepted.---The following is a list of the present professors in the university of Edinburgh, with the salary belonging to each.

THEOLOGY.

	L.	s.	d.
William Robertson, D. D. principal of the university, and primary professor of divinity.	111	2	0½
Robert Hamilton, D. D. professor of divinity.	161	2	0½
Robert Cuming, <i>regius</i> professor of divinity and church-history	100	0	0
James Robertson, D. D. professor of Oriental languages, librarian, and secretary to the university.	119	12	8

LAW.

James Balfour, advocate, <i>regius</i> professor of the law of nature and nations	200	0	0
Robert Dick, advocate, professor of civil law	100	0	0
William Wallace, advocate, professor of Scots law	100	0	0
John Pringle, advocate, professor of civil history, and Greek and Roman antiquities	100	0	0

MEDICINE.

Alexander Monro, professor of anatomy and surgery	50	0	0
William Cullen, M. D. professor of the practice of medicine	0	0	0
John Hope, M. D. <i>regius</i> professor of botany	77	15	6½
Francis Home, M. D. professor of materia medica	0	0	0
Joseph Black, M. D. professor of chemistry	0	0	0
James Gregory, M. D. professor of the theory of medicine, and dean of the faculty of medicine	0	0	0
Thomas Young, M. D. professor of midwifery	0	0	0
Professor of natural history	70	0	0

ARTS.

Adam Ferguson, L. L. D. professor of moral philosophy	102	4	5½
Hugh Blair, D. D. <i>regius</i> professor of rhetoric and belles lettres	70	0	0
Andrew Dalziel, M. A. professor of Greek	52	4	5½
John Hill, M. A. professor of humanity	52	10	0
John Robison, M. A. professor of natural philosophy	52	4	5½
Dugald Stewart, M. A. professor of			

mathematics and astronomy

113 6 5½ Edinburgh.

John Bruce, M. A. professor of Logic, and dean of the faculty of arts 52 4 8
N. B. The salary of the king's physician is divided among those gentlemen who have no salaries as professors.

The college is endowed with a very fine library. It was founded in 1580 by Mr Clement Little, advocate, who bequeathed it to the town-council. They ordered a house to be built for it in the neighbourhood of St Giles's church, where it was for some time kept under the care of the eldest minister of Edinburgh, but was afterwards removed to the college. This collection is enriched, as well as others of a similar kind, by receiving a copy of every book entered in Stationer's hall, according to the statute for the encouragement of authors. Besides this, the only fund it has is the money paid by all the students at the university, except those of divinity, upon their being matriculated; and a sum of 51. given by each professor at his admission. The amount of these sums is uncertain.

The advocates library is a better collection than the former. It was founded, in 1682, by Sir George Mackenzie, lord advocate. Besides 30,000 printed volumes in all languages, here are also a very valuable collection of manuscripts of different kinds, prints, medals, coins, &c. The faculty have also in their possession an entire mummy, preserved in its original chest. This was presented by the earl of Morton, who bought it at the price of 300l.

25. *The High School.* The earliest institution of a grammar-school in Edinburgh seems to have been about the year 1519. The whole expence bestowed upon the first building of this kind amounted only to about 401. Sterling. Another building, which had been erected for the accommodation of the scholars in 1578, continued, notwithstanding the great increase of their number, to be used for that purpose till 1777. The foundation of the present new building was laid on the 24th of June that year by Sir William Forbes, Grand Master of the Free Masons. The total length of this building is 120 feet from south to north; the breadth in the middle 36, at each end 38 feet. The great hall where the boys meet for prayers, is 68 feet by 30. At each end of the hall is a room of 32 feet by 20, intended for libraries. The building is two stories high, the one 18, the other 17, feet in height. The expence of the whole when finished is reckoned at 3000 l.

26. *The exchange.* The foundation of this building was laid by Provost Drummond on the 13th of September 1753. It is a large and elegant building, of a square figure, with a court in the centre. The principal part forms the north side of the square, and extends 111 feet in length, and 51 in breadth. Pillars and arches supporting a platform run along the south front which faces the square, and forms a piazza. In the centre, four Corinthian pillars, whose bases rest upon the platform, support a pediment on which the arms of the city are engraved. This building on the south side is 60 feet high; but on the north, upwards of 100; owing to the extreme inequality of the ground on which it is built. The whole expence amounted to 31,457 l.

With regard to the political constitution of Edinburgh, the town-council have the direction of all public

lic affairs. The ordinary council consists only of 25 persons; but the *council ordinary and extraordinary*, of 33. The whole is composed of merchants and tradesmen, whose respective powers and interests are so interwoven, that a balance is preserved between the two bodies. The members of the town-council are partly elected by the members of the 14 incorporations, and they partly choose their own successors. The election is made in the following manner. First, a list or *leet* of six persons is made out by each incorporation; from which number, the deacon belonging to that incorporation must be chosen. These lists are then laid before the ordinary council of 25, who "shorten the leets," by expunging one half of the names from each; and from the three remaining ones the deacon is to be chosen. When this election is over, the new deacons are presented to the ordinary council, who choose six of them to be members of their body, and the six deacons of last year then walk off. The council of 25 next proceed to the election of three merchant and two trades counsellors. The members of council, who now amount to 30 in number, then make out *leets*, from which the lord provost, dean of guild, treasurer, and bailies, must be chosen. The candidates for each of these offices are three in number; and the election is made by the 30 members of council already mentioned, joined to the eight *extraordinary* council-deacons.

The lord provost of Edinburgh is high sheriff, coroner, and admiral, within the city and liberties, and the town, harbour, and road of Leith. He has also a jurisdiction in matters of life and death. He is preses of the convention of royal boroughs. Colonel of the trained bands, commander of the city-guard, and of Edinburgh jail. In the city he has the precedence of all the great officers of state, and of the nobility; walking on the right hand of the king, or of his majesty's commissioner; and has the privilege of having a sword and mace carried before him. Formerly he was also an officer in the Scots parliament. The magistrates are sheriffs-depute and justices of the peace; and the town-council are patrons of all the churches in Edinburgh, patrons of the university, and electors of the city's representative in parliament; and have the right of presenting to all offices of trust, honour, or profit, belonging to the city. They have besides a very ample jurisdiction both civil and criminal. The town-council are superiors of the Canongate, Portsburgh, and Leith; and appoint over these certain of their own number, who are called *baron bailies*; but the person who presides over Leith has the title of *admiral*, because he hath there a jurisdiction over maritime affairs. The baron-bailies appoint one or two of the inhabitants of their respective districts to be their substitutes, and these are called *resident bailies*. They hold courts in absence of the baron-bailies, for petty offences, and discussing civil causes of little moment.

No city in the world affords greater security to the inhabitants in their persons and properties, than Edinburgh. Robberies are here very rare, and a street-murder is unknown in the memory of man, so that a person may walk the streets at any hour of the night in perfect security. This is in a great measure owing to the *town-guard*. This institution originated from the consideration into which the citizens were thrown after the battle at Flodden. At that time, the town-council

commanded the inhabitants to assemble in defence of the city, and every fourth man to be on duty each night. This introduced a kind of personal duty for the defence of the town, called *watching and warding*; by which the trading part of the inhabitants were obliged in person to watch alternately, in order to prevent or suppress occasional disturbances. This, however, becoming in time extremely inconvenient, the town-council, in 1648, appointed a body of 60 men to be raised; the captain of which was to have a monthly pay of 11 l. 2 s. 3 d. two lieutenants of 2 l. each, two sergeants of 1 l. 5 s. and the private men of 15 s. each. No regular fund, however, was established for defraying this expence; the consequence of which was, that the old method of watching and warding was resumed; but the people on whom this service devolved, were now become so relaxed in their discipline, that the magistrates were threatened with having the king's troops quartered in the city if they did not appoint a sufficient guard. On this, 40 men were raised in 1679, and in 1682 the number was increased to 108. After the revolution, the town-council complained of the guard as a grievance, and requested parliament that it might be removed. Their request was immediately granted, and the old method of watching and warding was renewed. This, however, was now so intolerable, that the very next year they applied to parliament for leave to raise 126 men for the defence of the city, and to tax the citizens for their payment. This being granted, the corps was raised, which still continues under the name of the *town-guard*. The number of private men is about 75. They are paid chiefly by a tax on the trading people; these being the only persons formerly subject to watching and warding. This tax, however, amounts only to 1250 l. and as the expence of the guard amounts to 1400 l. the magistrates are obliged to defray the additional charge by other means.

The number of inhabitants in the city of Edinburgh is somewhat uncertain, and has been very variously calculated. By a survey made in the year 1775, it appears that the number of families in the city, Canongate and other suburbs, and the town of Leith, amounted to 13,806. The difficulty therefore is to fix the number of persons in a family. Dr Price fixes this number at $4\frac{1}{10}$; Mr Maitland, at $5\frac{1}{2}$; and Mr Arnot, at 6: so that, according to this last gentleman, the whole number of inhabitants is 82,836; to which he thinks 1400 more may be added for those in the garrison, hospitals, &c. There are, in Edinburgh, 14 incorporations, capable of choosing their own deacons, viz. The royal college of surgeons; the corporations of goldsmiths, skinners, furriers, hammermen, wrights and mafons, tailors, bakers, butchers, shoemakers, weavers, wankers, bonnet-makers, and merchant-company. The revenue of the city, arising partly from duties of different kinds, and partly from landed property, is estimated at about 10,000 l. per annum. As Edinburgh is not properly a seaport, it hath never been remarkable for trade. Its principal support arises from the supreme courts of justice, which are held there, and from the college. The exports and imports must all go and come by the town of Leith. See the article LEITH.

EDITOR, a person of learning, who has the care
15 F 2 of

Edinburgh,
Editor.

Edmund
Edwards.

of an impression of any work, particularly that of an ancient author: thus, Erasmus was a great editor; the Louvain doctors, Scaliger, Petavius, F. Sirmond, bishop Walton, Mr Hearne, Mr Ruddiman, &c. are likewise famous editors.

EDMUND I. and II. See (*History of*) ENGLAND.

EDUCATION, the instructing children, and youth in general, in such branches of knowledge and polite exercises as are suitable to their genius and station.

Education is a very extensive subject, that has employed the thoughts and pens of the greatest men: Locke, the archbishop of Cambray, Tanaquil Faber, M. Croufaz, Rollin, and Rousseau, may be consulted on this head.

The principal aim of parents should be, to know what sphere of life their children are designed to act in; what education is really suitable to them; what will be the consequence of neglecting that; and what chance a superior education will give them, for their advancement in the world. Their chief study should be to give their children such a degree of knowledge as will qualify them to fill some certain post or station in life: in short, to fit them for an employment suited to their condition and capacity, such as will make them happy in themselves and useful to society.

EDULCORATION, properly signifies the rendering substances more mild. Chemical edulcoration consists almost always in taking away acids and other saline substances; and this is effected by washing the bodies to which they adhere in a large quantity of water. The washing of diaphoretic antimony, powder of algaroth, &c. till the water comes off quite pure and insipid, are instances of chemical edulcoration.—In pharmacy, juleps, potions, and other medicines, are said to be *edulcorated*, by adding sugar, or syrup.

EDWARD, the name of several kings of England. See (*History of*) ENGLAND.

EDWARDS (George), fellow of the royal and antiquarian societies, was born at Stratford, a hamlet belonging to Westham in Essex, on the 3^d of April 1694. After having spent some time at school, he was put apprentice to a tradesman in Fenchurch-Street. His master, who was eminent both for his piety and skill in the languages, treated him with great kindness; but about the middle of his apprenticeship, an accident happened which totally put a stop to the hopes of young Edwards's advancing himself in the way of trade. Dr Nicolas, a person of eminence in the physical world, and a relation of his master's, happened to die. The Doctor's books were removed to an apartment occupied by Edwards, who eagerly employed all his leisure-hours, both in the day and great part of the night, in perusing those which treated of natural history, sculpture, painting, astronomy, and antiquities. The reading of these books entirely deprived him of any inclination for mercantile business he might have formerly had, and he resolved to travel into foreign countries. In 1716, he visited most of the principal towns in Holland, and in about a month returned to England. Two years after, he took a voyage to Norway, at the invitation of a gentleman who was disposed to be his friend, and who was nephew to the master of the ship in which he embarked. At this time Charles XII. was besieging Frederickshall; by which means our young naturalist was hindered from making such excursions into the coun-

try as otherwise he would have done, for the Swedes were very careful to confine such strangers as could not give a good account of themselves. But notwithstanding all his precaution, he was confined by the Danish guard, who supposed him to be a spy employed by the enemy to get intelligence of their designs. However, by obtaining testimonials of his innocence, a release was granted.

In 1718 he returned to England, and next year visited Paris by the way of Dieppe. During his stay in this country he made two journeys of 100 miles each; the first to Chalons in Champagne, in May 1720; the second on foot, to Orleans and Blois: but an edict happening at that time to be issued for securing vagrants, in order to transport themselves to America, as the banks of the Mississippi wanted population; our author narrowly escaped a western voyage.

On his arrival in England, Mr Edwards closely pursued his favourite study of natural history, applying himself to drawing and colouring such animals as fell under his notice. A strict attention to natural, more than picturesque beauty, claimed his earliest care: birds first engaged his particular attention; and, having purchased some of the best pictures of these subjects, he was induced to make a few drawings of his own; which were admired by the curious, who encouraged our young naturalist to proceed, by paying a good price for his early labours.

Among his first patrons and benefactors may be mentioned James Theobalds, Esq; of Lambeth; a gentleman zealous for the promotion of science. Our artist, thus unexpectedly encouraged, increased in skill and assiduity; and procured, by his application to his favourite pursuit, a decent subsistence, and a large acquaintance. However, he remitted his industry in 1731; when, in company with two of his relations, he made an excursion to Holland and Brabant, where he collected several scarce books and prints, and had an opportunity of examining the original pictures of several great masters at Antwerp, Brussels, Utrecht, and other cities.

In December 1733, by the recommendation of the great Sir Hans Sloane, Bart. president of the college of physicians, he was chosen librarian, and had apartments in the college. This office was peculiarly agreeable to his taste and inclination, as he had the opportunity of a constant recourse to a valuable library, filled with scarce and curious books on the subjects of natural history, which he so assiduously studied. By degrees he became one of the most eminent ornithologists in this or any other country. His merit is so well known in this respect, as to render any eulogium on his performances unnecessary: but it may be observed, that he never trusted to others what he could perform himself; and often found it so difficult to give satisfaction to his own mind, that he frequently made three or four drawings to delineate the object in its most lively character, attitude, and representation.

In 1743, the first volume of the *History of Birds* was published in quarto. His subscribers exceeding even his most sanguine expectations, a second volume appeared in 1747. The third volume was published in 1750. In 1751, the fourth volume came from the press. This volume being the last he intended to publish at that time, he seems to have considered it as the most

perfect

perfect of his productions in natural history; and therefore devoutly offered it up to the great God of nature, in humble gratitude for all the good things he had received from him in this world.

Our author, in 1758, continued his labours under a new title, viz. *Gleanings of Natural History*. A second volume of the *Gleanings* was published in 1760. The third part, which made the seventh and last volume of his works, appeared in 1764.

Thus our author, after a long series of years, the most studious application, and the most extensive correspondence to every quarter of the world, concluded a work which contains engravings and descriptions of more than 600 subjects in natural history, not before described or delineated. He likewise added a general index in French and English; which was afterwards perfected, with the Linnæan names, by that great naturalist Linnæus himself, who frequently honoured him with his friendship and correspondence.

Some time after Mr Edwards had been appointed library-keeper to the royal college of physicians, he was, on St Andrew's day, in the year 1750, presented with an honorary compliment by the president and council of the royal society, with the gold medal, the donation of Sir Godfrey Copley, Bart. annually given on that day to the author of any new discovery in art or nature, in consideration of his natural history just then completed. A copy of this medal he had afterwards engraved, and placed under the title in the first volume of his history. He was a few years afterwards elected fellow of the royal society, and of the society of antiquaries, London; and also a member of many of the academies of sciences and learning in different parts of Europe. In compliment to these honorary distinctions from such learned bodies, he presented elegant coloured copies of all his works, to the royal college of physicians, the royal society, the society of antiquarians, and to the British museum; also to the royal academy of sciences at Paris, from whom he received the most polite and obliging letter of thanks by their then secretary Monsieur Desouchy.

His collection of drawings, which amounted to upwards of 900, were purchased by the earl of Bute. They contain a great number of British as well as foreign birds, and other animals hitherto not accurately delineated or described.

After the publication of the last work, being arrived at his 70th year, he found his sight begin to fail, and his hand lost its wonted steadiness. He retired from public employment to a little house which he purchased at Plaistow; previous to which, he disposed of all the copies, as well as plates, of his works. The conversation of a few select friends, and the perusal of a few select books, were the amusement of the evening of his life; and now and then he made an excursion to some of the principal cities in England, particularly to Bristol, Bath, Exeter, and Norwich.

Some years before his death, the alarming depredations of a cancer, which baffled all the efforts of physical skill, deprived him of the sight of one of his eyes: he also suffered much from the stone, a complaint to which at different periods of his life he had been subject. Yet it has been remarked, that, in the severest paroxysms of misery, he was scarcely known to utter a single complaint.

Having completed his 80th year, emaciated with age and sickness, he died on the 23^d of July 1773, deservedly lamented by a numerous acquaintance.

EEL, in ichthyology, a species of *MURÆNA*.

EEL-Fishing. See *BOBBING* and *SNIGGLING*.

The silver-eel may be caught with several sorts of baits; as powdered-beef, garden-worms, minnows, hens-guts, fish-garbage, &c. The most proper time for taking them is in the night, fastening your line to the bank-sides, with your laying-hook in the water: or a line may be thrown with good store of hooks, baited and plumbed, with a float to discover where the line lies, that they may be taken up in the morning.

Microscopic EELS in four Paste. See *ANIMALCULE*, n^o 8.

EELS in *Vinegar*, are similar to those in four paste. The taste of vinegar was formerly thought to be occasioned by the biting of these little animals, but that opinion has been long ago exploded. Mentzelius says, he has observed the actual transformation of these little creatures into flies: but as this hath never been observed by any other person, nor is there an instance of such a transformation in any other animalcule, it seems probable that Mentzelius hath been mistaken in his observations.

EEL-Spear, a forked instrument with three or four jagged teeth, used for catching of eels: that with the four teeth is best, which they strike into the mud at the bottom of the river, and if it strike against any eels it never fails to bring them up.

EFFARE, or EFFRAYE, in heraldry, a term applied to a beast rearing on its hind-legs, as if it were frightened or provoked.

EFFECT, in a general sense, is that which results from, or is produced by, any cause. See *CAUSE*.

EFFERVESCENCE, an intestine motion excited betwixt the parts of two bodies of different natures, when they reciprocally dissolve each other. Effervescences are commonly attended with bubbles, vapours, small jets of the liquid, and a hissing noise; and these phenomena are occasioned by the air which at that time disengages itself. Sometimes also they are accompanied with a great degree of heat, the cause of which is not so well known. See *DISSOLUTION*.

Formerly the word *fermentation* was also applied to effervescences; but now that word is confined to the motion naturally excited in animal and vegetable matters, and from which new combinations among their principles take place.

EFFIGY, the portrait, figure, or exact representation of a person.

EFFLORESCENCE, among physicians, the same with exanthema. See *EXANTHEMA*.

EFFLORESCENCE, in chemistry, denotes the formation of a kind of mealy powder on the surface of certain bodies. Efflorescence is occasioned either by decomposition or drying. The efflorescence which happens to cobalt and martial pyrites is of the first, and that observed on the crystals of marine alkali, Glauber's salt, &c. of the latter kind. An efflorescence is sometimes also a species of crystallization, the nature of which is not well understood; as, the beautiful vegetations which shoot up from vitriolated tartar acidulated either with the vitriolic or nitrous acids, the saline spi-
culæ

culæ which are observed to shoot from salt butter, &c. **EFFLORESCENTIA**, in botany, (from *effloresco* to bloom); the precise time of the year and month in which every plant shews its first flowers.

Some plants flower twice a-year, as is common between the tropics; others oftener, as the monthly rose. The former are called by botanists *bifera*; the latter, *multifera*.

The time of flowering is determined by the degree of heat which each species requires. Mezeron and snow-drop produce their flowers in February; primrose, in the beginning of March; the greater number of plants, during the month of May; corn, and other grain, in the beginning of June; the vine, in the middle of the same month; several compound flowers, in the months of July and August; lastly, meadow-saffron flowers in the month of October, and announces the speedy approach of winter.

Grafs of Parnassus always flowers about the time of cutting down the hay; and in Sweden, the different species of thistle, mountain-lettuce, fuccory, and balfam, seldom flower till after the summer solstice: the country-men even know, as by a calendar, that the solstice is past, when these plants begin to produce their flowers.

The temperature of the seasons has a mighty influence both in accelerating and retarding the flowering of plants. All plants are earlier in warm countries: hence such as are cultivated out of their native soil, never flower, till the heat of the climate or situation into which they are removed, is equal to that under the influence of which they produced flowers in their own country. For this reason, all exotics from warm climates are later in this country than many plants which it naturally produces.

In general, we may observe, that the plants of the coldest countries, and those produced on the mountains in all climates, being of equal temperature, flower about the same time, viz. during our spring in Europe.

Plants that grow betwixt the tropics, and those of temperate climates, flower during our summer.

Plants of temperate climates, situated under the same parallel of latitude with certain parts of Europe, but removed much farther to the west, such as Canada, Virginia, and Mississippi, do not produce flowers till autumn.

Plants of temperate climates in the opposite hemisphere to Europe, flower during our winter, which is the summer of these regions.

Linnaeus and Adanson have given a sketch of the different times in which plants flower at Upsal and Paris.

EFFLUVIUM, in physiology, a term much used by philosophers and physicians, to express the minute particles which exhale from most, if not all, terrestrial bodies, in form of insensible vapours. See *PERSPIRATION*, *VAPOUR*, *SMELL*, and the *Index* subjoined to *MEDICINE*.

EFFUSION, in a general sense, the pouring out of any thing liquid, and that with some violence.

EFT, in zoology, the English name of the common lizard. See *LACERTA*.

EGERIA, or *ÆGERIA*, a nymph held in great veneration by the Romans. Numa Pompilius made

the people believe that he had composed the laws and religious ceremonies of Rome by her advice and assistance.

EGG, in physiology, a body formed in certain females, in which is contained an embryo or fetus of the same species, under a cortical surface or shell. The exterior part of an egg is the shell; which in a hen, for instance, is a white, thin, and friable cortex, including all the other parts. The shell becomes more brittle by being exposed to a dry heat. It is lined every where with a very thin but a pretty tough membrane, which dividing at, or very near, the obtuse end of the egg, forms a small bag, where only air is contained. In new-laid eggs this follicle appears very little, but becomes larger when the egg is kept.

Within this are contained the albumen or white, and the vitellus or yolk; each of which have their different virtues.

The albumen is a cold, viscous, white liquor in the egg, different in consistence in its different parts. It is observed, that there are two distinct albumens, each of which is inclosed in its proper membrane. Of these one is very thin and liquid: the other is more dense and viscous, and of a somewhat whiter colour; but, in old and stale eggs, after some days incubation, inclining to a yellow. As this second albumen covers the yolk on all sides, so it is itself surrounded by the other external liquid. The albumen of a fecundated egg, is as sweet and free from corruption, during all the time of incubation, as it is in new-laid eggs; as is also the vitellus. As the eggs of hens consist of two liquors separated one from another; and distinguished by two branches of umbilical veins, one of which goes to the vitellus, and the other to the albumen; so it is very probable that they are of different natures, and consequently appointed for different purposes.

When the vitellus grows warm with incubation, it becomes more humid, and like melting wax, or fat; whence it takes up more space. For as the fetus increases, the albumen insensibly wastes away, and condenses: the vitellus, on the contrary, seems to lose little or nothing of its bulk when the fetus is perfected, and only appears more liquid and humid when the abdomen of the fetus begins to be formed.

The chick in the egg is first nourished by the albumen; and when this is consumed, by the vitellus, as with milk. If we compare the chalazæ to the extremities of an axis passing through the vitellus, which is of a spherical form, this sphere will be composed of two unequal portions, its axis not passing through its centre; consequently, since it is heavier than the white, its smaller portion must always be uppermost in all positions of the egg.

The yellowish white round spot, called *cicatricula*, is placed on the middle of the smaller portion of the yolk; and therefore, from what has been said in the last paragraph, must always appear on the superior part of the vitellus.

Not long before the exclusion of the chick, the whole yolk is taken into its abdomen; and the shell, at the obtuse end of the egg, frequently appears cracked some time before the exclusion of the chick. The chick is sometimes observed to perforate the shell with its beak. After exclusion, the yolk is gradually wasted,

Eggs
||
Egypt.

ed, being conveyed into the small-guts by a small duct.

Eggs differ very much according to the birds that lay them, according to their colour, form, bigness, age, and the different way of dressing them: those most used in food are hens eggs; of which, such as are new-laid are best.

As to the preservation of eggs, it is observed that the egg is always quite full when it is first laid by the hen; but from that time it gradually becomes less and less so, to its decay: and however compact and close its shell may appear, it is nevertheless perforated with a multitude of small holes, though too minute for the discernment of our eyes, the effect of which is a daily decrease of matter within the egg, from the time of its being laid; and the perspiration is much quicker in hot weather than in cold.

To preserve the egg fresh, there needs no more than to preserve it full, and stop its transpiration; the method of doing which is, by stopping up those pores with matter which is not soluble in watery fluids: and on this principle it is, that all kinds of varnish, prepared with spirit of wine, will preserve eggs fresh for a long time, if they are carefully rubbed all over the shell: tallow, or mutton-fat, is also good for this purpose; for such as are rubbed over with this, will keep as long as those coated over with varnish.

For the chemical principles of eggs, and the various uses to which the eggs themselves may be applied, see the articles ALBUMEN, VITELLUS, CEMENT, CLARIFICATION, VARNISH, the *Index* subjoined to MEDICINE, &c.

Artificial Method of Hatching Eggs. See HATCHING.

EGINA. See *ÆGINA*.

EGINHART, secretary to the emperor Charles the Great, was a German. He is the most ancient historian of that nation, and wrote very eloquently for a man of the 9th century. It is said, that he insinuated himself so well into the favour of Imma, daughter to Charles the Great, that he obtained from her whatever he desired. Charles the Great, having found out the intrigue, did not do as Augustus, who is thought to have banished Ovid because he believed him to be too much favoured by Julia; for he married the two lovers together, and gave them a fine estate in land.

EGLANTINE, in botany. See ROSA.

EGRA, a town of Bohemia, formerly imperial, but now subject to the house of Austria. It contains a great number of able artificers, and is famous for its mineral waters. Wallenstein, the emperor's general, was assassinated here, in 1634. The French became masters of this town in 1741; but afterwards being blocked up, they were forced to capitulate on September 7th, 1743. It is looked upon as a town of the greatest consequence in Bohemia, except Prague. It is seated on a river of the same name, in E. Long. 12. 30. N. Lat. 50. 21.

EGYPT, an extensive country of Africa, lying between 30° and 36° of east longitude, and between 21° and 31° of north latitude; and bounded by the Mediterranean on the north; by the Red-sea and Isthmus of Suez, which divide it from Arabia, on the east; by Abyssinia or Ethiopia, on the south; and by the deserts of Barca and Nubia, on the west; being 600 miles

in length from north to south, and from 100 to 200 in breadth from east to west.

As a nation, the Egyptians may with justice lay claim to as high antiquity as any in the world. The country was most probably peopled by Mizraim the son of Ham, and grandson of Noah.—By its ancient inhabitants it was called *Chemias*, and is still called *Chemi* in the language of the *Copts* or native Egyptians; and this name it is supposed to have received from Ham the son of Noah. In scripture, we find it most generally named *Mizraim*; though in the Psalms it is styled the *land of Ham*.—To us it is best known by the name *Egypt*, the etymology of which is more uncertain.—Some derive it from *Ægyptus*, a supposed king of the country: others say it signifies no more than “the land of the *Copts*,” *Aia* in Greek signifying a country, and *Ægyptos* being easily softened into *Ægyptus*.—The most probable opinion, however, seems to be, that it received this name from the blackness of its soil, and the dark colour both of its river and inhabitants: for such a blackish colour is by the Greeks called *ægyptios*, from *gypti*, and *ægypti*, a vulture; and by the Latins, *subvulturius*. For the same reason, other names of a similar import have been given to this country by the Greeks; such as *Aeria*, and *Melambolus*: the river itself was called *Melo* or *Melas*; by the Hebrews, *Shihor*; and by the Ethiopians, *Siris*; all of which signify “black.”

Ancient Egypt is by some divided into two parts, the upper and lower Egypt: by others into three, the upper Egypt, properly so called, or *Thebais*; the middle Egypt, or *Heptanomis*; and the lower Egypt, the best part of which was the *Delta*, or that space encompassed by the branches of the Nile. See THEBAIS, &c.

The Egyptians, like the Chinese, pretend to an excessive antiquity, pretending to have records for ten, twenty, or even fifty thousand years. Thus their history is so much involved in obscurity and fable, that for many ages it must be passed over in silence.—The first mortal king whom the Egyptians own to have reigned in that country, was *Menes* or *Menar*. At what time he reigned, it would be to very little purpose to inquire. He had been preceded, however, by a set of *immortals*, who it seems left him the kingdom in a very bad situation: for the whole country, except Thebais, was a morass; the people also were entirely destitute of religion, and every kind of knowledge which could render their life comfortable and happy. Menes diverted the course of the Nile, which before that time had washed the foot of a sandy mountain near the borders of Libya, built the city of Memphis, instructed his subjects, and did other things of a similar kind which are usually attributed to the founders of kingdoms.

From the time of Menes, the Egyptian chronology is filled with a list of 330 kings, who reigned 1400 years, but did nothing worthy of notice.—The first distinct piece of history we find concerning Egypt, is the irruption of the *Shepherds*, by whom the country was subdued; but whether this revolution happened during the vast interval of indolence above-mentioned, or before or after, cannot be known. The affair is thus related by Manetho. It happened, in the reign of Timaüs king of Egypt, that God being displeased with the Egyptians, they suffered a great revolution: for a multitude of men, ig-
noble

Egypt.

Different
names.

2

Invaded by the shepherds.

noble in their race, took courage, and, pouring from the east into Egypt, made war with the inhabitants; who submitted to them without resistance. The shepherds, however, behaved with the greatest cruelty; burnt the cities, threw down the temples of the gods, and put to death the inhabitants, carrying the women and children into captivity. This people came from Arabia, and were called *Hyksos*, or *king-shepherds*. They held Egypt in subjection for 259 years; at the end of which period, they were obliged by a king of Upper Egypt, named *Amosis*, or *Thebanosis*, to leave the country. This prince's father had, it seems, gained great advantages over them, and flung them up in a place called *Abaris*, or *Avaris*, containing 10,000 acres of land. Here they were closely besieged by Amosis, with an army of 400,000 men; but at last the king, finding himself unable to reduce them by force, proposed an agreement, which was readily accepted. In consequence of this agreement, the shepherds withdrew from Egypt with their families, to the number of 240,000; and, taking the way of the desert, entered Syria: but, fearing the Assyrians, who were then very powerful, and masters of Asia, they entered the land of Judæa, and built there a city capable of holding so great a multitude, and called it *Jerusalem*.

As this account seems to bear some faint resemblance to the departure of the Israelites under Moses, some chronologers have supposed them to be the same event. This, however, is strenuously opposed by others; but to decide the question seems impossible. In these early ages, however, it would seem that the kingdom of Egypt had been very powerful, and its dominion very widely extended, since we find it said, that the *Babryans* revolted from Olymndyas another Egyptian king of very high antiquity, and of whose wealth the most marvellous accounts are given.

After an unknown interval of time from this monarch, reigned Sesostris. He was the first great warrior whose conquests are recorded with any degree of distinctness. In what age of the world he lived, is uncertain. Some chronologers, among whom is Sir Isaac Newton, are of opinion, that he is the Sefac, or Shishak, who took Jerusalem in the reign of Rehoboam the son of Solomon. Others, however, place him much earlier; and Mr Whiston will have him to be the Pharaoh who refused to part with the Israelites, and was at last drowned in the Red Sea. His reign is reckoned the most extraordinary part of the Egyptian history; and the following seems to be the least fabulous account that can be got of it. The father of Sesostris was told in a dream, by the god Vulcan, that his son, who was then newly born, or perhaps still unborn, should be lord of the whole earth. His father, upon the credit of this vision, got together all the males in the land of Egypt that were born on the same day with Sesostris; appointed nurses and proper persons to take care of them, and had them treated like his own child; being persuaded that they who had been the constant companions of his youth would prove the most faithful ministers and soldiers. As they grew up, they were inured to laborious exercises; and, in particular, were never permitted to taste any food till they had performed a course of 180 furlongs, upwards of 22 of our miles. When the old king imagined they were sufficiently educated in the martial

way he designed them to follow, they were sent by way of trial of their abilities against the Arabians. In this expedition Sesostris proved successful, and in the end subdued that people who had never before been conquered. He was sent to the westward, and conquered the greatest part of Africa; nor could he be stopped in his career, till he arrived at the Atlantic ocean. Whilst he was on this expedition, his father died; and then Sesostris resolved to fulfil the prediction of Vulcan, by actually conquering the whole world. As he knew that this must take up a long time, he prepared for his journey in the best manner possible. The kingdom he divided into 36 provinces, and endeavoured to secure the affections of the people by gifts both of money and land. He forgave all who had been guilty of high treason, and discharged the debts of all his soldiers. He then constituted his brother Arais, the supreme regent; but forbade him to use the diadem, and commanded him to offer no injury to the queen or her children, and to abstain from the royal concubines. His army consisted of 600,000 foot, 24,000 horse, and 27,000 chariots. Besides these land-forces, he had at sea two mighty fleets; one, according to Diodorus, of 400 sail. Of these fleets, one was designed to make conquests in the west, and the other in the east; and therefore the one was built on the Mediterranean, and the other on the Red Sea. The first of these conquered Cyprus, the coast of Phœnicia, and several of the islands called *Cyclades*: the other conquered all the coasts of the Red Sea; but its progress was stopped by shoals and difficult places which the navigators could not pass, so that he seems not to have made many conquests by sea.

With the land-forces Sesostris marched against the Ethiopians and Troglodites; whom he overcame, and obliged them to pay him a tribute of gold, ebony, and ivory. From thence he proceeded as far as the promontory of Dira, which lay near the straits of Babel-mandel, where he set up a pillar with an inscription in sacred characters. He then marched on to the country where cinnamon grows, or at least to some country where cinnamon at that time was brought, probably some place in India; and here he in like manner set up pillars, which were to be seen for many ages after. As to his farther conquests, it is agreed by almost all authors of antiquity, that he over-ran and pillaged the whole continent of Asia, and some part of Europe. He crossed the Ganges, and erected pillars on its banks; and from thence he is said to have marched eastward to the very extremity of the Asiatic continent. Returning from thence, he invaded the Scythians and Thracians; but all authors do not agree that he conquered them. Some even affirm, that he was overthrown by them with great slaughter, and obliged to abandon a great part of his booty and military stores. But, whether he had good or bad success in these parts, it is a common opinion that he settled a colony in Colchis. Herodotus, however, who gives the most particular account of the conquests of this monarch, does not say whether the colony was designedly planted by Sesostris; or whether part of his army loitered behind the rest, and took up their residence in that region. From his own knowledge, he asserts, that the inhabitants of that country were undoubtedly of Egyptian descent. This was evident from the personal

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fonal resemblance they bore to the Egyptians, who were swarthy-complexioned and frizzle-haired; but more especially from the conformity of their customs, particularly circumcision.

The utmost boundary of this mighty monarch's conquests, however, was in the country of Thrace; for beyond this country his pillars were no where to be seen. These pillars he was accustomed to set up in every country which he conquered, with the following inscription, or one to the same purpose: "Sesostris, king of kings, and lord of lords, subdued this country by the power of his arms." Besides these, he left also statues of himself; two of which, according to Herodotus, were to be seen in his time, the one on the road between Ephesus and Phocæa, and the other between Smyrna and Sardis: they were armed after the Ethiopian and Egyptian manner, holding a javelin in one hand, and a bow in the other. Across the breast they had a line drawn from one shoulder to the other, with the following inscription; "This region I obtained by these my shoulders." They were mistaken for images of Memnon.

The reason given by Sesostris for his returning into Thrace from Thrace, and thus leaving the conquest of the world unfinished, was, the want of provisions for his army, and the difficulty of the passes. Most probably, however, his return was hastened by the intelligence he received from the high priest of Egypt, concerning the rebellious proceedings of his brother; who, encouraged by his long absence, had assumed the diadem, violated the queen, and also the royal concubines. On receiving this news, Sesostris hastened from Thrace; and, at the end of nine years, came to Pelusium in Egypt, attended by an innumerable multitude of captives taken from many different nations, and loaded with the spoils of Asia. The treacherous brother met him at this city; and it is said, with very little probability, that Sesostris accepted of an invitation to an entertainment from him. At this he drank freely, together with the queen and the rest of the royal family. During the continuance of the entertainment, Armais caused a great quantity of dried reeds to be laid round the apartment where they were to sleep; and as soon as they were retired to rest, set fire to the reeds. Sesostris perceiving the danger he was in; and that his guards, overcharged with liquor, were incapable of assisting him; rushed through the flames, and was followed by his wife and children. In thanksgiving for this wonderful deliverance, he made several donations to the gods, particularly to Vulcan the god of fire. He then took vengeance on his brother Armais, said to be the Danaus of the Greeks, who, being on this occasion driven out of Egypt, withdrew into Greece.

Sesostris now laid aside all thoughts of war; and applied himself wholly to such works as might tend to the public good, and his own future reputation. In order to prevent the incursions of the Syrians and Arabians, he fortified the east side of Egypt with a wall which ran from Pelusium through the desert to Heliopolis, for 187½ miles. He raised also an incredible number of vast and lofty mounds of earth, to which he removed such towns as had before been situated too low, in order to secure them from the inundations of the Nile. All the way from Memphis to the sea he dug canals which branched out from the Nile, and not

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only made an easier communication between different places, but rendered the country in a great measure impassable to an enemy. He erected a temple in every city in Egypt, and dedicated it to the supreme deity of the place; but in the course of such a great undertaking as this necessarily must have been, he took care not to employ any of his Egyptian subjects. Thus he secured their affection, and employed the vast multitude of captives he had brought along with him; and to perpetuate the memory of a transaction so remarkable, he caused to be inscribed on all these temples, "No one native laboured hereon." In the city of Memphis, before the temple of Vulcan, he raised six gigantic statues, each of one stone. Two of them were 30 cubits high, representing himself and his wife. The other four were 20 cubits each, and represented his four sons. These he dedicated to Vulcan in memory of his abovementioned deliverance. He raised also two obelisks of marble 120 cubits high, and charged them with inscriptions, denoting the greatness of his power, his revenues, &c.

The captives taken by Sesostris are said to have been treated with the greatest barbarity, so that at last they resolved at all events to deliver themselves from a servitude so intolerable. The Babylonians particularly were concerned in this revolt, and laid waste the country to some extent; but being offered a pardon, and a place to dwell in, they were pacified, and built for themselves a city which they called *Babylon*. Towards the conquered princes who waited on him with their tribute, the Egyptian monarch behaved with unparalleled insolence. On certain occasions he is said to have unharnessed his horses, and, yoking kings together, made them draw his chariot. One day, however, observing one of the kings who drew his chariot to look back upon the wheels with great earnestness, he asked what made him look so attentively at them. The unhappy prince replied, "O king, the going round of the wheel puts me in mind of the vicissitudes of fortune: for as every part of the wheel is uppermost and lowermost by turns, so it is with men; who one day sit on a throne, and on the next are reduced to the vilest degree of slavery." This answer brought the insulting conqueror to his senses; so that he gave over the practice, and thenceforth treated his captives with great humanity. At length this mighty monarch lost his sight, and laid violent hands on himself.

After the death of Sesostris, we meet with another chasm of an indeterminate length in the Egyptian history. It concludes with the reign of Amasis or Amosis; who being a tyrant, his subjects joined Actisanes the king of Ethiopia, to drive him out. Thus Actisanes became master of the kingdom; and after his death follows another chasm in the history, during which the empire is said to have been in a state of anarchy for five generations.---This period brings us down to the times of the Trojan war. The reigning prince in Egypt was at that time called *Cetes*; by the Greeks, *Proteus*. The priests reported that he was a magician; and that he could assume any shape he pleased, even that of fire. This fable, as told by the Greeks, drew its origin from a custom among the Egyptians, perhaps introduced by Proteus. They were used to adorn and distinguish the heads of their kings with the representations of animals or vegetables, or

6
Origin of
the fable of
Proteus.

3
returns to
Egypt.

2
His great
works.

⁷ **Egypt.** even with burning incense, in order to strike the beholders with the greater awe. Whilst Proteus reigned, Paris or Alexander, the son of Priam king of Troy, was driven by a storm on the coasts of Egypt, with Helen, whom he was carrying off from her husband. But when the Egyptian monarch heard of the breach of hospitality committed by Paris, he seized him, his mistress, and companions, with all the riches he had brought away with him from Greece. He detained Helen, with all the effects belonging to Menelaus her husband, promising to restore them to the injured party whenever they were demanded; but commanded Paris and his companions to depart out of his dominions in three days, on pain of being treated as enemies. In what manner Paris afterwards prevailed upon Proteus to restore his mistress, we are not told; neither do we know any thing further of the transactions of this prince's reign nor of his successors, except what has entirely the air of fable, till the days of *Sabbaco* the Ethiopian, who again conquered this kingdom. He began his reign with an act of great cruelty, causing the conquered prince to be burnt alive: nevertheless, he no sooner saw himself firmly established on the throne of Egypt, than he became a new man; so that he is highly extolled for his mercy, clemency, and wisdom. He is thought to have been the *So* mentioned in scripture, and who entered into a league with Hoshea king of Israel against *Shalmaneser* king of Assyria. He is said to have been excited to the invasion of Egypt by a dream or vision, in which he was assured, that he should hold that kingdom for 50 years. Accordingly, he conquered Egypt, as had been foretold; and at the expiration of the time above-mentioned, he had another dream, in which the tutelar god of Thebes acquainted him, that he could no longer hold the kingdom of Egypt with safety and happiness, unless he massacred the priests as he passed through them with his guards. Being haunted with this vision, and at the same time abhorring to hold the kingdom on such terms, he sent for the priests, and acquainted them with what seemed to be the will of the gods. Upon this it was concluded, that it was the pleasure of the Deity that *Sabbaco* should remain no longer in Egypt; and therefore he immediately quitted that kingdom, and returned to Ethiopia.

⁹ **Remarkable story of Sethon.** Of *Asiath*, who was *Sabbaco's* immediate successor, we have no particulars worth notice. After him reigned one *Sethon*, who was both king and priest of Vulcan. He gave himself up to religious contemplation; and not only neglected the military class, but deprived them of their lands. At this they were so much incensed, that they entered into an agreement not to bear arms under him; and, in this state of affairs, *Sennacherib* king of Assyria arrived before Pelusium with a mighty army. *Sethon* now applied to his soldiers, but in vain: they unanimously persisted in refusing to march under his banner. Being therefore destitute of all human aid, he applied to the god Vulcan, and requested him to deliver him from his enemies. Whilst he was yet in the temple of that god, it is said, he fell into a deep sleep; during which, he saw Vulcan standing at his side, and exhorting him to take courage. He promised, that if *Sethon* would but go out against the Assyrians, he should obtain a complete victory over them. Encouraged by this assurance, the king assem-

bled a body of artificers, shop-keepers, and labourers; and, with this undisciplined rabble, marched towards Pelusium. He had no occasion, however, to fight; for the very night after his arrival at Pelusium, an innumerable multitude of field-rats entering the enemies' camp, gnawed to pieces their quivers, bowstrings, and shield-straps. Next morning, when *Sethon* found the enemy disarmed, and on that account beginning to fly, he pursued them to a great distance, making a terrible slaughter. In memory of this extraordinary event, a statue of *Sethon* was erected in the temple of Vulcan, holding in one hand a rat, and delivering these words: "Whosoever beholdeth me, let him be pious."

Soon after the death of *Sethon*, the form of government in Egypt was totally changed. The kingdom was divided into twelve parts, over which as many of the chief nobility presided. This division, however, subsisted but for a short time. *Plammitichus*, one of the twelve, dethroned all the rest, 15 years after the division had been made. The history now begins to be divested of fable, and from this time may be accounted equally certain with that of any other nation. The vast conquests of *Sesotris* were now no longer known; for *Plammitichus* possessed no more than the country of Egypt itself. It appears, indeed, that none of the successors of *Sesotris*, or even that monarch himself, had made use of any means to keep in subjection the countries he had once conquered. Perhaps, indeed, his design originally was rather to pillage than to conquer; and therefore, on his return, his vast empire vanished at once. *Plammitichus*, however, endeavoured to extend his dominions by making war on his neighbours; but by putting more confidence in foreign auxiliaries than in his own subjects, the latter were so much offended, that upwards of 200,000 fighting men emigrated in a body, and took up their residence in Ethiopia.—To repair this loss, *Plammitichus* earnestly applied himself to the advancement of commerce; and opened his ports to all strangers, whom he greatly caressed, contrary to the cruel maxims of his predecessors, who refused to admit them into the country. He also laid siege to the city of *Azotus* in Syria, which held out for 29 years against the whole strength of the kingdom; from which we may gather, that, as a warrior, *Plammitichus* was by no means remarkable. He is reported to have been the first king of Egypt that drank wine. He also sent to discover the springs of the Nile; and is said to have attempted to discover the most ancient nation in the world by the following method. Having procured two newly born children, he caused them to be brought up in such a manner, that they never heard a human voice. He imagined that these children would naturally speak the original language of mankind: therefore, when, at two years of age, they pronounced the Phrygian word *beccos*, (or some sound resembling it), which signifies bread, he concluded that the Phrygians were the most ancient people in the world.

Nechus, the son and successor of *Plammitichus*, is the *Pharaoh-Necho* of scripture, and was a prince of an enterprising and warlike genius. In the beginning of his reign, he attempted to cut through the isthmus of Suez, between the Red Sea and the Mediterranean; but, through the invincible obstacles which nature has thrown in the way of such undertakings, he was obli-

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¹⁰ Reign of *Plammitichus*.

¹¹ Succeeded by *Nechus*.

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god to abandon the enterprise, after having lost 120,000 men in the attempt. After this, he sent a ship, manned with some expert Phœnician mariners, on a voyage to explore the coasts of Africa. Accordingly, they performed the voyage; sailed round the continent of Africa; and after three years returned to Egypt, where their relation was deemed incredible. See AFRICA.

12

is wars
and Nebu-
chadnezzar.

The most remarkable wars in which this king was engaged, are recorded in the sacred writings. He went out against the king of Assyria, by the divine command, as he himself told Josiah; but being opposed by this king of Judæa, he defeated and killed him at Megiddo; after which he set up, in that country, king Jehoiakim, and imposed on him an annual tribute of 100 talents of silver and one talent of gold. He then proceeded against the king of Assyria; and weakened him so much, that the empire was soon after dissolved. Thus he became master of Syria and Phœnicia; but, in a short time, Nebuchadnezzar king of Babylon came against him with a mighty army. The Egyptian monarch, not daunted by the formidable appearance of his antagonist, boldly ventured a battle; but was overthrown with prodigious slaughter, and Nebuchadnezzar became master of all the country to the very gates of Pelusium.

13

Apries a
martial and
successful
prince.

The reign of Apries, the *Pharaoh-Hopbra* of scripture, presents us with a new revolution in the Egyptian affairs. He is represented as a martial prince, and in the beginning of his reign very successful. He took by storm the rich city of Sidon; and having overcome the Cypriots and Phœnicians in a sea-fight, returned to Egypt laden with spoil. This success probably incited Zedekiah king of Judæa to enter into an alliance with him against Nebuchadnezzar king of Babylon. The bad success of this alliance was foretold by the prophet Jeremiah; and accordingly it happened. For Nebuchadnezzar having fat down with his army before Jerusalem, Apries marched from Egypt with a design to relieve the city; but no sooner did he perceive the Babylonians approaching him, than he retreated as fast as he could, leaving the Jews exposed to the rage of their merciless enemies; who were thereupon treated as Jeremiah had foretold; and by this step Apries brought upon himself the vengeance denounced by the same prophet.—The manner in which these predictions were fulfilled, is as follows. The Cyrenæans, a colony of the Greeks, being greatly strengthened by a numerous supply of their countrymen under their third king *Battus* styled the happy, and encouraged by the Pythian oracle, began to drive out their Libyan neighbours, and share their possessions among themselves. Hereupon Andican king of Libya sent a submissive embassy to Apries, and implored his protection against the Cyrenæans. Apries complied with his request, and sent a powerful army to his relief. The Egyptians were defeated with great slaughter; and those who returned complained that the army had been sent off by Apries in order to be destroyed, and that he might tyrannize without controul over the remainder of his subjects. This thought catching the attention of the giddy multitude, an almost universal defection ensued. Apries sent one Amasis, a particular friend, in whom he thought he could confide, to bring back his people to a sense of their duty. But by this friend he was betrayed; for Amasis, taking the opportunity of the present ferment, caused himself to be

14

Bad conse-
quences of
his alliance
with Zede-
kiah.

15

His subjects
revolt.

proclaimed king. Apries then dispatched one Patabemis, with orders to take Amasis, and bring him alive before him. This he found impossible, and therefore returned without his prisoner; at which the king was so enraged, that he commanded Patabemis's nose and ears to be cut off. This piece of cruelty completed his ruin; for when the rest of the Egyptians who continued faithful to Apries beheld the inhuman mutilation of so worthy and noble a person as Patabemis was, they to a man deserted Apries, and went over to Amasis.

Both parties now prepared for war; the usurper having under his command the whole body of native Egyptians; and Apries only those Ionians, Carians, and other mercenaries whom he could engage in his service. The army of Apries amounted only to 30,000; but, though greatly inferior in number to the troops of his rival, as he well knew that the Greeks were much superior in valour, he did not doubt of victory. Nay, so far was Apries puffed up with this notion, that he did not believe it was in the power, even of any God, to deprive him of his kingdom. The two armies fought, and drew up in order of battle near Memphis. A bloody engagement ensued; in which, tho' the army of Apries behaved with the greatest resolution, they were at last overpowered with numbers, and utterly defeated, the king himself being taken prisoner. Amasis now took possession of the throne without opposition. He confined Apries in one of his palaces, but treated him with great care and respect. The people, however, were implacable, and could not be satisfied while he enjoyed his life. Amasis, therefore, at last found himself obliged to deliver him into their hands. Thus the prediction received its final completion: Apries was delivered up to those who sought his life; and who no sooner had him in their power, than they strangled him, and laid his body in the sepulchre of his ancestors.

16
Apries de-
feated and
taken pri-
soner by
Amasis.

During these intestine broils, which must have greatly weakened the kingdom, it is probable that Nebuchadnezzar invaded Egypt. He had been for 13 years before this employed in besieging Tyre, and at last had nothing but an empty city for his pains. To make himself some amends, therefore, he entered Egypt, miserably harassed the country, killed and carried away great numbers of the inhabitants, so that the country did not recover from the effects of this incursion for a long time after. In this expedition, however, he seems not to have aimed at any permanent conquest, but to have been induced to it merely by the love of plunder, and of this he carried with him an immense quantity to Babylon.

17
Egypt in-
vaded by
Nebuchad-
nezzar.

During the reign of Amasis, Egypt is said to have been perfectly happy, and to have contained 20,000 populous cities. That good order might be kept among such vast numbers of people, Amasis enacted a law, by which every Egyptian was bound once a-year to inform the governor of his province by what means he gained his livelihood; and if he failed of this, to put him to death. The same punishment he decreed to those who could not give a satisfactory account of themselves.

This monarch was a great favourite of the Greeks, and married a woman of Grecian extract. To many Greek cities, as well as particular persons, he made

18
Happy ad-
ministra-
tion of
Amasis.

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considerable presents. Beside these, he gave leave to the Greeks in general to come into Egypt, and settle either in the city of Naucratis, or carry on their trade upon the sea-coasts; granting them also temples, and places where they might erect temples to their own deities. He received also a visit from Solon the celebrated Athenian lawgiver, and reduced the island of Cyprus under his subjection.

19
Offends
Cambyzes
king of
Persia.

This great prosperity, however, ended with the death of Amasis, or indeed before it. The Egyptian monarch had some how or other incensed Phanes king of Persia. The cause of the quarrel is uncertain; but whatever it was, the Persian monarch vowed the destruction of Amasis. In the mean time Phanes of Halicarnassus, commander of the Grecian auxiliaries in the pay of Amasis, took some private disgust; and leaving Egypt, embarked for Persia. He was a wife and able general, perfectly well acquainted with every thing that related to Egypt; and had great credit with the Greeks in that country. Amasis was immediately sensible how great the loss of this man would be to him, and therefore sent after him a trusty eunuch with a swift galley. Phanes was accordingly overtaken in Lycia, but not brought back; for, making his guard drunk, he continued his journey to Persia, and presented himself before Cambyzes, as he was meditating the destruction of the Egyptian monarchy.

20
And Poly-
crates ty-
rant of
Samos.

At this dangerous crisis, also, the Egyptian monarch imprudently made Polycrates the tyrant of Samos his enemy. This man had been the most remarkable, perhaps, of any recorded in history, for an uninterrupted course of success, without the intervention of one single unfortunate event. Amasis, who was at this time in strict alliance with Polycrates, wrote him a letter, in which, after congratulating him on his prosperity, he told him that he was afraid lest his successes were too many, and he might be suddenly thrown down into the greatest misery. For this reason he advised him voluntarily to take away something from his own happiness; and to cast away that which would grieve him most if he was accidentally to lose it. Polycrates followed his advice, and threw into the sea a signet of inestimable value. This, however, did not answer the intended purpose. The signet happened to be swallowed by a fish, which was taken a few days afterwards, and thus was restored to Polycrates. Of this Amasis was no sooner informed, than, considering Polycrates as really unhappy, and already on the brink of destruction, he resolved to put an end to the friendship which subsisted between them. For this purpose he dispatched an herald to Samos, commanding him to acquaint Polycrates, that he renounced his alliance, and all the obligations between them; that he might not mourn his misfortunes with the sorrow of a friend. Thus Amasis left Polycrates at liberty to act against him, if he chose to do so; and accordingly he offered to assist Cambyzes with a fleet of ships in his Egyptian expedition.

21
Egypt in-
vaded by
Cambyzes.

Amasis had not, however, the misfortune to see the calamities of his country. He died about 525 years before Christ, after a reign of 44 years; and left the kingdom to his son Psammenitus, just as Cambyzes was approaching the frontiers of the kingdom. The new prince was scarce seated on the throne, when the Persians appeared. Psammenitus drew together what forces

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he could, in order to prevent them from entering the kingdom. Cambyzes, however, immediately laid siege to Pelusium, and made himself master of it by the following stratagem: he placed in the front of his army a great number of cats, dogs, and other animals that were deemed sacred by the Egyptians. He then attacked the city, and took it without opposition; the garrison, which consisted entirely of Egyptians, not daring to throw a dart or shoot an arrow against their enemies, lest they should kill some of the holy animals.

22
Crucity
defeat of
the Egypt-
ians.

Cambyzes had scarce taken possession of the city, when Psammenitus advanced against him with a numerous army. But, before the engagement, the Greeks who served under Psammenitus, to show their indignation against their treacherous countryman Phanes, brought his children into the camp, killed them in the presence of their father and of the two armies, and then drank their blood. The Persians, enraged at so cruel a sight, fell upon the Egyptians with the utmost fury, put them to flight, and cut the greatest part of them in pieces. Those who escaped, fled to Memphis, where they were soon after guilty of a horrid outrage. Cambyzes sent a herald to them in a ship from Mitylene: but no sooner did they see her come into the port, than they flocked down to the shore, destroyed the ship, and tore to pieces the herald and all the crew; afterwards carrying their mangled limbs into the city, in a kind of barbarous triumph. Not long after, they were obliged to surrender; and thus Psammenitus fell into the hands of his inveterate enemy, who was now enraged beyond measure at the cruelties exercised upon the children of Phanes, the herald, and the Mitylenæan sailors.

23
Their
dreadful
punishment
by Cam-
byzes.

The rapid success of the Persians struck with such terror the Libyans, Cyrenæans, Barchanæ, and other dependents or allies of the Egyptian monarch, that they immediately submitted. Nothing now remained but to dispose of the captive king, and revenge on him and his subjects the cruelties which they had committed. This the merciless victor executed in the severest manner. On the 10th day after Memphis had been taken, Psammenitus and the chief of the Egyptian nobility were ignominiously sent into one of the suburbs of that city. The king being there seated in a proper place, saw his daughter coming along in the habit of a poor slave with a pitcher to fetch water from the river, and followed by the daughters of the greatest families in Egypt, all in the same miserable garb, with pitchers in their hands, drowned in tears, and loudly bemoaning their miserable situation. When the fathers saw their daughters in this distress, they burst into tears, all but Psammenitus, who only cast his eyes on the ground and kept them fixed there. After the young women, came the son of Psammenitus, with 2000 of the young nobility, all of them with bits in their mouths, and halters round their necks, led to execution. This was done to expiate the murder of the Persian herald and the Mitylenæan sailors; for Cambyzes caused ten Egyptians of the first rank to be publicly executed for every one of those that had been slain. Psammenitus, however, observed the same conduct as before, keeping his eyes steadfastly fixed on the ground, though all the Egyptians around him made the loudest lamentations. A little after this he saw an intimate friend and

com-

Egypt.

companion, now advanced in years, who, having been plundered of all he had, was begging his bread from door to door in the suburbs. As soon as he saw this man, Ptolemy wept bitterly; and calling out to him by his name, struck himself on the head as if he had been frantic. Of this the spies who had been sent over him to observe his behaviour, gave immediate notice to Cambyfes, who thereupon sent a messenger to inquire the cause of such immoderate grief. Ptolemy answered, That the calamities of his own family confounded him, and were too great to be lamented by any outward signs of grief; but the extreme distress of a bosom friend gave more room for reflection, and therefore extorted tears from him. With this answer Cambyfes was so affected, that he sent orders to prevent the execution of the king's son; but these came too late, for the young prince had been put to death before any of the rest. Ptolemy himself was then sent for into the city, and restored to his liberty: and, had he not shewed a desire of revenge, might perhaps have been trusted with the government of Egypt; but being discovered hatching schemes of that kind, he was seized, and condemned to drink bull's blood.

24
Egypt becomes a province of the Persian and afterwards of the Grecian empire.

The Egyptians were now reduced to the lowest degree of slavery. Their country became a province of the Persian empire: the body of Amasis their late king, was taken out of his grave; and after being mangled in a shocking manner, was finally burnt. But what seemed more grievous than all the rest, their god Apis was slain, and his priests ignominiously scourged; and this inspired the whole nation with such an hatred to the Persians, that they could never afterwards be reconciled to them. As long as the Persian empire subsisted, the Egyptians could never shake off their yoke. They frequently revolted indeed, but were always overthrown with prodigious loss. At last they submitted, without opposition, to Alexander the Great: after his death, Egypt again became a powerful kingdom; though since the conquest of it by Cambyfes to the present time, it hath never been governed but by foreign princes, agreeable to the prophecy of Ezekiel, "There shall be no more a prince of the land of Egypt."

25
Assigned to Ptolemy Lagus, who assumes the title of king.

On the death of Alexander the Great, Egypt, together with Libya, and that part of Arabia which borders on Egypt, were assigned to Ptolemy Lagus as governor under Alexander's son by Roxana, who was but newly born. Nothing was farther from the intention of this governor, than to keep the provinces in trust for another. He did not, however, assume the title of king, till he perceived his authority so firmly established that it could not be shaken; and this did not happen till 19 years after the death of Alexander, when Antigonus and Demetrius had unsuccessfully attempted the conquest of Egypt.

From the time of his first establishment on the throne, Ptolemy, who had assumed the title of *Soter*, reigned 20 years; which added to the former 19, make up the 39 years which historians commonly allow him to have reigned alone.—In the 39th year of his reign, he made one of his sons, named *Philadelphus*, partner in the empire; declaring him his successor, to the prejudice of his eldest son named *Ceraunus*; being excited thereto by his violent love for *Berenice* Philadelphus's mother. When the succession was thus settled, Ceraunus im-

mediately quitted the court; and fled at last into Syria, where he was received with open arms by Seleucus Nicator, whom he afterwards murdered.

The most remarkable transaction of this reign was the embellishing of the city of Alexandria, which Ptolemy made the capital of his new kingdom, and of which an account is given under the article *ALEXANDRIA*. About 284 years before Christ, died Ptolemy Soter, in the 41st year of his reign, and 84th of his age. He was the best prince of his race; and left behind him an example of prudence, justice, and clemency, which few of his successors chose to follow. Besides the provinces originally assigned to him, he had added to his empire those of *Cælo-Syria*, *Ethiopia*, *Pamphylia*, *Lycia*, *Caria*, and some of the *Cyclades*. His successor, Ptolemy Philadelphus, added nothing to the extent of the empire; nor did he perform any thing worthy of notice except embellishing further the city of Alexandria, and entering into an alliance with the Romans. In his time, one Magas, the governor of Libya and Cyrene, revolted; and held these provinces as an independent prince, notwithstanding the utmost efforts of Ptolemy to reduce him. At last an accommodation took place; and a marriage was proposed between *Berenice*, the only daughter of Magas, and Ptolemy's eldest son. The young prince was to receive all her father's dominions by way of dowry, and thus they would again be brought under the dominion of Ptolemy's family. But before this treaty could be put in execution, Magas died; and then *Apamea*, the prince's mother, did all she could to prevent the match. This, however, she was not able to do; though her efforts for that purpose produced a destructive war of four years continuance with Antiochus Theus king of Syria, and the acting of a cruel tragedy in the family of the latter. See *SYRIA*.

26
Succeeded by Philadelphus.

About 246 years before Christ, Ptolemy Philadelphus died; and was succeeded by his eldest son Ptolemy, who had been married to *Berenice* the daughter of Magas, as above related. In the beginning of his reign, he found himself engaged in a war with Antiochus Theus king of Syria. From this he returned victorious, and brought with him 2500 statues and pictures, among which were many of the ancient Egyptian idols, which had been carried away by Cambyfes into Persia. These were restored by Ptolemy to their ancient temples; in memory of which favour, the Egyptians gave him the surname of *Euergetes*, or the Beneficent. In this expedition, he greatly enlarged his dominions, making himself master of all the countries that lie between mount *Taurus* and the confines of *India*. An account of these conquests was given by himself, inscribed on a monument, to the following effect. "Ptolemy Euergetes, having received from his father the sovereignty of Egypt, Libya, Syria, Phœnice, Cyprus, Lycia, Caria, and the other *Cyclades*, assembled a mighty army of horse and foot, with a great fleet, and elephants, out of *Trogloditia* and *Ethiopia*; some of which had been taken by his father, and the rest by himself, and brought from thence, and trained up for war: with this great force he sailed into Asia; and having conquered all the provinces which lie on this side the *Euphrates*, *Cilicia*, *Pamphylia*, *Jonia*, the *Hellepont*, and *Thrace*, he crossed that river with all the forces of the conquered countries, and the kings

27
Ptolemy Euergetes a great conqueror.

Egypt. of those nations, and reduced Mesopotamia, Babylonia, Susia, Persia, Media, and all the country as far as Bactria."

On the king's return from this expedition, he passed through Jerusalem, where he offered many sacrifices to the God of Israel, and ever afterwards expressed a great favour for the Jewish nation. At this time, the Jews were tributaries to the Egyptian monarchs, and paid them annually 20 talents of silver. This tribute, however, Onias, who was then high priest, being of a very covetous disposition, had for a long time neglected to pay, so that the arrears amounted to a very large sum. Soon after his return, therefore, Ptolemy sent one of his courtiers named *Athenion* to demand the money, and desired him to acquaint the Jews that he would make war upon them in case of a refusal. A young man, however, named *Joseph*, nephew to Onias, not only found means to avert the king's anger, but even got himself chosen his receiver-general, and by his faithful discharge of that important trust, continued in high favour with Ptolemy as long as he lived.

Ptolemy Euergetes, having at last concluded a peace with Seleucus the successor of Antiochus Theus king of Syria, attempted the enlargement of his dominions on the south side. In this he was attended with such success, that he made himself master of all the coasts of the Red Sea, both on the Arabian and Ethiopian sides, quite down to the straits of Babel-mandel. On his return he was met by ambassadors from the Achæans, imploring his assistance against the Etolians and Lacedæmonians. This the king readily promised them: but they having in the mean time engaged Antigonus king of Macedon to support them, Ptolemy was so much offended, that he sent powerful succours to Cleomenes king of Sparta; hoping, by that means, to humble both the Achæans and their new ally Antigonus. In this, however, he was disappointed; for Cleomenes, after having gained very considerable advantages over the enemy, was at last entirely defeated in the battle of Sellasia, and obliged to take refuge in Ptolemy's dominions. He was received by the Egyptian monarch with the greatest demonstrations of kindness; a yearly pension of 24 talents was assigned him, with a promise of restoring him to the Spartan throne; but before this could be accomplished, the king of Egypt died, in the 27th year of his reign, and was succeeded by his son Ptolemy Philopator.

Thus we have seen the Egyptian empire brought to a very great height of power; and had the succeeding monarchs been careful to preserve that strength of empire transmitted to them by Euergetes, it is very probable that Egypt might have been capable of holding the balance against Rome, and, after the destruction of Carthage, prevented that haughty city from becoming mistress of the world. But after the death of Ptolemy Euergetes, the Egyptian empire, being governed only by weak or vicious monarchs, quickly declined, and from that time makes no conspicuous figure in history. Ptolemy Philopator began his reign with the murder of his brother; after which, giving himself up to all manner of licentiousness, the kingdom fell into a kind of anarchy. Cleomenes, the Spartan king, still resided at court; and being now unable to bear the dissolute manners which prevailed there, he pressed Philopator to give him the assistance he had

promised for restoring him to the throne of Sparta. This he the rather insisted upon, because he had received advice that Antigonus king of Macedon was dead, that the Achæans were engaged in a war with the Etolians, and that the Lacedæmonians had joined the latter against the Achæans and Macedonians. Ptolemy, when afraid of his brother Magas, had indeed promised to assist the king of Sparta with a powerful fleet, hoping by this means to attach him to his own interest; but now when Magas was out of the way, it was determined by the king, or rather his ministers, that Cleomenes should not be assisted, nor even allowed to leave the kingdom; and this extravagant resolution produced the desperate attempt of Cleomenes, of which an account is given in the history of SPARTA.

Of the disorders which now ensued in the government, Antiochus, king of Syria, surnamed *the Great*, took the advantage, and attempted to wrest from Ptolemy the provinces of Cælo-Syria and Palestine: but in this he was finally disappointed; and might easily have been totally driven out of Syria, had not Ptolemy been too much taken up with his debaucheries to think of carrying on the war. The discontent occasioned by this piece of negligence soon produced a civil war in his dominions, and the whole kingdom continued in the utmost confusion till his death, which happened in the 17th year of his reign, and 37th of his age.

During the reign of Philopator happened a very extraordinary event with regard to the Jews, which is mentioned in the Maccabees *. The king of Egypt, while on his Syrian expedition, had attempted to enter the temple of Jerusalem; but being hindered by the Jews, he was filled with the utmost rage against the whole nation. On his return to Alexandria, he resolved to make those who dwelt in that city feel the first effects of his vengeance. He began with publishing a decree, which he caused to be engraved on a pillar erected for that purpose at the gate of his palace, excluding all those who did not sacrifice to the gods worshipped by the king. By this means the Jews were debarred from suing to him for justice, or obtaining his protection when they happened to stand in need of it. By the favour of Alexander the Great, Ptolemy Soter, and Euergetes, the Jews enjoyed, at Alexandria, the same privileges with the Macedonians. In that metropolis the inhabitants were divided into three ranks or classes. In the first were the Macedonians, or original founders of the city, and along with them were enrolled the Jews. In the second were the Mercenaries who had served under Alexander; and in the third, the native Egyptians. Ptolemy now, to be revenged of the Jews, ordered, by another decree, that they should be degraded from the first rank, and enrolled among the native Egyptians. By the same decree it was enacted, that all of that nation should appear at an appointed time before the proper officers, in order to be enrolled among the common people; that at the time of their enrollment they should have the mark of an ivy leaf, the badge of Bacchus, impressed with a hot iron on their faces; that all who were thus marked, should be made slaves; and lastly, that if any one should stand out against this decree, he should be immediately put to death. That he might not, however, seem an enemy to the whole nation, he declared, that those who sacrificed to his gods should enjoy their for-

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29
Cleomenes
king of
Sparta takes
refuge in
Egypt.

29
Ptolemy
Philopator
a cruel ty-
rant.

30
Extraordi-
nary story
concerning
the Jews.
• L. iii. 2,
3, 4, 5.

Egypt.

men privileges, and remain in the same state. Yet, notwithstanding this tempting offer, 300 only, out of many thousand Jews who lived in Alexandria, could be prevailed upon to abandon their religion in order to save themselves from slavery.

The apostates were immediately excommunicated by their brethren: and this their enemies construed as done in opposition to the king's order; which threw the tyrant into such a rage, that he resolved to extirpate the whole nation, beginning with the Jews who lived in Alexandria and other cities of Egypt, and proceeding from thence to Judæa and Jerusalem itself. In consequence of this cruel resolution, he commanded all the Jews that lived in any part of Egypt to be brought in chains to Alexandria, and there to be shut up in the Hippodrome, which was a very spacious place without the city, where the people used to assemble to see horse-races and other public diversions. He then sent for Hermon, master of the elephants; and commanded him to have 500 of these animals ready against the next day, to let loose upon the Jews in the Hippodrome. But when the elephants were prepared for the execution, and the people were assembled in great crowds to see it, they were, for that day, disappointed by the king's absence. For, having been late up the night before with some of his debauched companions, he did not awake till the time for the show was over, and the spectators returned home. He therefore ordered one of his servants to call him early on the following day, that the people might not meet with a second disappointment. But when the person awaked him according to his order, the king was not yet returned to his senses; having withdrawn, exceedingly drunk, only a short time before. As he did not remember the order, he therefore fell into a violent passion, and threatened with death the servant who had awaked him; and this caused the show to be put off till the third day. At last the king came to the Hippodrome, attended with a vast multitude of spectators; but when the elephants were let loose, instead of falling upon the Jews, they turned their rage against the spectators and soldiers, and destroyed great numbers of them. At the same time, some frightful appearances which were seen in the air, so terrified the king that he commanded the Jews to be immediately set at liberty, and restored them to their former privileges. No sooner were they delivered from this danger, than they demanded leave to put to death such of their nation as had abandoned their religion; and this being granted, they dispatched the apostates without excepting a single man.

Philopator was succeeded by Ptolemy Epiphanes; and he, after a reign of 24 years, by Ptolemy Philometor. In the beginning of his reign, a war commenced with the king of Syria, who had seized on the provinces of Cæle-Syria and Palestine in the preceding reign. In the course of this war, Philometor was either voluntarily delivered up to Antiochus, or taken prisoner. But, however this was, the Alexandrians despairing of his ever being able to recover his liberty, raised to the throne his brother Ptolemy, who took the name of Euergetes II. but was afterwards called *Physcon*, or the *great-bellied*, on account of the prominent belly which by his gluttony and luxury he had acquired. He was scarce seated on the throne, however,

when Antiochus Epiphanes, returning into Egypt, drove out Physcon, and restored the whole kingdom, except Pelusium, to Philometor. His design was to kindle a war betwixt the two brothers, so that he might have an opportunity of seizing the kingdom for himself. For this reason he kept to himself the city of Pelusium; which being the key of Egypt, he might at his pleasure re-enter the country. But Philometor, apprised of his design, invited his brother Physcon to an accommodation; which was happily effected by their sister *Cleopatra*. In virtue of this agreement, the brothers were to reign jointly, and to oppose to the utmost of their power Antiochus, whom they considered as a common enemy. On this the king of Syria invaded Egypt with a mighty army, but was prevented by the Romans from conquering it.

The two brothers were no sooner freed from the apprehensions of a foreign enemy, than they began to quarrel with each other. Their differences soon came to such a height, that the Roman senate interposed. But before the ambassadors employed to inquire into the merits of the cause could arrive in Egypt, Physcon had driven Philometor from the throne, and obliged him to quit the kingdom. On this the dethroned prince fled to Rome, where he appeared meanly dressed, and without attendants. He was very kindly received by the senate; who were so well satisfied of the injustice done him, that they immediately decreed his restoration. He was reconducted accordingly; and, on the arrival of the ambassadors in Egypt, an accommodation between the two brothers was negotiated. By this agreement, Physcon was put in possession of Libya and Cyrene, and Philometor of all Egypt and the island of Cyprus; each of them being declared independent of the other in the dominion allotted to them. The treaty, as usual, was confirmed with oaths and sacrifices, and was broken almost as soon as made. Physcon was dissatisfied with his share of the dominions; and therefore sent ambassadors to Rome, desiring that the island of Cyprus might be added to his other possessions. This could not be obtained by the ambassadors; and therefore Physcon went to Rome in person. His demand was evidently unjust; but the Romans, considering that it was their interest to weaken the power of Egypt as much as possible, without further ceremony adjudged the island to him.

Physcon set out from Rome with two ambassadors; and arriving in Greece on his way to Cyprus, he raised there a great number of mercenaries, with a design to sail immediately to that island and conquer it. But the Roman ambassadors telling him, that they were commanded to put him in possession of it by fair means, and not by force, he dismissed his army, and returned to Alexandria. Their design was to bring the two brothers to an interview on the frontiers of their dominions, and there to settle matters in an amicable manner. But the ambassador who went to Alexandria, found Philometor very averse from compliance with the decree of the senate. He put off the ambassador so long, that Physcon sent the other also to Alexandria, hoping that the joint persuasions of the two would induce Philometor to comply. But the king, after entertaining them at an immense charge for 40 days, at last plainly refused to submit, and told the ambassadors

Egypt.

Philometor was restored, and reigns jointly with his brother.

33 Difference between the two brothers decided by the Roman senate.

34 Island of Cyprus adjudged to Physcon.

35 Philometor refuses to comply.

that

31 Ptolemy Philometor taken prisoner by Antiochus, and Physcon raised to the throne.

Egyt.

that he was resolved to adhere to the first treaty. With this answer the Roman ambassadors departed, and were followed by others from the two brothers. The senate, however, not only confirmed their decree in favour of Phyfcon, but renounced their alliance with Philometor, and commanded his ambassador to leave the city in five days.

In the mean time, the inhabitants of Cyrene, having heard unfavourable accounts of Phyfcon's behaviour during the short time he reigned in Alexandria, conceived so strong an aversion against him, that they resolved to keep him out of their country by force of arms. On receiving intelligence of this resolution, Phyfcon dropped all thoughts of Cyprus for the present; and hastened with all his forces to Cyrene, where he soon got the better of his rebellious subjects, and established himself in the kingdom. His vicious and tyrannical conduct, however, soon estranged from him the minds of his subjects, in such a manner, that some of them entering into a conspiracy against him, fell upon him one night as he was returning to his palace, wounded him in several places, and left him for dead on the spot. This he laid to the charge of his brother Philometor; and as soon as he was recovered, took another voyage to Rome. Here he made his complaints to the senate, and shewed them the scars of his wounds, accusing his brother of having employed the assassins from whom he received them. Though Philometor was known to be a man of a most humane and mild disposition, and therefore very unlikely to have been concerned in so black an attempt; yet the senate, being offended at his refusing to submit to their decree concerning the island of Cyprus, hearkened to this false accusation; and carried their prejudice so far, that they not only refused to hear what his ambassadors had to say, but ordered them immediately to depart from the city. At the same time, they appointed five commissioners to conduct Phyfcon into Cyprus, and put him in possession of that island, enjoining all their allies in those parts to supply him with forces for that purpose.

Phyfcon having by this means got together an army which seemed to him to be sufficient for the accomplishment of his design, landed in Cyprus; but being there encountered by Philometor in person, he was entirely defeated, and obliged to shelter himself in a city called *Lapitha*. Here he was closely besieged, and at last obliged to surrender. Every one now expected that Phyfcon would have been treated as he deserved; but his brother, instead of punishing, restored him to the government of Libya and Cyrene, adding some other territories instead of the island of Cyprus, and promising him his daughter in marriage. Thus an end was put to the war between the two brothers; for the Romans were ashamed any longer to oppose a prince who had given such a signal instance of his justice and clemency.

On his return to Alexandria, Philometor appointed one Archias governor of Cyprus. But he, soon after the king's departure, agreed with Demetrius king of Syria, to betray the island to him for 500 talents. The treachery was discovered before it took effect; and the traitor, to avoid the punishment due to his crime, laid violent hands on himself. Ptolemy being offended with Demetrius for this attempt on Cyprus, joined Attalus king of Pergamus, and Ariarathes king of

Cappadocia, in setting up a pretender to the crown of Syria. This was Alexander Balas; to whom he even gave his daughter Cleopatra in marriage, after he had placed him on the throne of Syria. But he, notwithstanding these and many other favours, being suspected of having entered into a plot against his benefactor, Ptolemy became his greatest enemy; and marching against him, routed his army in the neighbourhood of Antioch. He did not, however, long enjoy his victory; for he died in a few days after the engagement, of the wounds he had received.

On the death of Philometor, Cleopatra the queen designed to secure the throne for her son. But some of the principal nobility declaring for Phyfcon, a civil war was about to ensue, when matters were compromised on condition that Phyfcon should marry Cleopatra, that he should reign jointly with her during his life, and declare her son by Philometor heir to the crown. These terms were no sooner agreed upon than Phyfcon married Cleopatra, and, on the very day of the nuptials, murdered her son in her arms.—This was only a prelude to the cruelties which he afterwards practised on his subjects. He was no sooner seated on the throne, than he put to death all those who had shewn any concern for the murder of the young prince. He then wrecked his fury on the Jews, whom he treated more like slaves than subjects, on account of their having favoured the cause of Cleopatra. His own people were treated with little more ceremony. Numbers of them were every day put to death for the smallest faults, and often for no fault at all, but merely to gratify his inhuman temper. His cruelty towards the Alexandrians is particularly mentioned under the article ALEXANDRIA.—In a short time, being wearied of his queen, who was also his sister, he divorced her; and married her daughter, who was also called *Cleopatra*, and whom he had previously ravished. In short, his behaviour was so exceedingly wicked, that it soon became quite intolerable to his subjects; and he was obliged to fly to the island of Cyprus with his new queen, and *Memphis*, a son he had by her mother.

On the flight of the king, the divorced queen was placed on the throne by the Alexandrians; but Phyfcon, fearing lest a son whom he had left behind should be appointed king, sent for him into Cyprus, and caused him to be assassinated as soon as he landed. This provoked the people against him to such a degree, that they pulled down and dashed to pieces all the statues which had been erected to him in Alexandria. This the tyrant supposed to have been done at the instigation of the queen, and therefore resolved to revenge it on her by killing his own son whom he had by her. He therefore, without the least remorse, caused the young prince's throat to be cut; and having put his mangled limbs into a box, sent them as a present to his mother Cleopatra. The messenger with whom this box was sent, was one of his guards. He was ordered to wait till the queen's birth-day, which approached, and was to be celebrated with extraordinary pomp; and in the midst of the general rejoicing, he was to deliver the present.

The horror and detestation occasioned by this unexampled piece of cruelty cannot be expressed. An army was soon raised, and the command of it given to one *Marsyas*, whom the queen had appointed general, and enjoined to take all the necessary steps for the de-

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Egyt.

38

Death of
Phileme-
tor.

39

Monstrous
wickedness
of Phyfcon.

40

He is driven
out.

41

Murders
his son.36
Rebellion
against
Phyfcon.37
He is de-
feated and
taken pri-
soner by
Philome-
tor.

Egypt.

Egypt.

fence of the country. On the other hand, Phylcon, having hired a numerous body of mercenaries, sent them, under the command of one *Hogelochus*, against the Egyptians. The two armies met on the frontiers of Egypt, on which a bloody battle ensued; but at last the Egyptians were entirely defeated, and Mariyas was taken prisoner. Every one expected that the captive general would have been put to death with the severest torments: but Phylcon, perceiving that his cruelties only exasperated the people, resolved to try whether he could regain their affections by lenity; and therefore pardoned Mariyas, and set him at liberty.—Cleopatra, in the mean time, being greatly distressed by this overthrow, demanded assistance from Demetrius king of Syria, who had married her eldest daughter by Philometor, promising him the crown of Egypt for his reward. Demetrius accepted the proposal without hesitation, marched with all his forces into Egypt, and there laid siege to Ptolemais. But he being no less hated in Syria than Phylcon was in Egypt, the people of Antioch, taking advantage of his absence, revolted against him, and were joined by most of the other cities in Syria. Thus Demetrius was obliged to return; and Cleopatra, being now in no condition to oppose Phylcon, fled to Ptolemais, where her daughter the queen of Syria at that time resided. Phylcon was then restored to the throne of Egypt, which he enjoyed without further molestation till his death; which happened at Alexandria, in the 29th year of his reign, and 67th of his age.

To Phylcon succeeded Ptolemy Lathyrus, about 122 years before Christ; but he had not reigned long, before his mother, finding that he would not be entirely governed by her, by false surmises stirred up the Alexandrians, who drove him from the throne, and placed on it his youngest brother Alexander. Lathyrus after this was obliged to content himself with the government of Cyprus, which he was permitted to enjoy in quiet. Ptolemy Alexander, in the mean time, finding he was to have only the shadow of sovereignty, and that his mother Cleopatra was to have all the power, stole away privately from Alexandria. The queen used every artifice to bring him back, as well knowing that the Alexandrians would never suffer her to reign alone. At last her son yielded to her intreaties; but soon after, understanding that she had hired assassins to dispatch him, he caused her to be murdered.

The death of the queen was no sooner known to the Alexandrians, than, disdaining to be commanded by a parricide, they drove out Alexander, and recalled Lathyrus.—The deposed prince for some time led a rambling life in the island of Cos; but having got together some ships, he, the next year, attempted to return into Egypt. But, being met by *Tyrribus*, Lathyrus's admiral, he was defeated, and obliged to fly to Myra in Lycia. From Myra he steered his course towards Cyprus, hoping that the inhabitants would place him on the throne, instead of his brother. But *Chareas*, another of Lathyrus's admirals, coming up with him while he was ready to land, an engagement ensued, in which Alexander's fleet was dispersed, and he himself killed.

During these disturbances, *Apion* king of Cyrenaiica, the son of Ptolemy Phylcon by a concubine, having maintained peace and tranquillity in his dominions

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during a reign of 21 years, died, and by his will left his kingdom to the Romans; and thus the Egyptian empire was considerably reduced and circumscribed.

Lathyrus being now delivered from all competitors, turned his arms against the city of Thebes, which had revolted from him. The king marched in person against the rebels; and, having defeated them in a pitched battle, laid close siege to their city. The inhabitants defended themselves with great resolution for three years. At last, however, they were obliged to submit, and the city was given up to be plundered by the soldiery. They left every where the most melancholy monuments of their avarice and cruelty; so that Thebes, which till that time had been one of the most wealthy cities of Egypt, was now reduced so low that it never afterwards made any figure.

About 76 years before Christ, Ptolemy Lathyrus was succeeded by Alexander II. He was the son of the Ptolemy Alexander for whom Lathyrus had been driven out; and had met with many adventures. He was first sent by Cleopatra into the island of Cos, with a great sum of money, and all her jewels; as thinking that was the safest place where they could be kept. When Mithridates king of Pontus made himself master of that island, the inhabitants delivered up to him the young Egyptian prince, together with all the treasures. Mithridates gave him an education suitable to his birth; but he, not thinking himself safe with a prince who had shed the blood of his own children, fled to the camp of Sylla the Roman dictator, who was then making war in Asia. From that time he lived in the family of the Roman general, till news was brought to Rome of the death of Lathyrus. Sylla then sent him to Egypt to take possession of the throne. But, before his arrival, the Alexandrians had chosen Cleopatra for their sovereign. To compromise matters, however, it was agreed, that Ptolemy should marry her, and take her for his partner in the throne. This was accordingly done; and 19 days after the marriage, the unhappy queen was murdered by her husband, who for 15 years afterwards shewed himself such a monster of wickedness, that a general insurrection at last ensued among his subjects, and he was obliged to fly to Pompey the Great, who was then carrying on the war against Mithridates king of Pontus. But Pompey refusing to concern himself in the matter, he retired to the city of Tyre, where he died some months after.

When he was forced to shut himself up in the city of Tyre, Alexander had sent ambassadors to Rome, in order to influence the senate in his favour. But, dying before the negotiation was finished, he made over by his last will all his rights to the Roman people, declaring them heirs to his kingdom; not out of any affection to the republic; but with a view to raise disputes between the Romans and his rival Auletes, whom the Egyptians had placed on the throne. The will was brought to Rome, where it occasioned warm debates. Some were for taking immediate possession of the kingdom. Others thought that no notice should be taken of such a will, because Alexander had no right to dispose of his dominions in prejudice of his successor, and to exclude from the crown those who were of the royal blood of Egypt. Cicero represented, that such a notorious imposition would debase the majesty of the Roman people, and involve them in endless wars

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City of
Thebes
ruined.47
Alexander
II. succeeds
Lathyrus.48
Marries
Cleopatra,
and murders her.49
Leaves his
kingdom to
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bequeathed
to the Ro-
mans.

Egypt.

and disputes; that the fruitful fields of Egypt would be a strong temptation to the avarice of the people, who would insist on their being divided among them; and lastly, that by this means the bloody quarrels about the Agrarian laws would be revived. These reasons had some weight with the senate; but what chiefly prevented them from seizing on Egypt at this time was, that they had lately taken possession of the kingdom of Bithynia in virtue of the will of Nicomedes, and of Cyrene and Libya by the will of Apion. They thought therefore, that if they should, on the like pretence, take possession of the kingdom of Egypt, this might too much expose their design of setting up a kind of universal monarchy, and occasion a formidable combination against them.

50
Character
of Auletes
the new
king.

Auletes, who was now raised to the throne by the Egyptians, is said to have surpassed all the kings that went before him in the effeminacy of his manners. The name *Auletes*, which signifies the *flute-player*, was given him because he piqued himself on his skill in performing upon that instrument, and was not ashamed even to contend for the prize in the public games. He took great pleasure in imitating the manners of the Bacchanals; dancing in a female dress, and in the same measures that they used during the solemnity of their god Bacchus; and hence he had the surname of the *New Dionysius* or *Bacchus*. As his title to the crown was disputable, (he being only the son of a concubine), the first care of Auletes was to get himself acknowledged by the Romans, and declared their ally. This was obtained by applying to Julius Cæsar, who was at that time consul, and immensely in debt. Cæsar being glad of such an opportunity of raising money, made the king of Egypt pay pretty dear for his alliance. Six thousand talents, a sum equal to 1,162,500 pounds Sterling, were paid partly to Cæsar himself, and partly to Pompey, whose interest was necessary for obtaining the consent of the people. Though the revenues of Egypt amounted to twice this sum, yet Auletes found it impossible for him to raise it without severely taxing his subjects. This occasioned a general discontent; and while the people were almost ready to take up arms, a most unjust decree passed at Rome for seizing the island of Cyprus. When the Alexandrians heard of the intentions of the republic, they pressed Auletes to demand that island as an ancient appendage of Egypt; and, in case of a refusal, to declare war against that haughty and imperious people, who, they now saw, though too late, aimed at nothing less than the sovereignty of the world. With this request the king refused to comply; upon which his subjects, already provoked beyond measure at the taxes with which they were loaded, flew to arms, and surrounded the palace. The king had the good luck to escape their fury, and immediately leaving Alexandria, set sail for Rome.

52
Is driven
from the
throne, and
flies to
Rome.

In his way to that city, he landed on the island of Rhodes, where the famous Cato at that time was, being on his way to Cyprus, to put the unjust decree of the senate in execution. Auletes, desirous to confer with a man of his prudence, immediately sent to acquaint him with his arrival. He imagined, that, upon this notice, Cato would immediately come and wait upon him; but the proud Roman told the messenger, that if the king of Egypt had any thing to say to Cæ-

to, he might, if he thought proper, come to his house. Accordingly the king went to pay him a visit; but was received with very little ceremony by Cato, who did not even vouchsafe to rise out of his seat when he came into his presence. When Auletes had laid his affairs before this haughty republican, he was blamed by him for leaving Egypt, the richest kingdom in the world, in order to expose himself, as he laid, to the indignities he would meet with at Rome. There, Cato told him, that nothing was in request but wealth and grandeur. All the riches of Egypt, he said, would not be sufficient to satisfy the avarice of the leading men in Rome. He therefore advised him to return to Egypt; and strive, by a more equitable conduct, to regain the affections of his people. He even offered to reconduct him thither, and employ his good offices in his behalf. But though Ptolemy was sensible of the propriety of this advice, the friends he had with him dissuaded him from following it, and accordingly he set out for Rome.

Egypt.

53
Cato's ad-
vice to him.

On his arrival in this metropolis, the king found, to his great concern, that Cæsar, in whom he placed his greatest confidence, was then in Gaul. He was received, however, by Pompey with great kindness. He assigned him an apartment in his own house, and omitted nothing that lay in his power to serve him. But, notwithstanding the protection of so powerful a man, Auletes was forced to go from house to house like a private person, soliciting the votes of the senators. After he had spent immense treasures in procuring a strong party in the city, he was at last permitted to lay his complaints before the senate; and at the same time there arrived an embassy from the Alexandrians, consisting of 100 citizens, to acquaint the senate with the reasons of their revolt.

54
Infamous
conduct of
Auletes.

When Auletes first set out for Rome, the Alexandrians, not knowing what was become of him, placed on the throne his daughter Berenice; and sent an embassy into Syria to Antiochus Asiaticus, inviting him into Egypt to marry the queen, and reign in partnership with her. Antiochus was dead before the arrival of the ambassadors; upon which the same proposal was made to his brother Seleucus, who readily accepted it. This Seleucus is described by Strabo as monstrously deformed in body, and still more so in mind. The Egyptians nicknamed him *Cybil-facter*, or the *Scullion*; a name which seemed more fit for him than any other. He was scarce settled on the throne, when he gave a signal instance of his sordid and avaricious temper. Ptolemy the first had caused the body of Alexander the Great to be deposited in a coffin of massy gold. This the king seized upon; and by that means provoked his wife Berenice to such a degree, that she caused him to be murdered. She then married one Archelaus, high priest of Comana in Pontus, who pretended to be the son of Mithridates the Great; but was, in fact, only the son of that monarch's general.

55
Berenice
raised to the
throne of
Egypt.

56
She marries
Seleucus,
and mur-
ders him.

Auletes was not a little alarmed on hearing of these transactions, especially when the ambassadors arrived, who he feared would overturn all the schemes he had laboured so much to bring about. The embassy was headed by one Dion, a celebrated academic philosopher, who had many powerful friends at Rome. But Ptolemy found means to get both him and most of his followers assassinated; and this intimidated the rest to such a de-

57
Marries
Archelaus.

58
Auletes
murders the
Egyptian
ambassa-
dors,
grec,

Egyp.

gree, that they durst not execute their commission, or, for some time, even demand justice for the murder of their colleagues.

The report of so many murders, however, at last spread a general alarm. Auletes, sure of the protection of Pompey, did not scruple to own himself the perpetrator of them. Nay, though an action was commenced against one Alcitus an assassin who had stabbed Dio the chief of the embassy abovementioned, and the crime was fully proved; yet he was acquitted by the venal judges, who had all been bribed by Ptolemy. In a short time, the senate passed a decree, by which it was enacted, that the king of Egypt should be restored by force of arms. All the great men in Rome were ambitious of this commission; which they well knew, would be attended with immense profit. Their contests on this occasion took up a considerable time; and at last a prophecy of the Sybil was found out, which forbade the assisting an Egyptian monarch with an army. Ptolemy therefore, wearied out with so long a delay, retired from Rome, where he had made himself generally odious, to the temple of Diana at Ephesus, there to wait the decision of his fate. Here he remained a considerable time: but as he saw that the senate came to no resolution, tho' he had solicited them by letters so to do; at last, by Pompey's advice, he applied to Gabinius the proconsul of Syria. This Gabinius was a man of a most infamous character, and ready to undertake any thing for money. Therefore, tho' it was contrary to an express law for any governor to go out of his province without positive orders from the senate and people of Rome, yet Gabinius ventured to transgress this law, upon condition of being well paid for his pains. As a recompence for his trouble, however, he demanded 10,000 talents; that is, 1,937,500 pounds Sterling. Gabinius, glad to be restored on any terms, agreed to pay the abovementioned sum; but Gabinius would not stir till he had received one half of it. This obliged the king to borrow it from a Roman knight named *Caius Rabirius Posthumus*; Pompey interposing his credit and authority for the payment of the capital and interest.

Gabinius now set out for Egypt, attended by the famous Mark Anthony, who at this time served in the army under him. He was met by Archelaus, who since the departure of Auletes had reigned in Egypt jointly with Berenice, at the head of a numerous army. The Egyptians were utterly defeated, and Archelaus taken prisoner in the first engagement. Thus Gabinius might have put an end to the war at once; but his avarice prompted him to dismiss Archelaus on his paying a considerable ransom; after which, pretending that he had made his escape, fresh sums were demanded from Ptolemy for defraying the expences of the war. For these sums Ptolemy was again obliged to apply to Rabirius, who lent him what money he wanted at a very high interest. At last, however, Archelaus was defeated and killed, and thus Ptolemy again became master of all Egypt.

No sooner was Auletes firmly settled on the throne, than he put to death his daughter Berenice, and oppressed his people with the most cruel exactions, in order to procure the money he had been obliged to borrow while in a state of exile. These oppressions and exactions the cowardly Egyptians bore with great pa-

tience, being intimidated by the garriſon which Gabinius had left in Alexandria. But neither the fear of the Romans, nor the authority of Ptolemy, could make them put up an affront offered to their religion. A Roman soldier happened to kill a cat, which was an animal held sacred and even worshipped by the Egyptians; and no sooner was this supposed sacrilege known, than the Alexandrians made a general insurrection, and, gathering together in crowds, made their way through the Roman guards, dragged the soldier out of his house, and, in spite of all opposition, tore him in pieces.

Notwithstanding the heavy taxes, however, which Ptolemy laid on his people, it doth not appear that he had any design of paying his debts. Rabirius, who, as we have already observed, had lent him immense sums, finding that the king affected delays, took a voyage to Egypt, in order to expostulate with him in person. Ptolemy paid very little regard to his expostulations; but excused himself on account of the bad state of his finances. For this reason he offered to make Rabirius collector-general of his revenues, that he might in that employment pay himself. The unfortunate creditor accepted the employment for fear of losing his debt. But Ptolemy, soon after, upon some frivolous pretence or other, caused him and all his servants to be closely confined. This base conduct exasperated Pompey as much as Rabirius; for the former had been in a manner security for the debt, as the money had been lent at his request, and the business transacted at a country-house of his near Alba. However, as Rabirius had reason to fear the worst, he took the first opportunity of making his escape, glad to get off with life from his cruel and faithless debtor. To complete his misfortunes, he was prosecuted at Rome as soon as he returned. 1. For having enabled Ptolemy to corrupt the senate with sums lent him for that purpose. 2. For having debased and dishonoured the character of a Roman knight, by farming the revenues, and becoming the servant of a foreign prince. 3. For having been an accomplice with Gabinius, and sharing with him the 10,000 talents which that proconsul had received for his Egyptian expedition. By the eloquence of Cicero he was acquitted, and one of the best orations to be found in the writings of that author was composed on this occasion. Gabinius was also prosecuted; and, as Cicero spoke against him, he very narrowly escaped death. He was, however, condemned to perpetual banishment, after having been stripped of all he was worth. He lived in exile till the time of the civil wars, when he was recalled by Cæsar, in whose service he lost his life.

Auletes enjoyed the throne of Egypt about four years after his re-establishment; and at his death left his children, a son and two daughters, under the tuition of the Roman people. The name of the son was *Ptolemy*, those of the daughters were *Cleopatra* and *Arsinoë*. This was the Cleopatra who afterwards became so famous, and had so great a share in the civil wars of Rome. As the transactions of the present reign, however, are so closely connected with the affairs of Rome, that they cannot be well understood without knowing the situation of the Romans at that time, we refer for an account of them to the *History of Rome*.

Egypt.

63

Ingratitude of Auletes.

60

Gabinius undertakes to restore him for a great sum.

61

Archelaus defeated and killed.

62

Berenice put to death, and the people oppressed.

64

Leaves his children to the care of the Romans.

Egypt.

65
State of Egypt till its conquest by the Khalif of Cairwan.

With Cleopatra ended the family of Ptolemy Lagus, the founder of the Grecian empire in Egypt, after it had held that country in subjection for the space of 294 years. From this time Egypt became a province of the Roman empire, and continued subject to the emperors of Rome or Constantinople. In the year 642, it was conquered by the Arabs under Amru Ebn Al As, one of the generals of the Khalif Omar. In the year 889, an independent government was set up in this kingdom by Ahmed Ebn Tolun, who rebelled against Al Mokhadi khalif of Bagdad. It continued to be governed by him and his successors for 27 years, when it was again reduced by Al Moctafi khalif of Bagdad. In about 30 years after, we find it again an independent state, being joined with Syria under Mahomet Ebn Taj, who had been appointed governor of these provinces. This government, however, was also but short-lived; for in the year 968 it was conquered by Jawhar, one of the generals of Moez Ledinillah, the Fatemite khalif of Cairwan in Barbary *.

* See Barbary, n^o 34-66

Moez takes possession of his new kingdom.

No sooner was Moez informed of the success of his general, than he prepared with all expedition to go and take possession of his new conquest. Accordingly he ordered all the vast quantities of gold which he and his predecessors had amassed, to be cast into ingots of the size and figure of the millstones used in hand-mills, and conveyed on camels backs into Egypt. To shew that he was fully determined to abandon his dominions in Barbary, and to make Egypt the residence of himself and his successors, he caused the remains of the three former princes of his race to be removed from Cairwan in Barbary, and to be deposited in a lately mosque erected for that purpose in the city of Cairo in Egypt. This was a most effectual method to induce his successors to reside in Egypt also, as it was become an established custom and duty among those princes frequently to pay their respectful visits to the tombs of their ancestors.

67
Will not suffer prayers to be said for the Khalif of Bagdad.

To establish himself the more effectually in his new dominions, Moez suppressed the usual prayers made in the mosques for the khalifs of Bagdad, and substituted his own name in their stead. This was complied with, not only in Egypt and Syria, but even throughout all Arabia, the city of Mecca alone excepted. The consequence was, a schism in the Mahomedan faith, which continued upwards of 200 years, and was attended with continual anathemas, and sometimes destructive wars between the khalifs of Bagdad and of Egypt.—Having fully established himself in his kingdom, he died in the 45th year of his age, three years after he had left his dominions in Barbary; and was succeeded by his son Abu Al Mansur Barar, surnamed Aziz Billah.

68
Unsuccessful expedition into Syria.

The new khalif succeeded to the throne at the age of 21, and committed the management of affairs entirely to the care of Jawhar, his father's long experienced general and prime minister. In 978, he sent this famous warrior to drive out Al Aftekin, the emir of Damafcus. The Egyptian general accordingly formed the siege of that place; but at the end of two months, was obliged to raise it, on the approach of an army of Karmatians under the command of Al Hakem. As Jawhar was not strong enough to venture an engagement with these Karmatians, it was impossible for him to hinder them from effecting a junction with the

forces of Al Aftekin. He therefore retreated, or rather fled, towards Egypt with the utmost expedition; but being overtaken by the two confederate armies, he was soon reduced to the last extremity. He was, however, permitted to resume his march, on condition that he passed under Al Aftekin's sword and Al Hakem's lance; and to this disgraceful condition Jawhar found himself obliged to submit. On his arrival in Egypt, he immediately advised Al Aziz to undertake an expedition in person into the east, against the combined army of Turks, Karmatians, and Damascenes, under the command of Al Aftekin and Al Hakem. The khalif followed his advice; and advancing against his enemies, overthrew them with great slaughter. Al Aftekin himself escaped out of the battle; but was afterwards taken and brought to Al Aziz, who made him his chamberlain, and treated him with great kindness. Jawhar, in the mean time, was disgraced on account of his bad success; and in this disgrace he continued till his death, which happened in the year of our Lord 990, and of the Hegira 381.

This year Al Aziz having received advice of the death of Saado'dawla prince of Aleppo, sent a formidable army under the command of a general named *Manjubekin*, to reduce that place. Lulu, who had been appointed guardian to Saado'dawla's son, finding himself pressed by the Egyptians, who carried on the siege with great vigour, demanded assistance from the Greek emperor. Accordingly, he ordered a body of troops to advance to Lulu's relief. Manjubekin, being informed of their approach, immediately raised the siege, and advanced to give them battle. An obstinate engagement ensued, in which the Greeks were at last overthrown with great slaughter. After this victory, Manjubekin pushed on the siege of Aleppo very briskly; but finding the place capable of defending itself much longer than he at first imagined, and his provisions beginning to fail, he raised the siege. The khalif upon this sent him a very threatening letter, and commanded him to return before Aleppo. He did so; and continued the siege for 13 months, during all which time it was defended by Lulu with incredible bravery. At last, the Egyptians hearing that a numerous army of Greeks was on their way to relieve the city, they raised the siege, and fled with the utmost precipitation. The Greeks then took and plundered some of the cities which Al Aziz possessed in Syria; and Manjubekin made the best of his way to Damafcus, where he set up for himself. Al Aziz being informed of this revolt, marched in person against him with a considerable army; but being taken ill by the way, he expired, in the 21st year of his reign, and 42d of his age.

Al Aziz was succeeded by his son Abu Al Mansur, surnamed Al Hakem; who, being only 11 years of age, was put under the tuition of an eunuch of approved integrity.

This reign is remarkable for nothing so much as the madness with which the khalif was seized in the latter part of it. This manifested itself first by his issuing many preposterous edicts; but at length grew to such a height, that he fancied himself a god, and found no fewer than 16,000 persons who owned him as such. These were mostly the Derarians, a new sect sprung up about this time, who were so called from their chief,

Egypt.

69
Aleppo besieged without success.

70
Strange madness of the Khalif Al Hakem.

Mo.

Egypt.

Mohammed Ebn Ishmael, furnished Darari. He is supposed to have inspired the mad khalif with this impious notion; and, as Darari set up for a second Moses, he did not scruple to assert that Al Hakem was the great Creator of the universe. For this reason, a zealous Turk stabbed him in the khalif's chariot. His death was followed by a three days uproar in the city of Cairo; during which, Darari's house was pulled down, and many of his followers massacred. The sect, however, did not expire with its author. He left behind him a disciple named Hamza, who, being encouraged by the mad khalif, spread it far and wide through his dominions. This was quickly followed by an abrogation of all the Mahomedan fasts, festivals, and pilgrimages, the grand one to Mecca in particular; so that the zealous Mahometans were now greatly alarmed, as justly supposing that Al Hakem designed entirely to suppress the worship of the true God, and introduce his own in its place. From this apprehension, however, they were delivered by the death of the khalif; who was assassinated, by a contrivance of his own sister, in the year 1020.

Al Hakem was succeeded by his son Al Taher, who reigned 15 years; and left the throne to a son under seven years of age, named Al Mostanser Billah.—In the year 1041, a revolt happened in Syria; but Al Mostanser having sent a powerful army into that country, under the command of one *Anshetkin*, he not only reduced the rebels, but considerably enlarged the Egyptian dominions in Syria.

71 Al Mostanser attempts the conquest of Bagdad.

72 Khalif of Bagdad assisted by Togrol Beg.

In 1054, a Turk named Al Bassafiri, having quarrelled with the vizir of Al Kayem khalif of Bagdad, fled to Egypt, and put himself under the protection of Al Mostanser. The latter, imagining this would be a favourable opportunity for enlarging his dominions, and perhaps seizing on the city of Bagdad, supplied Bassafiri with money and troops. By this assistance, he was enabled to possess himself of Arabian Irak, and ravaged that province to the very gates of Bagdad. On this, Al Kayem wrote to Togrol Beg, or Tangrolipix, the Turkish sultan, who possessed very extensive dominions in the east, to come to his assistance. The sultan immediately complied with his request, and soon arrived at Bagdad with a formidable army and 18 elephants. Of this Bassafiri gave notice to Al Mostanser, and intreated him to exert himself further for his support against so powerful an enemy. This was accordingly done, but nothing worthy of notice happened till the year 1058. At this time Bassafiri having found means to excite Ibrahim the Sultan's brother to a revolt, Togrol Beg was obliged to employ all his force against him. This gave Bassafiri an opportunity of seizing on the city of Bagdad itself; and the unfortunate khalif, according to some, was taken prisoner, or, according to others, fled out of the city. Bassafiri, on his entry, caused Al Mostanser to be immediately proclaimed khalif in all quarters of the city. Al Kayem's vizir he caused to be led on a camel through the streets of Bagdad, dressed in a woollen gown, with a high red bonnet, and a leathern collar about his neck; a man lashing him all the way behind. Then being sewed up in a bull's hide, with the horns placed over his head, and hung upon hooks, he was beaten without ceasing till he died. The imperial palace was plundered, and the khalif himself detained a close prisoner.

This success was but short-lived; for, in 1059, Togrol Beg defeated his brother Ibrahim, took him prisoner, and strangled him with a bow-string. He then marched to Bagdad, which Bassafiri thought proper to abandon at his approach. Here the khalif Al Kayem was delivered up by Mahras, the governor of a city called *Haditha*, who had the charge of him. The khalif was immediately restored to his dignity; which Bassafiri no sooner understood, than he again advanced towards the city. Against him Togrol Beg sent a part of his army under some of his generals, while he himself followed with the rest. A battle ensued, in which the army of Bassafiri was defeated, and he himself killed. His head was brought to Togrol Beg, who caused it to be carried on a pike through the streets of Bagdad.

Thus the hopes of Al Mostanser were entirely frustrated; and from this period we may date the declension of the Egyptian empire under the khalifs. They had made themselves masters of almost all Syria; but no sooner was Bassafiri's bad success known, than the younger part of the citizens of Aleppo revolted, and set up Mahmud Azzo'dawla, who immediately laid siege to the citadel. Al Mostanser sent a powerful army against him, which Azzo'dawla entirely defeated, and took the general himself prisoner; and soon after this, he made himself master both of the city and citadel, with all their dependencies. In his new dominions he behaved with the greatest cruelty, destroying every thing with fire and sword, and making frequent incursions into the neighbouring provinces, which he treated in the same manner.

This disaster was soon followed by others still more terrible. In 1066, a famine raged over all Egypt and Syria, with such fury, that dogs and cats were sold for four or five Egyptian dinars each, and other provisions in proportion. Multitudes of people died in Cairo for want of food. Nay, so great was the scarcity, that the vizir had but one servant left who was able to attend him to the khalif's palace, and to whom he gave the care of his horse when he alighted at the gate. But, at his return, he was surprised to find that the horse had been carried off, killed, and eaten, by the famished people. Of this he complained to the khalif; who caused three of them, who had carried off the horse, to be hanged. Next day, however, he was still more surprised to hear, that all the flesh had been picked off the bones of the three unhappy criminals, so that nothing but the skeletons were left. And to such a degree of misery were the inhabitants, not only in Cairo, but through all Egypt, reduced, that the carcases of those who died were sold for food at a great price, instead of being buried. All this time the khalif shewed the greatest kindness and beneficence towards his unhappy subjects, inasmuch, that of 10,000 horses, mules, and camels, which he had in his stables when the famine began, he had only three left when it was removed.

77 The famine was followed by a plague; and this by an invasion of the Turks under Abu Ali Al Hafan the Turks. Naserod'dawla, the very general who had been sent against the rebel Azzo'dawla and defeated by him. He began with besieging the khalif in his own palace; and the unhappy prince, being in no condition to make resistance, was obliged to buy himself off at the expense of every thing valuable that was left in his exchequer.

Egypt.

74 The khalif restored.

75 Decline of the Egyptian empire.

76 Terrible famine and plague.

Egypt.

Egypt.

hausted capital and treasury. This, however, did not hinder these merciless plunderers from ravaging all the lower Egypt from Cairo to Alexandria, and committing the most horrid cruelties through that whole tract. — This happened in the years 1067 and 1068; and in 1069 and 1070, there happened two other revolts in Syria: so that this country was now almost entirely lost.

In 1095 died the khalif Al Mostanser, having reigned 60 years; and was succeeded by his son Abul Kasem, surnamed Al Mottali. — The most remarkable transaction of this prince's reign, was his taking the city of Jerusalem from the Turks in 1098: but this success was only of short duration; for it was, the same year, taken by the crusaders.

78
Jerusalem
taken.

From this time to the year 1164, the Egyptian history affords little else than an account of the intestine broils and contests between the vizirs or prime ministers, who were now become so powerful, that they had in a great measure stripped the khalifs of their civil power, and left them nothing but a shadow of spiritual dignity. These contests at last gave occasion to a revolution, by which the race of Fatemite khalifs was totally extinguished. This revolution was accomplished in the following manner. — One *Shawer*, having overcome all his competitors, became vizir to Al Aded, the eleventh khalif of Egypt. He had not been long in possession of this office, when Al Dargam, an officer of rank, endeavoured to deprive him of it. Both parties quickly had recourse to arms; and a battle ensued, in which Shawer was defeated, and obliged to fly to Nuroddin prince of Syria, by whom he was graciously received, and who promised to reinstate him in his office of vizir. As an inducement to Nuroddin to assist him more powerfully, Shawer told him that the crusaders had landed in Egypt, and made a considerable progress in the conquest of it. He promised also, that, in case he was reinstated in his office, he would pay Nuroddin annually the third part of the revenues of Egypt; and would, besides, defray the whole expence of the expedition.

As Nuroddin bore an implacable hatred to the Christians, he readily undertook an expedition against them, for which he was to be so well paid. He therefore sent an army into Egypt under the command of Shawer and a general named *Asadoddin*. Dargam, in the mean time, had cut off so many generals whom he imagined favourable to Shawer's interest, that he thereby weakened the military force of the kingdom, and in a great measure deprived himself of the power of resistance. He was therefore easily overthrown by Asadoddin, and Shawer reinstated in the office of vizir. The faithless minister, however, no sooner saw himself firmly established in his office, than he refused to fulfil his engagements to Nuroddin by paying the stipulated sums. Upon this, Asadoddin seized Pelusium and some other cities. Shawer then entered into an alliance with the Crusaders, and Asadoddin was besieged by their combined forces in Pelusium. Nuroddin, however, having invaded the Christian dominions in Syria, and taken a strong fortress called *Harem*, Shawer and his confederates thought proper to hearken to some terms of accommodation, and Asadoddin was permitted to depart for Syria.

In the mean time, Nuroddin, having subdued the greatest part of Syria and Mesopotamia, resolved to

make Shawer feel the weight of his repentment, on account of his perfidious conduct. He therefore sent back Asadoddin into Egypt with a sufficient force, to compel Shawer to fulfil his engagements: but this the vizir took care to do before the arrival of Asadoddin; and thus, for the present, avoided the danger. It was not long, however, before he gave Nuroddin fresh occasion to send this general against him. That prince had now driven the crusaders almost entirely out of Syria, but was greatly alarmed at their progress in Egypt; and consequently offended at the alliance which Shawer had concluded with them, and which he still persisted in observing. This treaty was also thought to be contrived on purpose to prevent Shawer from being able to fulfil his promise to Nuroddin, of sending him annually a third of the revenues of Egypt. Nuroddin therefore again dispatched Asadoddin into Egypt, in the year 1166, with a sufficient force, and attended by the famous Salahaddin, or Saladin, his own nephew. They entered the kingdom without opposition, and totally defeated Shawer and the crusaders. They next made themselves masters of Alexandria; and, after that, overran all the Upper Egypt. Saladin was left with a considerable garrison in Alexandria; but Asadoddin was no sooner gone, than the crusaders laid siege to that city. This at last obliged Asadoddin to return to its relief. The great losses he had sustained in this expedition probably occasioned his agreeing to a treaty with Shawer, by which he engaged to retire out of Egypt, upon being paid a sum of money.

Asadoddin was no sooner gone, than Shawer entered into a fresh treaty with the Franks. By this new alliance he was to attack Nuroddin in his own dominions, as he was at that time engaged in quelling some revolters, which would effectually prevent his sending any more forces into Egypt. This treaty provoked the Syrian prince, that he resolved to suspend his other conquests for some time, and exert his whole strength in the conquest of Egypt.

By this time the crusaders had reduced Pelusium, and made a considerable progress in the kingdom, as of the crusaders. 80
and as in some other countries, through the divisions which reigned among the Mahometan princes. In such places as they conquered, they put almost every body to the sword, Christians as well as Mahometans; selling their prisoners for slaves, and giving up the towns to be plundered by the soldiers. From Pelusium they marched to Cairo; which was then in no posture of defence, and in the utmost confusion, by reason of the divisions which reigned in it. Shawer, therefore, as soon as he heard of their approach, caused the ancient quarter called *Mess* to be set on fire, and the inhabitants to retire into the other parts. He also prevailed upon the khalif to solicit the assistance of Nuroddin; which the latter was indeed pretty much inclined of himself to grant, as it gave him the fairest opportunity he could have wished for, both of driving the crusaders out of Egypt, and of seizing the kingdom to himself. For this purpose he had already raised an army of 60,000 horse under his general Asadoddin; and, on the receipt of Al Aded's message, gave them orders to set out immediately. The crusaders were now arrived at Cairo; and had so closely besieged that place, that neither Shawer nor the khalif knew any thing of the approach of the Moslem army which was hastening to their relief. The vizir

Egypt.

Egypt.

vizir therefore, finding it impossible to hold out long against the enemy, had recourse to his old subterfuge of treaties and high promises. He sent the enemy 100,000 dinars, and promised them 500,000 more, if they would raise the siege; which they, dreading the approach of Afadoddin, very readily accepted.

81
They are
repulsed by
the army of
Nuroddin
prince of
Damascus.

The army of Nuroddin now approached the capital by hasty marches, and were every where received with the greatest demonstrations of joy. Afadoddin, on his arrival at Cairo, was invited by Al Aded to the royal palace, where he was entertained in the most magnificent manner, and received several presents; nor were Saladin and the other principal officers less magnificently treated. Shaver also, conscious of his perfidious conduct, was no less assiduous in attending punctually upon him. But having invited the general and some others to an entertainment, he had formed a scheme of having them seized and murdered. The plot, however, being discovered, Shaver himself had his head cut off, and Afadoddin was made vizir in his stead. He did not, however, long enjoy his new dignity; for he died two months and five days after his instalment, being succeeded in his office of vizir by his nephew Saladin.

82
Saladin be-
comes vizir
of Egypt.

The new vizir was the youngest of all the grandees who aspired to that office, but had already given some signal proofs of his valour and conduct. What determined the khalif to prefer him to all the rest is not known; but it is certain that some of them were highly displeased with his promotion, and even publicly declared that they would not obey him. In order to gain these to his interest, therefore, Saladin found it necessary to distribute among them part of the vast treasures left by his uncle; by which means he soon governed Egypt without controul, as had been customary with the vizirs for some time before. Soon after his being installed into the office of vizir, he gave a total defeat to the negroes who guarded the royal palace, and had opposed his election; by which means, and a strong garrison he had placed in the castle of Cairo, his power became firmly established. Though he had not the least intention of continuing in his allegiance to Nuroddin, he did not think it prudent at first to declare himself. He sent for his father, however, and the rest of his family, who were in Nuroddin's dominions, in order, as he said, to make them partakers of his grandeur and happiness. Nuroddin did not think proper to deny this request; though, being already jealous of the great power of Saladin, he insisted that his family should consider him only as one of his generals in Egypt.

83
Seizes the
effects of
the khalif.

A good understanding subsisted between Nuroddin and Saladin for some time, which did not a little contribute to raise the credit of the latter with the Egyptians. In 1169, Nuroddin sent him orders to omit the name of Al Aded, the khalif of Egypt, in the public prayers, and substitute that of the khalif of Bagdad in its place. This was at any rate a dangerous attempt; as it might very readily produce a revolt in favour of Al Aded; or if it did not, it gave Saladin an opportunity of engrossing even that small remnant of power which was left to the khalif. Al Aded, however, was not sensible of his disgrace; for he was on his death-bed, and past recovery, when Nuroddin's orders were executed. After his death, Saladin seized on all his wealth and valuable effects; which consisted of

jewels of prodigious size, sumptuous furniture, a library containing 100,000 volumes, &c. His family he caused to be closely confined in the most private and retired part of the palace; and either manumitted his slaves, or kept them for himself, or disposed of them to others.

Saladin was now arrived at the highest pitch of wealth, power, and grandeur. He was, however, obliged to behave with great circumspection with regard to Nuroddin; who still continued to treat him as his vassal, and would not suffer him to dispute the least of his commands. He relied for advice chiefly on his father Ayub; who was a consummate politician, and very ambitious of seeing his son raised to the throne of Egypt. He therefore advised Saladin to continue steadfast in his resolutions; and, whilst he amused Nuroddin with feigned submissions, to take every method in his power to secure himself in the possession of so valuable a kingdom. Nuroddin himself, however, was too great a master in the art of dissimulation to be easily imposed on by others; and therefore, though he pretended to be well pleased with Saladin's conduct, he was all this time raising a powerful army, with which he was fully determined to invade Egypt the following year. But while he meditated this expedition, he was seized with a quinzy at the castle of Damascus, which put an end to his life, in the year 1173.

84
Aspires to
the crown.

Saladin, though now freed from the apprehensions of such a formidable enemy, dared not venture to assume the title of *Sovereign*, while he saw the successor of Nuroddin at the head of a very powerful army, and no less desirous than able to dispossess him. For this reason his first care was to secure to himself an asylum, in case he should be obliged to leave Egypt altogether. For this purpose he chose the kingdom of Nubia; but having dispatched his brother Malek Turanash thither, at the head of a considerable army, the latter was so much struck with the sterility and desolate appearance of the country, that he returned without attempting any thing. Saladin then sent his brother into Arabia Felix, in order to subdue that country, which had been for some time held by Abdalnabi an Arabian prince. Malek entered the country without opposition; and having brought Abdalnabi to a general action, entirely defeated him, took him prisoner, and threw him into irons. He then over-ran and reduced under subjection to Saladin great part of the country, taking no fewer than 80 castles or fortresses of considerable strength.

85
Subdues A-
rabia Felix.

After this good fortune, Saladin, now sure of a convenient place of refuge in case of any misfortune, assumed the title of *Sultan* or sovereign of Egypt; and was acknowledged as such by the greater part of the states. The zeal of the Egyptians for the Fatemite khalifs, however, soon produced a rebellion. One *Al Kanz*, or *Kanzanaddoula*, governor of a city in Upper Egypt, assembled a great army of blacks, or rather swarthy natives; and marching directly into the lower country, was there joined by great numbers of other Egyptians. Against them Saladin dispatched his brother Malek, who soon defeated and entirely dispersed them. This, however, did not prevent another insurrection under an impostor, who pretended to be David the son of Al Aded the last Fatemite khalif, and had collected a body of 100,000 men. But be-

fore

86
Assumes
the title of
sultan.

Egypt.

fore these had time to do any great damage, they were surprised by the sultan's forces, and entirely defeated. Above 3000 were publicly hanged, and a vast number perished in the field, inasmuch that it was thought scarce a fourth part of the whole body escaped.

About this time Saladin gained a considerable advantage over the crusaders, commanded by William II. king of Sicily. That prince had invaded Egypt with a numerous fleet and army, with which he laid close siege to Alexandria both by sea and land. Saladin, however, marched to the relief of the city with such surprising expedition, that the crusaders were seized with a sudden panic, and fled with the utmost precipitation, leaving all their military engines, stores, and baggage behind.

87
Saladin
made sovereignty of
Damascus.

In the year 1175, the inhabitants of Damascus begged of Saladin to accept the sovereignty of that city and its dependencies; being jealous of the minister, who had the tuition of the reigning prince, and who governed all with an absolute sway. The application was no sooner made, than the sultan set out with the utmost celerity to Damascus, at the head of a chosen detachment of 700 horse. Having settled his affairs in that city, he appointed his brother Saif Al Islam governor of it; and set out for Hems, to which he immediately laid siege. Having made himself master of this place, he then proceeded to Hamah. The city very soon surrendered, but the citadel held out for some time. Saladin pretended that he accepted the sovereignty of Damascus and the other places he had conquered, only as deputy to Al Malec Al Saleh, the successor of Nurroddin, and who was then under age; and that he was desirous of sending Azzoddin, who commanded in the citadel, with a letter to Aleppo, where the young prince resided. This so pleased Azzoddin, that he took the oath of fidelity to Saladin, and immediately set out with the sultan's letter. He had not, however, been long at Aleppo before he was by the minister's orders thrown into prison; upon which, his brother, who had been appointed governor of the citadel Hamah in his absence, delivered it up to Saladin without further ceremony. The sultan then marched to Aleppo, with a design to reduce it; but, being vigorously repulsed in several attacks, he was at last obliged to abandon the enterprise. At the same time, Kamschlegin, Al Malec's minister or vizir, hired the chief of the Batainils, or Assassins*, to murder him. Several attempts were made in consequence of this application; but all of them, happily for Saladin, miscarried.

* See Assassins.

After raising the siege of Aleppo, Saladin returned to Hems, which place the crusaders had invested. On his approach, however, they thought proper to retire; after which, the sultan made himself master of the strong castle belonging to that place, which, before, he had not been able to reduce. This was soon followed by the reduction of Baalbec; and these rapid conquests so alarmed the ministers of Al Malec, that, entering into a combination with some of the neighbouring princes, they raised a formidable army with which they designed to crush the sultan at once. Saladin, fearing the event of a war, offered to cede Hems and Hamah to Al Malec, and to govern Damascus only as his lieutenant: but these terms being rejected, a battle ensued; in which the allied army was utterly defeated, and the shattered remains of it shut up in the

88
Defeats his
enemies.

city of Aleppo. This produced a treaty, by which Saladin was left master of all Syria, excepting only the city of Aleppo and the territory belonging to it.

In 1176 Saladin returned from the conquest of Syria, and made his triumphal entry into Cairo. Here, having rallied himself and his troops for some time, he began to encompass the city with a wall 29,000 cubits in length, but which he did not live to finish. Next year he led a very numerous army into Palestine against the crusaders. But here his usual good fortune failed him. His army was entirely defeated. Forty thousand of his men were left dead on the field; and the rest fled with so much precipitation, that, having no towns in the neighbourhood where they could shelter themselves, they traversed the vast desert between Palestine and Egypt, and scarce stopped till they reached the capital itself. The greatest part of the army by this means perished; and as no water was to be had in the desert abovementioned, almost all the beasts died of thirst, before the fugitives arrived on the confines of Egypt. Saladin himself seemed to have been greatly intimidated; for in a letter to his brother Al Malek, he told him, that "he was more than once in the most imminent danger; and that God, as he apprehended, had delivered him from thence, in order to reserve him for the execution of some grand and important design."

In the year 1182, the sultan set out on an expedition to Syria with a formidable army, amidst the acclamations and good wishes of the people. He was, however, repulsed with loss both before Aleppo and Al Mawfel, after having spent much time and labour in besieging these two important places.

In the mean time, a most powerful fleet of European ships appeared on the Red Sea, which threatened the cities of Mecca and Medina with the utmost danger. The news of this armament no sooner reached Cairo, than Abu Beer, Saladin's brother, who had been left viceroy in the sultan's absence, caused another to be fitted out with all speed under the command of Lulu, a brave and experienced officer; who quickly came up with them, and a dreadful engagement ensued. The Christians were defeated after an obstinate resistance, a vast number of their men were killed in the engagement, and all the prisoners butchered in cold blood. This proved such a terrible blow to the Europeans, that they never more ventured on a like attempt.

90
The Christians
receive a
great defeat
at sea.

In 1183, Saladin continued to extend his conquests. The city of Amida in Mesopotamia surrendered to him in eight days; after which, being provoked by some violence committed by the prince of Aleppo, he resolved at all events to make himself master of that place. He was now attended with better success than formerly; for as his army was very numerous, and he pushed on the siege with the utmost vigour, Amaddodn the prince capitulated, upon condition of being allowed to possess certain cities in Mesopotamia which had formerly belonged to him, and being ready to attend the sultan on whatever expedition he pleased. After the conquest of Aleppo, Saladin took three other cities, and then marched against his old enemies the Crusaders. Having sent out a party to reconnoitre the enemy, they fell in with a considerable detachment of Christians; whom they easily defeated, taking about 100 prisoners, with the loss of only a single man on their

or
Saladin's
rapid con-
quests.

Egypt.

89

Receives a
terrible over-
throw
from the
crusaders.

Egypt.

their side. The sultan, animated by this first instance of success, drew up his forces in order of battle, and advanced against the Crusaders, who had assembled their whole army at Sepphoris in Galilee. On viewing the sultan's troops, however, and perceiving them to be greatly superior in strength to what they had at first apprehended, they thought proper to decline an engagement, nor could Saladin with all his skill force them to it. But though it was found impossible to bring the Crusaders to a decisive engagement, Saladin found means to harass them greatly, and destroyed great numbers of their men. He carried off also many prisoners, dismantled three of their strongest cities, laid waste their territories, and concluded the campaign with taking another strong town.

92
Christians
totally de-
feated.

For three years Saladin continued to gain ground on the Crusaders, yet without any decisive advantage; but in 1187, the fortune of war was remarkably unfavourable to them. The Christians now found themselves obliged to venture a battle, by reason of the cruel ravages committed in their territories by Saladin, and by reason of the encroachments he daily made on them. Both armies therefore being resolved to exert their utmost efforts, a most fierce and bloody battle ensued. Night prevented victory from declaring on either side, and the fight was renewed with equal obstinacy next day. The victory was still left undecided; but, the third day, the sultan's men finding themselves surrounded by the enemy on all sides but one, and there also hemmed in by the river Jordan, so that there was no room to fly, fought like men in despair, and at last gained a most complete victory. Vast numbers of the Christians perished on the field. A large body found means to retire in safety to the top of a neighbouring hill covered with wood; but being surrounded by Saladin's troops, who set fire to the wood, they were all obliged to surrender at discretion. Some of them were butchered by their enemies as soon as they delivered themselves into their hands, and others thrown into irons. Among the latter were the king of Jerusalem himself, Arnold prince of Al Shawbec and Al Carac, the masters of the Templars and Hospitalers, with almost the whole body of the latter. So great was the consternation of the Christians on this occasion, that one of Saladin's men is said to have taken 30 of them prisoners, and tied them together with the cord of his tent, to prevent them from making their escape. The masters of the Templars and Hospitalers, with the knights acting under them, were no sooner brought into Saladin's presence, than he ordered them all to be cut in pieces. He called them *Assajins*, or *Batanists*; and had been wont to pay 50 dinars for the head of every Templar or Hospitaler that was brought him. After the engagement, Saladin feasted himself in a magnificent tent, placing the king of Jerusalem on his right hand, and Arnold prince of Al Shawbec and Al Carac on his left. Then he drank to the former, who was at that time ready to expire with thirst, and at the same time offered him a cup of snow-water. This was thankfully received; and the king immediately drank to the prince of Al Carac, who sat near him. But here Saladin interrupted him with some warmth: "I will not, says he, suffer this cursed rogue to drink; as that, according to the laudable and generous custom of the Arabs, would secure to him his life." Then,

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turning towards the prince, he reproached him with having undertaken the expedition while in alliance with himself, with having intercepted an Egyptian caravan in the time of profound peace, and massacring the people of which it was composed, &c. Notwithstanding all this, he told him, he would grant him his life, if he would embrace Mahometanism. This condition, however, was refused; and the sultan, with one stroke of his scymitar, cut off the prince's head. This greatly terrified the king of Jerusalem; but Saladin assured him he had nothing to fear, and that Arnold had brought on himself a violent death by his want of common honesty.

93
His further
conquests.

The Crusaders being thus totally defeated and dispersed, Saladin next laid siege to Tiberias, which capitulated in a short time. From thence he marched towards Acca or Ptolemais, which likewise surrendered after a short siege. Here he found 4000 Mahometan prisoners in chains, whom he immediately released. As the inhabitants enjoyed at present a very extensive trade, the place being full of merchants, he found there not only vast sums of money, but likewise a great variety of wares exceedingly valuable, all which he seized and applied to his own use. About the same time his brother Al Malec attacked and took a very strong fortress in the neighbourhood; after which the sultan divided his army into three bodies, that he might with the greater facility over-run the territories of the Christians. Thus, in a very short time, he made himself master of Neapolis, Cæsarea, Sepphoris, and other cities in the neighbourhood of Ptolemais, where his soldiers found only women and children, the men having been all killed or taken prisoners. His next conquest was Joppa, which was taken by storm after a vigorous resistance. Every thing being then settled, and a distribution made of the spoils and captives, Saladin marched in person against Tebrien, a strong fortress in the neighbourhood of Sidon; which was taken by assault, after it had sustained a siege of six days. No sooner was he master of this place, than he ordered the fortress to be razed, and the garrison put to the sword. From Tebrien the victorious sultan proceeded to Sidon itself; which, being deserted by its prince, surrendered almost on the first summons. Berytus was next invested, and surrendered in seven days. Among the prisoners Saladin found in this place the prince of a territory called *Hobeil*, who by way of ransom delivered up his dominions to him, and was of consequence released. About the same time, a Christian ship, in which was a nobleman of great courage and experience in war, arrived at the harbour of Ptolemais, not knowing that it was in the hands of Saladin. The governor might easily have secured the vessel; but neglecting the opportunity, she escaped to Tyre, where the abovementioned nobleman, together with the prince of Hobeil, contributed not a little to retrieve the affairs of the Christians, and enable them to make a stand for four years after.

Saladin in the mean time went on with his conquests. Having made himself master of Acalon after a siege of 14 days, he next invested Jerusalem. The garrison was numerous, and made an obstinate defence; but Saladin having at last made a breach in the walls by sapping, the besieged desired to capitulate. This was at first refused, upon which the Christian ambaf-

94
Jerusalem
taken.

fador made the following speech. " If that be the case, know, O sultan, that we who are extremely numerous, and have been restrained from fighting like men in despair only by the hopes of an honourable capitulation, will kill all our wives and children, commit all our wealth and valuable effects to the flames, massacre 5000 prisoners now in our hands, leave not a single beast of burden or animal of any kind belonging to us alive, and level with the ground the rock you esteem sacred, together with the temple Al Akfa. After this we will fall out upon you in a body; and doubt not but we shall either cut to pieces a much greater number of you than we are, or force you to abandon the siege." This desperate speech had such an effect upon Saladin, that he immediately called a council of war, at which all the general officers declared, that it would be most proper to allow the Christians to depart unmolested. The sultan therefore allowed them to march out freely and securely with their wives, children, and effects; after which he received ten dinars from every man capable of paying that sum, five from every woman, and two from every young person under age. For the poor who were not able to pay any thing, the rest of the inhabitants raised the sum of 30,000 dinars.

Most of the inhabitants of Jerusalem were escorted by a detachment of Saladin's troops to Tyre; and soon after, he advanced with his army against that place. As the port was blocked up by a squadron of five men of war, Saladin imagined that he should easily become master of it. But in this he found himself mistaken. For, one morning by break of day, a Christian fleet fell upon his squadron, and entirely defeated it; nor did a single vessel escape their pursuit. A considerable number of the Mahometans threw themselves into the sea during the engagement; most of whom were drowned, though some few escaped. About the same time Saladin himself was vigorously repulsed by land; so that, after calling a council of war, it was thought proper to raise the siege.

In 1188, Saladin, though his conquests were not so rapid and considerable as hitherto, continued still superior to his enemies. He reduced the city of Laodicea and some others, together with many strong castles; but met also with several repulses. At last he took the road to Antioch; and having reduced all the fortresses that lay in his way, many of which had been deemed impregnable, Bohemond prince of Antioch was so much intimidated, that he desired a truce for seven or eight months. This Saladin found himself obliged to comply with, on account of the prodigious fatigues his men had sustained, and because his auxiliaries now demanded leave to return home.

95
Crusaders
retrieve
their affairs.

All these heavy losses of the Christians, however, proved in some respects an advantage, as they were thus obliged to lay aside their animosities, which had originally proved the ruin of their affairs. Those who had defended Jerusalem, and most of the other fortresses taken by Saladin, having retreated to Tyre, formed there a very numerous body. This proved the means of preserving that city, and also of re-establishing their affairs for the present. For, having received powerful succours from Europe, they were enabled in 1189 to take the field with 30,000 foot and 2000 horse. Their first attempt was upon Alexandria; from whence they dislodged a strong party of

Mahometans, and made themselves masters of the place with very little loss. They next laid siege to Ptolemais; of which Saladin had no sooner received intelligence, than he marched to the relief of the place. After several skirmishes with various success, a general engagement ensued, in which Saladin was defeated with the loss of 10,000 men. This enabled the Christians to carry on the siege of Ptolemais with greater vigour; which place, however, they were not able to reduce for the space of two years.

This year the sultan was greatly alarmed by an account that the emperor of Germany was advancing to Constantinople with an army of 260,000 men, in order to assist the other Crusaders. This prodigious armament, however, came to nothing. The multitude was so reduced with sickness, famine, and fatigue, that scarce 1000 of them reached the camp before Ptolemais. The siege of that city was continued, though with bad success on the part of the Christians. They were repulsed in all their attacks, their engines were burnt with naphtha, and the besieged always received supplies of provisions in spite of the utmost efforts of the besiegers; at the same time that a dreadful famine and pestilence raged in the Christian camp, which sometimes carried off 200 people a-day.

In 1191, the Christians received powerful succours Richard I. of England arrives in Asia.

Philip II. of France, and Richard I. of England (from his great courage surnamed *Cœur de Lion*), arrived before the camp at Ptolemais. The latter was esteemed the bravest and most enterprising of all the generals the Crusaders had, and the spirits of his soldiers were greatly elated by the thoughts of acting under such an experienced commander. Soon after his arrival, the English sunk a Mahometan ship of vast size, having on board 650 soldiers, a great quantity of arms and provisions, going from Berytus to Ptolemais. Of the soldiers and sailors who navigated this vessel, only a single person escaped; who being taken prisoner by the English, was dispatched to the sultan with the news of the disaster. The besieged still defended themselves with the greatest resolution; and the king of England happening to fall sick, the operations of the besiegers were considerably delayed. On his recovery, however, the attacks were renewed with such fury, that the place was every moment in danger of being taken by assault. This induced them to send a letter to Saladin, informing him, that if they did not receive succours the very next day, they would be obliged to submit. As this town was the sultan's principal magazine of arms, he was greatly affected with the account of their distress, especially as he found it impossible to relieve them. The inhabitants, therefore, found themselves under a necessity of surrendering the place. One of the terms of the capitulation was, that the Crusaders should receive a very considerable sum of money from Saladin, in consequence of their delivering up the Mahometan prisoners they had in their hands. This article, Saladin refused to comply with; and in consequence of his refusal, Richard caused 3000 of those unfortunate men to be slaughtered at once.

After the reduction of Ptolemais, the king of England, now made generalissimo of the Crusaders, took the road to Afcalon, in order to besiege that place; after which, he intended to make an attempt upon Jerusalem itself. Saladin proposed to intercept his passage,

Egypt.

97
Defeats Sa-
ladin.

lage, and placed himself in the way with an army of 300,000 men. On this occasion was fought one of the greatest battles of that age. Saladin was totally defeated, with the loss of 40,000 men; and Aſcalon soon fell into the hands of the Crusaders. Other sieges were afterwards carried on with success, and Richard even approached within sight of Jerusalem, when he found, that, by reason of the weakened state of his army, and the divisions which prevailed among the officers who commanded it, he should be under the necessity of concluding a truce with the sultan. This was accordingly done in the year 1192; the term was, three years, three months, three weeks, three days, and three hours; soon after which the king of England set out on his return to his own dominions.

In 1193, Saladin died, to the inexpressible grief of all true Mahometans, who held him in the utmost veneration. His dominions in Syria and Palestine were shared out, among his children and relations, into many petty principalities: his son Othman succeeded to the crown of Egypt; but as none of his successors possessed the enterprising genius of Saladin, the history from that time to the year 1250 affords nothing remarkable. At this time the reigning sultan Malek Al Salek was dethroned and slain by the *Mamlucs* or *Mamelucs*, as they are called, a kind of mercenary soldiers who served under him. In consequence of this revolution, the Mamelucs became masters of Egypt, and chose a sultan from among themselves.—These Mamelucs were originally young Turks or Tartars, sold to private persons by the merchants, from whom they were bought by the sultan, educated at his expence, and employed to defend the maritime places of the kingdom. The reason of this institution originally was, that the native Egyptians were become so cowardly, treacherous, and effeminate, from a long course of slavery, that they were unfit for arms. The Mamelucs, on the contrary, made most excellent soldiers; for, having no friends but among their own corps, they turned all their thoughts to their own profect. When they had got possession of the government, therefore, as they neither understood nor valued any thing besides the art of war, every species of learning decayed in Egypt, and a great degree of barbarism was introduced. Neither was their empire of long duration, notwithstanding all their martial abilities. The reason of this was, that they were originally only a small part of the sultan of Egypt's standing forces. As a numerous standing army was necessary in a country where the fundamental maxim of government was, that every native must be a slave, they were at first at a loss how to act; being justly suspicious of all the rest of the army. At last they resolved to buy Christian slaves, and educate them in the same way that they themselves had formerly been. These were commonly brought from Circassia, where the people, though they professed Christianity, made no scruple of selling their children. When they were completed in their military education, these soldiers were disposed of through all the fortresses erected in the country to bridle the inhabitants; and because in their language such a fort was called *Borge*, the new militia obtained the name of *Borgites*. By this expedient the Mamelucs imagined they would be able to secure themselves in the sovereignty. But in this they were mistaken. In process of

99
Mamlucs
become mas-
ters of E-
gypt.

time, the old Mamelucs grew proud, insolent, and lazy; and the Borgites, taking advantage of this, rose upon their masters, deprived them of the government, and transferred it to themselves about the year 1382.

The Borgites, as well as the former, assumed the name of *Mamelucs*; and were famous for their valour, and ferocity of conduct. They were almost perpetually engaged in wars either foreign or domestic, and their dominion lasted till the year 1517, when their kingdom was invaded by Selim the Turkish sultan. The Mamelucs defended themselves with incredible valour; notwithstanding which, being overpowered by numbers, they were defeated in every engagement. The same year, their capital, the city of Cairo, was taken, with a terrible slaughter of those who defended it. The sultan was forced to fly; and, having collected all his force, ventured another battle. The most romantic efforts of valour, however, were insufficient to cope with the innumerable multitude which composed the Turkish army. Most of his men were cut in pieces, and the unhappy prince himself was at last obliged to take shelter in a marsh. He was dragged from his hiding place, where he had stood up to the shoulders in water, and soon after put to death. With him ended the glory, and almost the existence, of the Mamelucs, who were now every where searched for and cut in pieces.

This was the last great revolution in the Egyptian affairs; a revolution very little to the advantage of the natives, who may well doubt whether their ancient or modern conquerors have behaved with the greater degree of barbarity. Selim gave a specimen of his government, the very day after his being put in full possession of it by the death of Tuman Bey the unfortunate sultan above mentioned. Having ordered a theatre to be erected with a throne upon it on the banks of the Nile, he caused all the prisoners, upwards of 30,000 in number, to be beheaded in his presence, and their bodies thrown into the river. The rest of the Turkish government hath been conformable to such a beginning; and the inhabitants are still oppressed by exactions, and reduced to the lowest degree of slavery.

With regard to the country of Egypt, it is difficult to say any thing with certainty; for not only is there a prodigious difference between the accounts of the ancient and modern historians, but the latter differ very widely from one another. According to the former, the country abounded with grain of all sorts, especially rice. The most fertile parts were the Delta, now called *Al Feyyum*. The capital of this district is by the natives said to have been built by the patriarch Joseph, to whom they own themselves obliged for the improvement of this territory. Before his time it was nothing but a standing pool; but that patriarch, by cutting canals, particularly the great one which reaches from the Nile to the lake Mæris, drained it of the water, and, clearing it of the weeds and rushes, made it fit for tillage. It still continues to be the most fertile and best cultivated part of the kingdom. The great fertility of Egypt was attributed, and very justly, to the annual overflowing of the Nile; for the overflowing of grounds with water is found to be a very good method of fertilizing them *. The sources of this river were unknown to the ancients. They even thought it im-

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possible to discover them. It is now, however, known, that the Nile arises in Ethiopia or Abyssinia. It enters Egypt almost under the tropic of Cancer, violently pouring down no less than seven cataracts from a very considerable height, and making a noise that may be heard several miles off. Having passed through the Upper and Middle Egypt, a little below the ancient Memphis, it divided itself into two large arms, which afterwards formed seven channels, by which it was discharged into the sea. These seven mouths are much spoken of by ancient historians. They were called the *Canopic*, the *Heracleotic*, *Bolbitic*, *Sabennyitic*, *Phatnic* or *Pathmetic*, the *Mendesian* *Tanitic* or *Saitic*, and the *Pelusiatic*; all of which had their names from cities standing on their several branches. Besides these, there were two Pseudoformata, or false mouths, named *Pi-neptimi* and *Diocles*, which were too small for large vessels. But the greater part of these mouths have been since stopped up, and others formed; so that above thirty channels are now reckoned, through which the waters of the Nile empty themselves into the sea, especially at the time of its overflowing, the greater part of them becoming dry when the waters retire. The two chief, and indeed the only considerable branches of the Nile at present are those of *Rosetta* or *Rafhid* to the west, and *Damietta* or *Dinwyet* to the east.

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Its annual
inundation.

Concerning the annual inundation of the Nile, ancient and modern writers agree pretty well. It begins to rise about the summer solstice, and continues to do so for about 100 days after; then it gradually decreases for as many more, till it retires within its banks, and does not overflow till the next year. If the river does not rise to the height of 15 or 16 cubits at least, the country is not covered with water, and a scarcity ensues. No notice is taken of the rising of the river till the end of June; by which time it is usually risen to the height of six or eight *pikes*, (a Turkish measure of about 26 inches). Then the public criers proclaim it through all the cities; and in the same manner continue every day to give an account of its gradual progress. After it has risen to the height of 16 pikes, they cut down the dam of a great canal which passes through the middle of the city of Cairo, and let in the water on their lands. If the river want but an inch of this height, they will not cut the dam; because, in such a case, no tribute is due to the prince for the lands that should have been watered by them, the produce being then scarce sufficient to maintain the tillers. For this reason, if the bashaw or governor of Egypt cut this dam before the river has risen to the height above mentioned, he is answerable for the consequence, and must pay the Turkish emperor his tribute, whether the year prove plentiful or not. If the water rises to the height of 23 or 24 pikes, it is thought to be the most favourable; but if it exceeds that, it does a great deal of mischief, by overthrowing houses, drowning cattle, &c.

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sacs.

In order to judge more exactly of the rise and fall of the water, pillars are erected on its banks, and marked with proper divisions. A very ancient one, said to be erected for this purpose by the emperor Heraclius, is still to be seen in the castle of old Cairo. The present *nilemeter*, or *mikyas*, as the Arabs call it, is in the same castle. It is a large square reservoir, round which runs a handsome gallery sustained by 12 marble

pillars, with a ballustrade to lean on, when one looks into the water. Through this basin runs a canal drawn from the river. In the middle is an octagonal pillar of white marble divided into 22 equal parts: the first is divided into 24 inches; but the second is not; tho' all the rest have these subdivisions.

As it is impossible, however, that the Nile can of itself overflow every spot of land which requires its assistance, the inhabitants have been obliged to cut a vast number of canals and trenches from one end of Egypt to the other, to convey the water to those places where it is wanted. Every town and village has its canal; which is opened at the most proper time, and the water conducted to the most distant places. These canals are not permitted to be opened all at once; because, if this was done, some lands would have too much, and others too little, water. They begin to open them first in upper Egypt, and then gradually lower, according to the public regulations made for that purpose. By this means, the water is so carefully husbanded, that it answers the purposes of the whole country; which is so large, and the canals so numerous, that, it is thought, scarce a tenth part of the waters of the river enter the sea during the first three months of its overflowing. As some places, however, lie too high to be overflowed in this manner, they are for this reason obliged to raise the water to cover them by engines. Formerly, they made use of Archimedes's screw, from thence commonly called the *Egyptian pump*; but now they generally use wheels, which draw up the water in earthen pots, and are moved by oxen. There is also a vast number of wells, from whence water is drawn in the same manner for the gardens and fruit-trees; so that there are reckoned to be 200,000 oxen daily employed in this labour throughout the kingdom; without reckoning the men who draw water in wicker-baskets so close that not a drop runs through.

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Method of
distributing
the water.

The accounts given by the ancients of the fertility of Egypt, almost exceed the bounds of credibility. The mud or slime brought down by the river, according to them, was in quantity sufficient to serve for manure to the whole kingdom. They had not the toil of digging, ploughing, or breaking of clods. When the waters were retired, they needed only to mix a little sand with the earth to abate its strength; the mud brought down by the Nile making the soil, it seems, too rich; after which, they sowed their seed, and reaped the most plentiful crops.—We can scarce doubt that this formerly hath been true in some degree, seeing we find it attested by all the historians of antiquity, that, in the time of the Romans, their city was chiefly supplied with corn from Egypt. From the way in which it is spoke of in the sacred writings also, we must certainly look upon Egypt to have anciently been a very plentiful country. Now, however, the case is prodigiously altered. The inhabitants are scarce one twentieth part of what they formerly were, and every spot is cultivated as much as before; yet the country very seldom produces enough to support them. The waters of the Nile now bring down none of that mud spoke of by the ancients. They continue clear from the beginning of their rise till they have arrived at the height of 17 feet and upwards. Then they bring down a quantity of reddish coloured loam, which indeed

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proves an excellent manure. It is very probable, therefore, that the sources from whence the waters of the Nile received the black mud, have long since been exhausted; and the inhabitants not adverting to this change, and neglecting to manure their lands properly, the ground hath been exhausted by continual cultivation, and fallen short of its ancient fertility*.—What fertility this country still possesses, must be derived from the waters of the river, seeing less crops are always produced when the waters of the Nile rise to the least height. One thing which contributes greatly to the variation of quantity in the waters of the Nile, and consequently of the fertility of the country, is the blowing of the north-wind. This makes a kind of bar across the mouths of the river, and hinders the waters from flowing with such swiftness into the sea as they otherwise would do: and therefore it is observed, that when the wind blows from any other quarter, the waters decrease as much in one day, as they do in four when it blows from the north; and hence, in such cases, the fertility of Egypt is greatly diminished.—The ancients were ignorant of the causes of this inundation, which seemed to them the more unaccountable, as it overflowed in the summer-time, when other rivers are generally at the lowest. But it has long since been known to be occasioned by the great rains which fall in Ethiopia in April and May, and swell the river to such a degree, that it almost lays that country entirely under water. At the same time, it rains with equal regularity in the East Indies, and the rivers Indus and Ganges overflow their banks at the same time with the Nile.

Whatever may have been the cause with the fertility of ancient Egypt, it is certain, that such monuments of the power and wealth of its ancient monarchs remain, that we cannot doubt of its having been anciently very populous.—The most remarkable of these are the pyramids; which, on many accounts, may be reckoned the most wonderful structures in the world. There are many of them in the different parts of Egypt; but those which have been chiefly taken notice of and described by travellers, stand on the west side of the Nile, not far from the ancient Memphis. The number of these pyramids is about 20; of which three, standing almost together, are most remarkable, and have been most frequently described. The others lie scattered in the Libyan desert, and are lesser models of these three, though some of them also are very considerable.—The builders of these pyramids are unknown. Josephus supposes them to have been erected by the Israelites during their heavy oppression by Pharaoh. Others pretend, that they were built by the patriarch Joseph, for granaries to lay up the corn of the seven plentiful years: both of which opinions, however, seem to be improbable. It is much more likely, that they were erected as monuments for the dead.

The first of these pyramids is situated on a rocky hill, in the sandy desert of Libya, about a quarter of a mile from the plains of Egypt; above which, the rock rises 100 feet or more, with a gentle and easy ascent. Upon this advantageous rise and solid foundation is the pyramid erected; the height of the situation adding to the beauty of the work, and the solidity of the rock affording it a stable support. The north side, near the basis, being measured by a radius of 10 feet in length, taking two several stations, was found by Mr Greaves

to be 693 English feet. The other sides were examined by a line, for want of an even level, and a convenient distance to place the instruments. The altitude, if measured by its perpendicular, is 481 feet; but if it be taken as the pyramid ascends inclining, then it is equal, in respect of the lines subtending the several angles, to the latitude of the basis. Whereby it appears, that though several of the ancients have excessively magnified the height of these pyramids, yet the biggest of them falls short of the height of St Paul's church in London: which, from the ground to the top of the lantern only, is no less than 470 feet. If we imagine on the sides of the basis, which is perfectly square, four equilateral triangles mutually inclining till they meet in a point (for so the top seems to those who stand below), then we shall have a just idea of the true dimensions and figure of this pyramid; the area of whose basis contains 480,249 square feet, or something more than 11 English acres of ground: a proportion so monstrous, that did not the ancients attest as much, and some of them more, it might appear incredible.

The ascent to the top of the pyramid is contrived by steps, the lowermost of which is near four feet in height, and three in breadth; and running about the pyramid in a level, made a narrow walk, when the stones were entire, on every side. The second step is like the first, benching in near three feet. In the same manner is the third row placed on the second; and the rest in order, like so many stairs, rising one above another to the top; which ends not in a point, as mathematical pyramids do, but in a little flat or square of 13,280 English feet broad, and consisting of nine stones, besides two which are wanting at the corners. This pyramid, by reason of the stones being worn by the weather, cannot be conveniently ascended, except on the south side, or at the north-east angle. The steps are made of massy and polished stones (said to have been hewn out of the Arabian mountains, which bound the upper Egypt on the east); and are so vast, that the breadth and depth of every step is one single stone. It is also to be observed, that the steps are not all of equal depth; for some are near four feet, and others not quite three, diminishing the higher one ascends: and the breadth of them is proportionable to their depth; so that a right line, extended from the basis to the top, will equally touch the outward angle of every step. The number of these steps is not mentioned by any of the ancients; but modern travellers differ very much in their computation. Mr Greaves and two others counted them very carefully, and found them to be 207; though one of them, in descending, reckoned 208.

The entrance into the pyramid is by a square narrow passage, which opens in the midst of the north side on the 16th step, or ascending 38 feet, on an artificial bank of earth. The stone that is over it is near 12 feet long, and above 8 feet wide. This entry goes declining with an angle of 26 degrees, and is in breadth exactly 3,463 English feet, and in length 92 feet and an half. The structure of it has been the labour of an exquisite hand, as appears by the smoothness and evenness of the work, and close knitting of the joints; a property long since observed by Diodorus to have run through the whole fabric of this pyramid. At the end of this passage there is another like the former, but which goes on a little rising: at the meeting of these

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* See Agriculture, 10 25, 28.

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two passages, the one descending and the other ascending, the lowermost stone of the roof, perpendicular to it, forms a sharp ridge, between which and the sand there is sometimes not a foot space to pass through; so that a man must slide on his belly close to the ground, and yet grate his back against the above-mentioned stone, unless he be very slender. However, this difficulty is occasioned chiefly by the sand which the wind drives into this place; for if the passage be cleared, it is of the same dimensions there as at the entrance. There being no window or other opening in this pyramid to admit the light, it may easily be conceived, that those who would view the inside must carry lights with them.

Having passed this strait, on the right hand there is an ugly broken hole of about 89 feet in length, the height and breadth various, and not worthy consideration: whether this part be decayed by time, or has been dug away for curiosity, or in hopes of discovering some hidden treasure, is uncertain. On the left hand, adjoining to the narrow entrance, climbing up a steep and massy stone 8 or 9 feet in height, one enters on the lower end of the first gallery; the pavement of which rises with a gentle acclivity, consisting of a smooth polished marble, and, where not smeared with dust and filth, appearing of a white and alabaster colour; the sides and roof of unpolished stone, not so hard and compact as that of the pavement: the breadth of this gallery is almost 5 feet, the height about as much, and the length 110 feet. At the end of it, there are two passages; one low and horizontal, or level with the ground; and the other high and rising like the former. At the entry of the lower passage, on the right hand, is the well mentioned by Pliny, which is circular, and a little above 3 feet diameter: the sides are lined with white marble, and the descent is by fixing the hands and feet in little open spaces cut in the sides within, opposite and answering to one another in a perpendicular; which is the contrivance for descending into most of the wells and cisterns at Alexandria. This well might lead to the vault above-mentioned; but it is now almost stopped up with rubbish, and not above 20 feet deep.

Leaving the well, and going straight on to the distance of 15 feet, one enters another passage opening against the former, and of the same dimensions, the stones of which are very massy, and exquisitely joined. This passage runs in a level 110 feet, and leads to an arched vault, or chamber, standing due east and west, having a sepulchral smell, and half full of rubbish; its length is not quite 20 feet, its breadth about 17, and its height less than 15; the walls are entire, and plastered over with lime; the roof is covered with large smooth stones, not lying flat, but shelving, and meeting above in an angle. On the side of this room, in the middle of it, Greaves says, there seems to have been a passage leading to some other place; but neither Thevenot nor Le Brun could discover any such.

Returning back through the narrow horizontal passage, you climb over it, and enter into the other or second gallery on the left, divided from the first gallery by the wall, in which is the entrance to the last-mentioned passage. This second gallery rises with an angle of 26 degrees, and is in length 154 feet from the well below; but if measured on the pavement, somewhat less, by reason of a little vacuity of about 15 feet,

before described, between the well and the square-hole: the height of it is about 26 feet, and the breadth 6.87 feet; of which one half is to be allowed for the way in the middle, there being a stone bench on each side of the wall, of one foot and $\frac{1}{1000}$ in breadth, and as much in depth. On the top of these benches, near the angle where they close with the wall, are little spaces, cut in right-angled parallel figures, set in each side opposite to one another; intended, no question, for some other end than ornament. The stone of which this gallery is built, is a white and polished marble, very evenly cut in large tables; and the joints are so close, that they are scarce discernable by a curious eye: but what adds grace to the whole structure, though it makes the passage the more slippery and difficult, is the acclivity and rising of the ascent. However, the going up is not a little facilitated by certain holes made in the floor, about six hands-breadth from one another, into which a man may set his feet, while he holds by the bench with one hand. In the ranging of the marble tables in both the side-walls, there is one piece of architecture very graceful; and that is, that all the courses, which are but seven, do set and flag over one another about three inches, the bottom of the upper course oversetting the higher part of the next below it in order as they descend.

Having passed this gallery, one enters another square hole of the same dimensions with the former, which leads into two small antichambers or closets, lined with a rich and speckled kind of Thebaic marble. The first of these is almost equal to the second, which is of an oblong figure; one side containing seven feet, and the other three and a half; the height is ten feet, and the floor level. On the east and west sides, within two feet and a half of the top, which is somewhat larger than the bottom, are three semicircular cavities, or little seats.

The inner antichamber is separated from the former by a stone of red speckled marble, which hangs in two mortises (like the leaf of a sluice), between two walls, more than three feet above the pavement, and wanting two of the roof. From this second closet you enter another square hole, over which are five lines cut parallel and perpendicular; besides which no other sculptures or engravings are observed in the whole pyramid. The square passage is of the same wideness with the rest, being all of Thebaic marble, exquisitely cut, and landing you at the north end of a very sumptuous and well proportioned room. The distance from the end of the second gallery to this entry, running upon the same level, is 24 feet. This chamber stands as it were in the heart and centre of the pyramid, equidistant from all the sides, and almost in the middle between the basis and the top. The floor, the sides, and the roof of it, are all made of vast tables of Thebaic marble, most exquisitely polished; which, if they were not obscured by the smoke of torches, would appear glittering and shining. From the top of it descending to the bottom, there are about six ranges of stone, all of which being respectively sized to an equal height very gracefully run round the room in one altitude. The stones which cover this chamber are of a stupendous length, like as many huge beams lying flat and traversing the room, and supporting the prodigious mass of building above. Of these there are nine which cover the roof; two

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two of them are less by half in breadth than the rest; the one at the east end, and the other at the west. The length of the chamber on the south side, most accurately taken at the joint or line where the first and second row of stones meet, is 34.38 English feet; the breadth on the west side, at the joint where the first and second row of stones meet, is 1.719 feet; and the height 19½ feet.

Within this room stands the monument of *Cheops*, or *Chenosis*, of one piece of marble, hollow within, and founding like a bell. It is of the same kind of stone with which the whole room is lined; being a speckled marble with white, black, and red spots. The figure of the tomb is like an altar, or two cubes finely set together; it is cut smooth and plain, without any sculpture or engraving. The outward superficies is in length seven feet three inches and a half, and in depth three feet three inches and three quarters. The hollow inside is in length, on the west side, 6.488 feet; in breadth, at the north end, 2.218 feet; and in depth, 2.860 feet. As this monument could not have been brought hither through the above-mentioned narrow passages, it is supposed to have been raised and placed there before the roof of the chamber was closed. It stands exactly in the meridian, or due north and south, and equidistant from all the sides of the chamber, except the east, from whence it is twice as far removed as from the rest. Under it there is a little hollow space dug away, and a large stone in the pavement removed at the angle next adjoining to it: which hath probably been done in hopes of finding some treasure hidden there; it being a superstitious prodigality practised by the ancients, and continued to this day in the East Indies, to conceal money in their sepulchres. In the south and north sides of the chamber there are two inlets opposite to one another, seven tenths of a foot broad, four tenths of a foot deep, evenly cut, and running in a straight line six feet and further into the thickness of the wall: that on the south side is larger and somewhat round, not so long as the former, and by the thickness within seems to have been made use of for setting of lamps upon it. This is all that is to be seen within this first pyramid. The only thing more to be observed is a surprising echo, which Plutarch takes notice of, and says, that it answers four or five times; but a late traveller (Lucas) assures us that it answers ten or twelve times very distinctly.

The second pyramid stands at a small distance southward from the former. Mr Greaves assures us, that it is of the same dimensions. It has no passage into it; and is built of white stones, not near so large as the first. The sides rise not with steps like the first, but are smooth and equal; the whole fabric, except where it is opposed to the south, being very entire, and free from any deformed breaches. The third pyramid is much less than the two foregoing ones, measuring only 300 feet on each side. It is built of a clear and white stone, somewhat brighter than that of which the second is built. Besides these, there is also a fourth; which, had it been finished, would not have fallen short of the grandeur of the first. It has 148 steps like the first. The platform is not even, the stones being set together without order, which shews that it has not been finished; and yet it is much more ancient than any of the rest, as is evident by the stones,

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which are all worn out and crumbled into sand. It has a passage into it which leads into some halls and galleries like those of the first.

Besides these, there are many other monuments of the grandeur of the ancient Egyptian monarchs; some of which are mentioned under the article ARCHITECTURE, n° 4. and others under those of THEBES, MÆRIS, SYENE, &c.

With regard to the inhabitants of Egypt, it hath already been observed, that they are much less numerous than formerly; owing, no doubt, to the rigour of the Turkish government. The descendants of the original Egyptians are an ill-looking slovenly people, immersed in indolence, and are distinguished by the name of *Coptis*; in their complexions they are rather sun-burnt than swarthy or black. Their ancestors were once Christians, and in general they still pretend to be of that religion; but Mahometanism is the prevailing worship of Egypt. Those who inhabit the villages and fields, at any considerable distance from the Nile, consist of Arabs or their descendants, who are of a deep swarthy complexion; and they are represented by the best travellers, as still retaining the patriarchal method of tending their flocks, and many of them without any fixed place of abode. The Turks, who reside in Egypt, retain all their Ottoman pride and insolence, and the Turkish habit, to distinguish themselves from the Arabs and Copts, who dress very plain, their chief finery being an upper garment of white linen, and linen drawers; but their ordinary dress is of blue linen, with a long cloth coat, either over or under it. The Christians and Arabs of the meaner kind content themselves with a linen or woollen wrapper, which they fold, blanket-like, round their body. The Jews wear blue leather slippers, the other natives of the country wear red, and the foreign Christians yellow. The dress of the women is tawdry and unbecoming; but their cloaths are silk when they can afford it; and such of them as are not exposed to the sun, have delicate complexions and features. The Copts in general are excellent accountants, and many of them live by teaching the other natives to read and write. All Egypt is over-run with jugglers, fortune-tellers, mountebanks, and travelling sleight-of-hand men.

To what we have already said concerning the religion of Egypt, it is proper to add, that the bulk of the Mahometans are enthusiasts, and have among them their santos or fellows who pretend to a superior degree of holiness, and without any ceremony intrude into the best houses, where it would be dangerous to turn them out. The Egyptian Turks mind religious affairs very little; and it would be hard to say what species of Christianity is professed by the Christian Copts, which are here numerous; but they profess themselves to be of the Greek church, and enemies to that of Rome. In religious, and indeed in many civil matters, they are under the jurisdiction of the patriarch of Alexandria, who by dint of money generally purchases a protection at the Ottoman court.

The Coptic is the most ancient language of Egypt. This was succeeded by the Greek, about the time of Alexander the Great; and that by the Arabic, upon the commencement of the khalifate, when the Arabs dispossessed the Greeks of Egypt. The Arabic, or Arabesque, as it is called, is still the current language

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guage, but the Coptic and modern Greek continue to be spoken.

Though it is past dispute, that the Greeks derived all their knowledge from the ancient Egyptians, yet scarce a vestige of it remains among their descendants. This is owing to the bigotry and ignorance of their Mahometan masters; but here it is proper to make one observation which is of general use. The khalifs or Saracens who subdued Egypt, were of three kinds. The first, who were the immediate successors of Mahomet, made war, from conscience and principle, upon all kinds of literature, excepting the Alcoran; and hence it was, that, when they took possession of Alexandria, which contained the most magnificent library the world ever beheld, its valuable manuscripts were applied for some months in cooking their victuals, and warming their magnificent baths. The same fate attended upon the other Egyptian libraries. The khalifs of the second race were men of taste and learning, but of a peculiar strain. They bought up all the manuscripts that survived the general conflagration, relating to astronomy, medicine, and some useless parts of philosophy: but they had no taste for the Greek arts of architecture, sculpture, painting, or poetry; and learning was confined to their own courts and colleges, without ever finding its way back to Egypt. The lower race of khalifs, especially those who called themselves *Mamelucks*, disgraced human nature; and the Turks have rivetted the chains of barbarous ignorance which they imposed. All the learning, therefore, possessed by the modern Egyptians, consists in arithmetical calculations for the dispatch of business, the jargon of astrology, a few nostrums in medicine, and some knowledge of Arabesque and the Mahometan religion.

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Manufactures.

Modern geographers mention little of Egyptian manufactures at this time: but captain Norden, who travelled to that country, at the expense of his present Danish majesty's grandfather, about the year 1737, has been pretty explicit on the subject of commerce; and from him we learn that the Egyptians export prodigious quantities of unmanufactured as well as prepared flax, thread, cotton, and leather of all sorts, callicoos, yellow wax, sal armoniac, saffron, sugar, fenna, cassia. They trade with the Arabs for coffee, drugs, spices, callicoos, and other merchandizes, which are landed at Suez, from whence they send them to Europe. Several European states have consuls resident in Egypt. But the customs of the Turkish government are managed by Jews. A number of English vessels arrive yearly at Alexandria, some of which are laden on account of the owners, but most of them are hired and employed as carriers to the Jews, Armenians, and Mahometan traders. Captain Norden seems to think, that the English consul and merchants make no great figure in Alexandria, but that they are in much less danger and less troubled than the French.

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Constitution, &c.

The constitution and government of this country seem to be but little known to modern times. It is certain that Egypt is subject to the Turks, and that even the meanest Janizary is respected by the natives. A viceroy is sent to Egypt, under the title of *pasha* or *bashaw* of Cairo, and is one of the greatest officers of the Ottoman empire; but as the interior parts of Egypt are almost inaccessible to strangers, we know little of their government and laws. It is generally agreed,

that the pacha is very careful how he provokes the little princes, or rather heads of clans, who have parcelled out Egypt among themselves, and whom he governs chiefly by playing one against another. He has however a large regular army, and a militia, which serve as nurseries from whence the Ottoman troops are recruited. The keeping up this army employs his chief attention. It has sometimes happened that those pashas have employed their arms against their masters; they are sometimes displaced by the Porte, upon complaints from those petty princes. Captain Norden and Dr Pocock have given us the best, and indeed a very unfavourable, account of those princes, who are called the *Schechs* of the Bedouins, or wandering Arabs, who are sometimes too powerful to receive laws from the Turkish government. A certain number of beys, or beys, are appointed over the provinces of Egypt, under the pasha. Though these beys are designed to be clerks upon him, yet they often assume independent powers.

The revenues are very inconsiderable, when compared to the natural riches of the country and the despotism of its government. Some say that they amount to 1,000,000 Sterling, but that two-thirds of the whole is spent in the country.

EGYPTIANS, or GYPSIES. See GYPSIES.

EJACULATOR, in anatomy, a name applied to two muscles of the penis from their office in the ejection of the seed. See ANATOMY, *Table of the Muscles*.

EICK. See BRUGES.

EIDER-DUCK. See ANAS.

EJECTA, a term used by lawyers for a woman deflowered, or cast from the virtuous.

EJECTION, in the animal economy, evacuation, or the discharging any thing through some of the excretories, as by stool, vomit, &c.

EJECTION, in Scots law, is the turning out the possessor of any heritable subject by force; and is either *legal* or *illegal*. Legal ejection is where a person having no title to possess, is turned out by the authority of law. Illegal ejection, is one person's violently turning another out of possession without lawful authority.

EJECTMENT, in English law, a writ, or action, which lies for the lessee for years, on his being ejected, or put out of his land, before the expiration of his term, either by the lessor, or a stranger. It may also be brought by the lessor against the lessee, for rent in arrears, or holding over his term, &c. Ejectment of late years is become an action in the place of many real actions, as writs of right, formedons, &c. which are very difficult, as well as tedious and expensive; and this is now the common action for trial of titles, and recovering of lands, &c. illegally held from the right owner: yet where entry is taken away by disseints, fines, recoveries, disseins, &c. an ejectment shall not be brought; whereby we find, that all titles cannot be tried by this action.

The method of proceeding in the action of ejectment is to draw up a declaration, and feign therein a lease for three, five, or seven years, to him that would try the title; and also feign a casual ejector, or defendant; and then deliver the declaration to the ejector, who serves a copy of it on the tenant in possession, and gives notice, at the bottom, for him to appear and defend his title; or that he the feigned defendant will suffer judgment by default, whereby the true tenant will be turned

turned out of possession : to this declaration the tenant is to appear at the beginning of next term by his attorney, and consent to a rule to be made defendant, instead of the casual ejector, and take upon him the defence, in which he must confess lease, judgment, entry, and ouster, and at the trial stand upon the title only : but in case the tenant in possession does not appear, and enter into the said rule in time, after the declaration served, then, on affidavit being made of the service of the declaration, with the notice to appear as aforesaid, the court will order judgment to be entered against the casual ejector by default; and thereupon the tenant in possession, by writ *habere facias possessionem*, is turned out of his possession. On the trial in ejectment, the plaintiff's title is to be set forth from the person last seized in fee of the lands in question, under whom the lessor claims down to the plaintiff, proving the deeds, &c. and the plaintiff shall recover only according to the right which he has at the time of bringing his action. And here, another who hath title to the land, upon a motion made for that purpose, may be defendant in the action with the tenant in possession, to defend his title; for the possession of the lands is primarily in question, and to be recovered, which concerns the tenant, and the title thereto is tried collaterally, which may concern some other.

ELÆAGNUS, OLEASTER, or Wild Olive; a genus of the monogynia order, belonging to the tetrandria class of plants. There are three species: 1. The spinosa, or eastern broad-leaved olive with a large fruit, is a native of the Levant and some parts of Germany. The leaves are about two inches long, and one and a half broad in the middle. They are placed alternate, and of a silver colour: at the footstalk of every leaf there comes out a pretty long sharp thorn, which are alternately longer: the flowers are small, the inside of the empalement is yellow, and they have a strong scent when fully open. 2. The inermis, without thorns, is that kind commonly preserved in the gardens of this country. The leaves are more than three inches long, and half an inch broad, and have a shining appearance like satin. The flowers come out at the footstalks of the leaves, sometimes singly, at other times two, and sometimes three, at the same place. The outside of the empalement is silvery and fluted; the inside of a pale yellow, and having a very strong scent. The flowers appear in July, and are sometimes succeeded by fruit. 3. The latifolia with oval leaves, is a native of Ceylon and some other parts of India. In this country it rises with a woody stem to the height of eight or nine feet, dividing into many crooked branches, garnished with oval and silvery leaves, which have several irregular spots of a dark colour on the surface. They are placed alternately on the branches, and continue all the year.

Culture, &c. The two first may be propagated by laying under the young shoots in autumn. They will take root in one year; when they may be cut off from the old trees, and either transplanted into a nursery for two or three years to be trained up, or into places where they are to remain. The proper time for this is in the beginning of March or early in the autumn. They should be placed where they may be screened from high winds; for they grow very freely, and are apt to be split by the wind if they are too much ex-

posed. The third sort is too tender to endure the open air of this country; and therefore must be kept in a warm stove, except during a short time in the warmest part of summer.

From the flowers of these plants an aromatic and cordial water has been drawn, which is said to have been successfully used in putrid and pestilential fevers. The genus *elæagnus* is not to be confounded with the oleaster or wild olive of Gerard, Parkinson, and Ray. The last is only a particular species of olive, called by Tournefort and Caspar Bauhine, *olea sylvestris* *.

Elaeothium
||
Elasticity.

* See *Olea*.

ELÆOTHESIUM, in antiquity, the anointing room, or place where those who were to wrestle, or had bathed, anointed themselves. See **Gymnasium**.

ELAPHEBOLIUM, in Grecian antiquity, the ninth month of the Athenian year, answering to the latter part of February and beginning of March. It consisted of 30 days; and took its name from the festival elaphebolia, kept in this month, in honour of Diana the huntress; on which occasion, a cake made in the form of a deer, was offered to her.

ELASMIS, in natural history, a genus of talcs, composed of small plates in form of spangles; and either single, and not farther fissile; or, if complex, only fissile to a certain degree, and that in somewhat thick laminae.—Of these talcs there are several varieties, some with large and others with small spangles, which differ also in colour and other peculiarities.

ELASTIC, in natural philosophy, an appellation given to all bodies endowed with the property of elasticity. See **ELASTICITY**.

ELASTIC Fluids. See **AIR**, **ELECTRICITY**, **GAS**, and **VAPOUR**.

ELASTICITY, or **ELASTIC Force**, that property of bodies wherewith they restore themselves to their former figure, after any external pressure.

The cause or principle of this important property elasticity, or springiness, is variously assigned. The Cartesians account for it from the materia subtilis making an effort to pass through pores that are too narrow for it. Thus, say they, in bending, or compressing, a hard elastic body, *e. gr.* a bow, its parts recede from each other on the convex side, and approach on the concave: consequently the pores are contracted or straitened on the concave side; and if they were before round, are now, for instance, oval: so that the materia subtilis, or matter of the second element, endeavouring to pass out of those pores thus straitened, must make an effort, at the same time, to restore the body to the state it was in when the pores were more patent and round, *i. e.* before the bow was bent: and in this consists its elasticity.

Other later and more wary philosophers account for elasticity much after the same manner as the Cartesians; with this only difference, that in lieu of the subtle matter of the Cartesians, these substitute **ETHER**, or a fine ethereal medium that pervades all bodies.

Others, setting aside the precarious notion of a materia subtilis, account for elasticity from the great law of nature **ATTRACTION**, or the cause of the **COHESION** of the parts of solid and firm bodies. Thus, say they, when a hard body is struck or bent, so that the component parts are moved a little from each other, but not quite disjoined or broke off, or separated so far as to

Elasticity. be out of the power of that attracting force whereby they cohere; they must certainly, on the cessation of the external violence, spring back to their former natural state.

Others resolve elasticity into the pressure of the atmosphere: for a violent tension, or compression, tho' not so great as to separate the constituent particles of bodies far enough to let in any foreign matter, must yet occasion many little vacuola between the separated surfaces; so that upon the removal of the force they will close again, by the pressure of the aerial fluid upon the external parts. See *ATMOSPHERE*.

Lastly, others attribute the elasticity of all hard bodies to the power of resiliency in the air included within them; and so make the elastic force of the air, the principle of elasticity in all other bodies.

The *ELASTICITY of Fluids* is accounted for from their particles being all endowed with a centrifugal force; when Sir Isaac Newton, prop. 23. lib. 2. demonstrates, that particles, which mutually avoid or fly off from one another by such forces as are reciprocally proportioned to the distances of their centre, will compose an elastic fluid, whose density shall be proportional to its compression; and *vice versa*, if any fluid be composed of particles that fly off and avoid one another, and hath its density proportional to its compression, then the centrifugal forces of those particles will be reciprocally as the distances of their centres.

ELASTICITY of the Air, is the force wherewith that element dilates itself, upon removing the force whereby it was before compressed.*

The elasticity or spring of the air, was first discovered by Galileo. Its existence is proved by this experiment of that philosopher: An extraordinary quantity of air, being intruded by means of a syringe into a glass or metal ball, till such time as the ball, with this accession of air, weigh considerably more in the balance than it did before; upon opening the mouth thereof, the air rushes out, till the ball sink to its former weight. From hence we argue, that there is just as much air gone out, as compressed air had been crowded in. Air, therefore, returns to its former degree of expansion, upon removing the force that compressed or resisted its expansion; consequently it is endowed with an elastic force. It must be added, that as the air is found to rush out in every situation or direction of the orifice, the elastic force acts every way, or in every direction.

The elasticity of the air makes a considerable article in *PNEUMATICS*.

The cause of the elasticity of the atmosphere hath been commonly ascribed to a repulsion between its particles; but this can give us only a very slight idea of the nature of its elasticity. The term *repulsion*, like that of *attraction*, requires to be defined, and in all probability will be found in most cases to be the effect of the action of some other fluid. Thus, we find, that the elasticity of the atmosphere is very considerably affected by heat. Thus, supposing a quantity of air heated to such a degree as is sufficient to raise Fahrenheit's thermometer to 212, it will then occupy a considerable space. If it is cooled to such a degree as to sink the thermometer to 0, it will shrink up into less than half the former bulk. The quantity of repulsive

power therefore acquired by the air, while passing from one of these states to the other, is evidently owing to the heat added to or taken away from it. Nor have we any reason to suppose, that the quantity of elasticity or repulsive power it still possesses is owing to any other thing than the fire contained in it. The supposing repulsion to be a primary cause independent of all others, hath given rise to many erroneous theories, and been one very great mean of embarrassing philosophers in their accounting for the phenomena of *ELECTRICITY*.

ELATER, in zoology, a genus of insects, belonging to the order of coleoptera. The feelers are setaceous. There are 38 species, distinguished by their colour, &c.

ELATERIUM. See *PHARMACY*, n° 602.

ELBE, a large river in Germany, which, rising on the confines of Silesia, runs through Bohemia, Saxony, and Brandenburg; and afterwards dividing the duchy of Lunenburg from that of Mecklenburg, as also the duchy of Bremen from Holstein, it falls into the German ocean, about 70 miles below Hamburg. It is navigable for great ships higher than any river in Europe.

ELCESAITES, in church-history, ancient heretics, who made their appearance in the reign of the emperor Trajan, and took their name from their leader Elecebi. The elecsaites kept a mean between the Jews, Christians, and Pagans; they worshipped but one God, observed the Jewish sabbath, circumcision, and the other ceremonies of the law. They rejected the Pentateuch, and the prophets; nor had they any more respect for the writings of the apostles, particularly those of St Paul.

ELDERS, or *SENIORS*, in Jewish history, were persons the most considerable for age, experience, and wisdom. Of this sort were the 70 men whom Moses associated to himself in the government of his people; such, likewise, afterwards were those who held the first rank in the synagogue, as presidents.

In the first assemblies of the primitive Christians, those who held the first place were called *elders*. The word *presbyter*, often used in the New Testament, is of the same signification: hence the first councils of Christians were called *presbyteria*, or *councils of elders*.

ELDER is also a denomination preferred in the presbyterian discipline. See *PRESBYTERIAN*.

ELDER, or *Alder*, in botany. See *ALNUS*.

ELECAMPANE, in botany. See *INULA*.

ELECT, among ecclesiastical writers, those whom God has chosen, or predestinated to be saved. See *PREDESTINATION*.

ELECTION, the choice that is made of a person, or thing, in preference of any other.

ELECTION, in theology, signifies the choice which God makes of angels and men for the objects of his grace and mercy. See *GRACE*, and *PREDESTINATION*.

ELECTION, in British polity, is the people's choice of their representatives in parliament. (See *PARLIAMENT*.) In this consists the exercise of the democratical part of our constitution: for in a democracy there can be no exercise of sovereignty but by suffrage, which is the declaration of the people's will. In all democracies, therefore, it is of the utmost importance to regulate by whom, and in what manner, the suffra-

Elater
Election.

* See *Air*,
and *Atmosphere*.

Black.
Comment.

ges are to be given. And the Athenians were so justly jealous of this prerogative, that a stranger, who interfered in the assemblies of the people, was punished by their laws with death; because such a man was esteemed guilty of high treason, by usurping those rights of sovereignty to which he had no title. In Britain, where the people do not debate in a collective body, but by representation, the exercise of this sovereignty consists in the choice of representatives. The laws have therefore very strictly guarded against usurpation or abuse of this power, by many salutary provisions; which may be reduced to these three points, 1. The qualifications of the electors. 2. The qualifications of the elected. 3. The proceedings at elections.

(1.) As to the qualifications of the electors. The true reason of requiring any qualification, with regard to property, in voters, is to exclude such persons as are in so mean a situation, that they are esteemed to have no will of their own. If these persons had votes, they would be tempted to dispose of them under some undue influence or other. This would give a great, an artful, or a wealthy man, a larger share in elections than is consistent with general liberty. If it were probable that every man would give his vote freely, and without influence of any kind; then, upon the true theory and genuine principles of liberty, every member of the community, however poor, should have a vote in electing those delegates, to whose charge is committed the disposal of his property, his liberty, and his life. But, since that can hardly be expected in persons of indigent fortunes, or such as are under the immediate dominion of others, all popular states have been obliged to establish certain qualifications; whereby some, who are suspected to have no will of their own, are excluded from voting, in order to set other individuals, whose wills may be supposed independent, more thoroughly upon a level with each other.

And this constitution of suffrages is framed upon a wiser principle, with us, than either of the methods of voting, by centuries or by tribes, among the Romans. In the method by centuries, instituted by Servius Tullius, it was principally property, and not numbers, that turned the scale: in the method by tribes, gradually introduced by the tribunes of the people, numbers only were regarded, and property entirely overlooked. Hence the laws passed by the former method had usually too great a tendency to aggrandize the patricians or rich nobles; and those by the latter had too much of a levelling principle. Our constitution steers between the two extremes. Only such are entirely excluded, as can have no will of their own: there is hardly a free agent to be found, but what is entitled to a vote in some place or other in the kingdom. Nor is comparative wealth, or property, entirely disregarded in elections; for though the richest man has only one vote at one place, yet, if his property be at all diffused, he has probably a right to vote at more places than one, and therefore has many representatives. This is the spirit of our constitution: not that we assert it is in fact quite so perfect as we have here endeavoured to describe it; for, if any alteration might be wished or suggested in the present frame of parliaments, it should be in favour of a more complete representation of the

people.

But to return to the qualifications; and first those of electors for knights of the shire. 1. By statute 8 Hen. VI. c. 7. and 10 Hen. VI. c. 2. (amended by 14 Geo. III. c. 58.) the knights of the shire shall be chosen of people, whereof every man shall have freehold to the value of forty shillings by the year within the county; which (by subsequent statutes) is to be clear of all charges and deductions, except parliamentary and parochial taxes. The knights of shires are the representatives of the landholders, or landed interest of the kingdom: their electors must therefore have estates in lands or tenements, within the county represented. These estates must be freehold, that is, for term of life at least; because beneficial leases for long terms of years were not in use at the making of these statutes, and copyholders were then little better than villeins, absolutely dependent upon their lords. This freehold must be of 40 shillings annual value; because that sum would then, with proper industry, furnish all the necessities of life, and render the freeholder, if he pleased, an independent man: For bishop Fleetwood, in his *chronicon preciosum*, written at the beginning of the present century, has fully proved 40 shillings in the reign of Henry VI. to have been equal to 12 pounds *per annum* in the reign of queen Anne; and, as the value of money is very considerably lowered since the bishop wrote, we may fairly conclude, from this and other circumstances, that what was equivalent to 12 pounds in his days, is equivalent to 20 at present. The other less important qualifications of the electors for counties in England and Wales may be collected from the statutes cited below (A); which direct, 2. That no person under 21 years of age shall be capable of voting for any member. This extends to all sorts of members as well for boroughs as counties; as does also the next, *viz.* 3. That no person convicted of perjury, or subornation of perjury, shall be capable of voting in any election. 4. That no person shall vote in right of any freehold, granted to him fraudulently to qualify him to vote. Fraudulent grants are such as contain an agreement to reconvey, or to defeat, the estate granted; which agreements are made void, and the estate is absolutely vested in the person to whom it is so granted. And, to guard the better against such frauds, it is farther provided, 5. That every voter shall have been in the actual possession, or receipt of the profits, of his freehold to his own use for 12 calendar months before; except it came to him by descent, marriage, marriage-settlement, will, or promotion to a benefice or office. 6. That no person shall vote in respect of an annuity or rent-charge, unless registered with the clerk of the peace 12 calendar months before. 7. That in mortgaged or trust estates, the person in possession, under the above-mentioned restrictions, shall have the vote. 7. That only one person shall be admitted to vote for any one house or tenement, to prevent the splitting of freeholds. 9. That no estate shall qualify a voter, unless the estate has been assessed to some land-tax aid, at least 12 months before the election. 10. That no tenant by copy of court-roll shall be permitted to vote as a freeholder. Thus much for the electors in counties.

15 K 2

As

(A) 7 and 8 Will. III. c. 25. 10 Ann. c. 23. 2 Geo. II. c. 21. 18 Geo. II. c. 18. 31 Geo. II. c. 14. 3 Geo. III. c. 24.

are supposed to be the mercantile part or trading interest of this kingdom. But as trade is of a fluctuating nature, and seldom long fixed in a place, it was formerly left to the crown to summon, *pro re nata*, the most flourishing towns to send representatives to parliament. So that as towns increased in trade, and grew populous, they were admitted to a share in the legislature. But the misfortune is, that the deserted boroughs continued to be summoned, as well as those to whom their trade and inhabitants were transferred; except a few which petitioned to be eased of the expence, then usual, of maintaining their members: four shillings a-day being allowed for a knight of the shire, and two shillings for a citizen or burgess; which was the rate of wages established in the reign of Edward III. Hence the members for boroughs now bear above a quadruple proportion to those for counties; and the number of parliament men is increased since Fortescue's time, in the reign of Henry VI. from 300 to upwards of 500, exclusive of those for Scotland. The universities were, in general, not empowered to send burgesses to parliament; though once, in 28 Edw. I. when a parliament was summoned to consider of the king's right to Scotland, there were issued writs, which required the university of Oxford to send up four or five, and that of Cambridge two or three, of their most discreet and learned lawyers for that purpose. But it was king James the first, who indulged them with the permanent privilege to send constantly two of their own body; to serve for those students who, though useful members of the community, were neither concerned in the landed nor the trading interest; and to protect in the legislature the rights of the republic of letters. The right of election in boroughs is various, depending entirely on the several charters, customs, and constitutions of the respective places; which has occasioned infinite disputes: tho' now, by statute 2 Geo. II. c. 24. the right of voting for the future, shall be allowed according to the last determination of the house of commons concerning it; and, by statute 3 Geo. III. c. 15. no freeman of any city or borough (other than such as claim by birth, marriage, or servitude) shall be entitled to vote therein, unless he hath been admitted to his freedom 12 calendar months before.

(2.) Next, as to the qualifications of persons to be elected members of the house of commons. Some of these depend upon the law and custom of parliaments, declared by the house of commons; others upon certain statutes. And from these it appears, 1. That they must not be aliens born, or minors. 2. That they must not be any of the 12 judges, because they sit in the lords' house; nor of the clergy, for they sit in the convocation; nor persons attainted of treason or felony, for they are unfit to sit any where. 3. That sheriffs of counties, and mayors and bailiffs of boroughs, are not eligible in their respective jurisdictions, as being returning officers; but that sheriffs of one county are eligible to be knights of another. 4. That, in strictness, all members ought to have been inhabitants of the places for which they are chosen: but this,

having been long disregarded, was at length entirely repealed by statute 14 Geo. III. c. 58. 5. That no persons concerned in the management of any duties or taxes created since 1692, except the commissioners of the treasury, nor any of the officers following, (*viz.* commissioners of prizes, transports, sick and wounded, wine-licences, navy, and victualling; secretaries or receivers of prizes; comptrollers of the army-accounts; agents for regiments; governors of plantations, and their deputies; officers of Minorca or Gibraltar; officers of the excise and customs; clerks or deputies in the several offices of the treasury, exchequer, navy, victualling, admiralty, pay of the army or navy, secretaries of state, salt, stamps, appeals, wine-licences, hackney-coaches, hawkers, and pedlars) nor any persons that hold any new office under the crown created since 1705, are capable of being elected, or sitting as members. 6. That no person having a pension under the crown during pleasure, or for any terms of years, is capable of being elected or sitting. 7. That if any member accepts an office under the crown, except an officer in the army or navy accepting a new commission, his seat is void; but such member is capable of being re-elected. 8. That all knights of the shire shall be actual knights, or such notable esquires and gentlemen as have estates sufficient to be knights, and by no means of the degree of yeomen. This is reduced to a still greater certainty, by ordaining, 9. That every knight of a shire shall have a clear estate of freehold or copyhold to the value of 600*l.* *per annum*, and every citizen and burgess to the value of 300*l.*: except the eldest sons of peers and of persons qualified to be knights of shires, and except the members for the two universities: which somewhat balances the ascendancy which the boroughs have gained over the counties, by obliging the trading interest to make choice of landed men: and of this qualification the member must make oath, and give in the particulars in writing, at the time of his taking his seat. But, subject to these standing restrictions and disqualifications, every subject of the realm is eligible of common right: though there are instances, wherein persons in particular circumstances have forfeited that common right, and have been declared ineligible *for that parliament*, by a vote of the house of commons; or *for ever*, by an act of the legislature. But it was an unconstitutional prohibition, which was grounded on an ordinance of the house of lords, and inserted in the king's writs, for the parliament holden at Coventry, 6 Hen. IV. that no apprentice or other man of the law should be elected a knight of the shire therein: in return for which, our law-books and historians have branded this parliament with the name of *parliamentum indoctum*, or the lack-learning parliament; and Sir Edward Coke observes with some spleen, that there was never a good law made thereat.

(3.) The third point, regarding elections, is the method of proceeding therein. This is also regulated by the law of parliament, and the several statutes referred to in the margin below, (B); all which we shall blend together, and extract out of them a summary account of the method of proceeding to elections.

As

(B) 7 Hen. IV. c. 15. 8 Hen. VI. c. 7. 23 Hen. VI. c. 14. 1 W. & M. ft. 1. c. 2. 2 W. & M. ft. 1. c. 7. 5 & 6 W. & M. c. 20. 7 W. III. c. 4. 7 & 8 W. III. c. 7. and c. 25. 10 & 11 W. III. c. 7. 12 & 13 W. III. c. 10. 6 Ann. c. 23. 9 Ann. c. 5. 10 Ann. c. 19. and c. 33. 2 Geo. II. c. 24. 8 Geo. II. c. 30. 18 Geo. II. c. 18. 19 Geo. II. c. 28. 10 Geo. III. c. 16. 11 Geo. III. c. 42. 14 Geo. III. c. 15.

Election.

Election.

As soon as the parliament is summoned, the lord chancellor (or if a vacancy happens during the sitting of parliament, the speaker, by order of the house, and without such order if a vacancy happens by death in the time of a recess for upwards of 20 days) sends his warrant to the clerk of the crown in chancery; who thereupon issues out writs to the sheriff of every county, for the election of all the members to serve for that county, and every city and borough therein. Within three days after the receipt of this writ, the sheriff is to send his precept, under his seal, to the proper returning officers of the cities and boroughs, commanding them to elect their members: and the said returning officers are to proceed to election within eight days from the receipt of the precept, giving four days notice of the same; and to return the persons chosen, together with the precept, to the sheriff.

But elections of knights of the shire must be proceeded to by the sheriffs themselves in person, at the next county-court that shall happen after the delivery of the writ. The county-court is a court held every month or oftener by the sheriff, intended to try little causes not exceeding the value of 40s. in what part of the county he pleases to appoint for that purpose: but for the election of knights of the shire, it must be held at the most usual place. If the county-court falls upon the day of delivering the writ, or within six days after, the sheriff may adjourn the court and election to some other convenient time, not longer than 16 days, nor shorter than 10; but he cannot alter the place, without the consent of all the candidates: and, in all such cases, 10 days public notice must be given of the time and place of the election.

And, as it is essential to the very being of parliament that elections should be absolutely free, therefore all undue influences upon the electors are illegal, and strongly prohibited. For Mr Locke ranks it among those breaches of trust in the executive magistrate, which, according to his notions, amount to a dissolution of the government, "if he employs the force, "treasure, and offices of the society to corrupt the representatives, or openly to pre-engage the electors, "and prescribe what manner of persons shall be chosen: For thus to regulate candidates and electors, "and new-model the ways of election, what is it, (says he,) but to cut up the government by the roots, and "poison the very fountain of public security?" As soon, therefore, as the time and place of election, either in counties or boroughs, are fixed, all soldiers quartered in the place are to remove, at least one day before the election, to the distance of two miles or more; and not to return till one day after the poll is ended. Riots likewise have been frequently determined to make an election void. By vote also of the house of commons, to whom alone belongs the power of determining contested elections, no lord of parliament, or lord lieutenant of a county, hath any right to interfere in the election of commons; and, by statute, the lord warden of the cinque ports shall not recommend any members there. If any officer of the excise, customs, stamps, or certain other branches of the revenue, presumes to intermeddle in elections, by persuading any voter or dissuading him, he forfeits 100l. and is disabled to hold any office.

Thus are the electors of one branch of the legislature

secured from any undue influence from either of the other two, and from all external violence and compulsion. But the greatest danger is that in which themselves co-operate, by the infamous practice of bribery and corruption. To prevent which, it is enacted, that no candidate shall, after the date (usually called the *te/le*) of the writs, or after the vacancy, give any money or entertainment to his electors, or promise to give any, either to particular persons, or to the place in general, in order to his being elected: on pain of being incapable to serve for that place in parliament. And if any money, gift, office, employment, or reward be given, or promised to be given, to any voter, at any time, in order to influence him to give or withhold his vote, as well he that takes as he that offers such bribe forfeits 500l. and is for ever disabled from voting and holding any office in any corporation; unless, before conviction, he will discover some other offender of the same kind, and then he is indemnified for his own offence. The first instance that occurs, of election bribery, was so early as 13 Eliz. when one Thomas Longe (being a simple man, and of small capacity to serve in parliament) acknowledged that he had given the returning officer and others of the borough for which he was chosen, four pounds to be returned member, and was for that premium elected. But for this offence the borough was amerced, the member was removed, and the officer fined and imprisoned. But, as this practice hath since taken much deeper and more universal root, it hath occasioned the making of these wholesome statutes; to complete the efficacy of which, there is nothing wanting but resolution and integrity to put them in strict execution.

Undue influence being thus guarded against, the election is to be proceeded to on the day appointed; the sheriff or other returning officer first taking an oath against bribery, and for the due execution of his office. The candidates likewise, if required, must swear to their qualification, and the electors in counties to theirs; and the electors both in counties and boroughs are also compellable to take the oath of abjuration, and that against bribery and corruption. And it might not be amiss, if the members elected were bound to take the latter oath, as well as the former; which, in all probability, would be much more effectual, than admitting it only to the electors.

The election being closed, the returning officer in boroughs returns his precept to the sheriff, with the persons elected by the majority; and the sheriff returns the whole, together with the writ for the county and the knights elected thereupon, to the clerk of the crown in chancery; before the day of meeting, if it be a new parliament, or within 14 days after the election, if it be an occasional vacancy; and this under penalty of 500l. If the sheriff does not return such knights only as are duly elected, he forfeits, by the old statutes of Henry VI. 100l.; and the returning officer in boroughs for a like false return, 40l.; and they are besides liable to an action, in which double damages shall be recovered, by the later statutes of king William: and any person bribing the returning officer shall also forfeit 300l. But the members returned by him are the sitting members, until the house of commons, upon petition, shall adjudge the return to be false and illegal. The form and manner of proceeding upon such petition

petition are now regulated by statute 10 Geo. III. c. 16. (amended by 11 Geo. III. c. 42. and made perpetual by 14 Geo. III. c. 15.) which directs the method of choosing by lot a select committee of 15 members, who are sworn well and truly to try the same, and a true judgment to give, according to the evidence.

ELECTION of *Scott Peers*. See LORDS.

ELECTOR, a person who has a right to elect or chuse another to an office, honour, &c. See ELECTION.

Elector is particularly, and by way of eminence, applied to those princes of Germany in whom lies the right of electing the emperor: being all sovereign princes, and the principal members of the empire.

The electoral college, consisting of all the electors of the empire, is the most illustrious and august body in Europe. Bellarmine and Baronius attribute the institution of it to pope Gregory V. and the emperor Otho III. in the tenth century; of which opinion are the generality of historians, and particularly the canonists: however, the number of electors was unsettled, at least, till the 13th century. In 1356 Charles IV. by the golden bull, fixed the number of electors to seven; three ecclesiastics, viz. the archbishops of Mentz, Treves, and Cologne; and four seculars, viz. the king of Bohemia, count Palatine of the Rhine, duke of Saxony, and marquis of Brandenburg. In 1648 this order was changed, the duke of Bavaria being put in the place of the count Palatine, who having accepted the crown of Bohemia was outlawed by the emperor; but being at length restored, an eighth electorate was created for the duke of Bavaria. In 1692, a ninth electorate was created, by the emperor Leopold, in favour of the duke of Hanover, of the house of Brunswic Lunenburg.

There is this difference between the secular and ecclesiastical electors, that the first have an active and passive voice, that is, may chuse and be chosen; the last, an active only. The three archbishops are to be 30 years old, before they can be advanced to the dig-

nity; the seculars, 18, before they can perform the office themselves. These last have each their vicars, who officiate in their absence.

Besides the power of choosing an emperor, the electors have also that of capitulating with and deposing him; so that, if there be one suffrage wanting, a protest may be entered against the proceedings. By the right of capitulation, they attribute to themselves great privileges, as making of war, coining, and taking care of the public interest and security of the states; and the emperor promises, upon oath, to receive the empire upon these conditions.

The electors have precedence of all other princes of the empire, even of cardinals and kings; and are addressed under the title of *electoral highness*.

Their several functions are as follow. The elector of Mentz is chancellor of Germany, convokes the states, and gives his vote before any of the rest. The elector of Cologne is grand chancellor of Italy, and consecrates the emperor. The elector of Treves is chancellor of the Gauls, and confers imposition of hands upon the emperor. The count Palatine of the Rhine is great treasurer of the empire, and presents the emperor with a globe at his coronation. The elector of Bavaria is great master of the imperial palace, and carries the golden apple. The marquis of Brandenburg is grand chamberlain, and puts the ring on the emperor's finger. The elector of Saxony is grand marshal, and gives the sword to the emperor. The king of Bohemia is grand butler, and puts Charlemagne's crown on the emperor's head. Lastly, the elector of Hanover, now king of Great Britain, is arch-treasurer, though first created under the title of *standard-bearer* of the empire.

ELECTORATE, a term used as well to signify the dignity of, as the territories belonging to, any of the electors of Germany; such are Bavaria, Saxony, &c. See ELECTOR.

ELECTRIC FLUID. See ELECTRICITY.

E L E C T R I C I T Y,

IN general, signifies the operations of a very subtle fluid, in most cases invisible, but which sometimes becomes the object of our sight and other senses, discovering itself to be one of the chief agents employed in producing the phenomena of nature.

SECT. I. History of Electricity.

THO' it is certain that, ever since the creation of the world, the fluid we speak of hath had the same share in all the natural operations that it hath just now; yet the discovery of its action, and even of its existence, is, comparatively speaking, of a very late date. Thales the Milesian, who lived about 600 years before Christ, was the first that observed the electrical properties of amber. Of these indeed, he knew no more than that this substance would attract light bodies when it was rubbed. For 300 years after his time, we hear nothing farther concerning this subject. Theophrastus then tells us, that the *hyrcurium* (the same substance now called the *tourmalin*), has the property of attracting light bodies, as well as amber. From this time,

there is a chasm in the history of electricity for no less than 1900 years. Indeed, it is scarce to be supposed that during this long interval any person applied himself to the investigation of the subject; as, for the greatest part of it, science of every kind was almost totally extinguished. The electrical properties of *jets*, however, and, according to Mr Bose, of the *agate*, were some way or other discovered during the abovementioned period. But it was not till the beginning of the 17th century, that the subject of electricity became properly a distinct science, and the foundation was laid of those discoveries which have since taken place.

The first who can properly be called an *electrician*, was Dr William Gilbert, who, in the year 1600, of Doctor Gilbert. wrote a book de *Magnete*, which contains a variety of electrical experiments. All these, however, considered only the attractive property of certain substances, which, from their agreement in this respect with amber (in Latin *electrum*, were called *electric*. Dr Gilbert's merit consists in his having been at great pains to find out a number of such substances, and thus considerably enlarging the number of electrics.

Electricity
when first
mentioned.

Till the year 1670, it doth not appear that any farther discoveries were made; except some trifling additions to the catalogue of electricities. About this time, Mr Boyle applied himself to the study of electricity. He enlarged the catalogue of electricities; and found that their electric properties were increased by wiping and warming them before they were rubbed. He observed also, that all kinds of bodies were attracted promiscuously; and imagined that they were attracted *in vacuo* as well as in air. This last position, however, is denied by Mr Beccaria; and we shall afterwards show that Mr Boyle must necessarily have been mistaken. He also observed the electric light, though only in the instance of some diamonds.

3
Discoveries
of Otto
Guericke
and Sir Isaac
Newton.

Otto Guericke, however, who was cotemporary with Mr Boyle, improved the science much farther. He made use of a sulphur globe, whirled on an axis much in the same way with our present glass globes. Thus he could excite a vastly greater power of electricity than any of his predecessors, and try all their experiments to much more advantage. He discovered electric repulsion; and not only saw the electric light more clearly than Mr Boyle, but heard the hissing sound with which it is emitted. He also made another remarkable discovery, but which has since been very generally overlooked; namely, that a feather, when repelled by an excited electric, always keeps the same face towards the body which repels it, as the moon does to the earth. See ASTRONOMY, n° 101.

The next discovery of any moment was made by Sir Isaac Newton; who observed, that the electric attraction and repulsion penetrated through glass; and it is much to be regretted that this accurate philosopher did not apply himself to the study of electricity with greater assiduity.

4
Remark-
able disco-
very by Mr
Hauksbee.

In 1709, a treatise was written on electricity by Mr Hauksbee; who not only far excelled all his predecessors and cotemporaries, but also made some discoveries which well deserve the attention of the most expert electricians at this day. Besides a variety of new experiments made upon electric attraction and repulsion, as well as the light emitted by electric bodies; he found a method of rendering opaque bodies transparent by means of electricity. He lined more than half the inside of a glass globe with sealing wax; and having exhausted the globe, he put it in motion; when applying his hand to excite it, he saw the shape and figure of all the parts of his hand distinctly and perfectly, on the concave superficies of the wax within, just as if only pure glass without any wax at all had been interposed between his eye and his hand. The lining of wax, where it was spread the thinnest, would but just allow the light of a candle through it in the dark; but in some places the wax was at least an eighth part of an inch thick. Yet, even in these places, the light and figure of his hand were as distinguishable through it as any where else. The sealing-wax did not adhere to the glass in all places; but this made no difference with regard to the transparency. Pitch answered the purpose equally well with sealing-wax.

Mr Hauksbee also made a farther improvement, by using a glass globe, which acts much more powerfully than a sulphur one. After his death, however, not only the use of glass globes, but even the study of electricity itself, seems to have been pretty generally laid

aside for some time. The reason of this was, that the recent discoveries of Sir Isaac Newton engrossed the attention of philosophers to such a degree, that they had no leisure for any thing else. After the death of that great man, however, the science of electricity began to revive; and, in 1729, a capital discovery was made by Mr Stephen Grey. This was the distinction between conductors and non-conductors of electricity. As the discovery was entirely accidental, and attended with several curious circumstances, we shall here give some account of it. In the month of February 1729, Mr Grey, after some fruitless attempts to excite an electric power in metals, recollected a suspicion he had for some time entertained, that as a glass tube, when excited in the dark, communicated its light to various bodies, it might at the same time possibly communicate to them an electricity; that is, a power of attracting light bodies; which, as yet, was all that was understood by the word *electricity*. For this purpose he provided himself with a glass tube, three feet five inches long, and near one inch and two-tenths in diameter. To each end was fitted a cork; to keep the dust out when the tube was not in use. His first experiments were made with a view to determine whether the tube would attract equally well with the ends shut, as with them open. In this respect there was no difference; but he found that the corks attracted and repelled light substances as well, and rather better than the tube itself. He then fixed an ivory ball upon a stalk of fir about four inches long; and thrusting the end of the stalk into one of the corks, he found the ball endowed with a strong attractive and repulsive virtue. This experiment he repeated in many different ways; fixing the ball upon long sticks, and upon pieces of brass and iron wire, always with the same success; but he constantly observed, that the ball at the end attracted more vigorously, than that part of the wire nearest the tube.

5
Difference
between e-
lectricities and
conductors
discovered
by Mr
Grey.

The inconvenience of using long wires in this manner, put Mr Grey upon trying whether the ball might be suspended by a pack-thread with a loop on the tube, with equal success; and the event fully answered his expectation. Having thus suspended bodies of the greatest length he conveniently could, to his tube, he ascended a balcony 26 feet high, and fastening a string to his tube, found that the ball would attract light bodies on the ground below. This experiment succeeded in the greatest heights to which he could ascend; after which, he attempted to carry the electricity horizontally. His first attempt miscarried, because he suspended his line, which was intended to carry the electricity horizontally, by a pack-thread; and thus the fluid got off from it: but though Mr Grey knew this was the case, he could not at that time think of any method to prevent it.

On the 30th of June 1729, Mr Grey paid a visit to Mr Wheeler, in order to give him a specimen of his experiments; but told him of the unsuccessful attempt he had made to carry the electric fluid horizontally. Mr Wheeler proposed to suspend the conducting line by *silk*, instead of *pack-thread*. For this advice he could give no reason, but that the silk thread was *smaller* than the other; however, with it they succeeded perfectly well. Their first experiment was in a matted gallery at Mr Wheeler's house, on the 2d of July 1729. About four feet from the end of the gallery they fastened

History.

History.

stened a line across the place. The middle of this line was silk, the rest pack-thread. Over the silken part they laid one end of the conducting line, to which was fastened the ivory ball, and which hung down about nine feet below the line stretched across the gallery. The conducting line was 80½ feet in length, and the other end of it was fastened by a loop to the electric tube. Upon rubbing the tube, the ivory ball attracted and repelled light substances as the tube itself would have done. They next contrived to return the line, so that the whole length of it amounted to 147 feet; which also answered pretty well. But, suspecting that the attraction would be stronger without doubling or returning the line, they made use of one carried straight forward for 124 feet; and, as they expected, found the attraction in this manner stronger than when the line had been doubled. Thus they proceeded with till their experiments; still adding more conducting line, at last their silk-string broke with the weight. This they endeavoured to supply, first with a small iron-wire, and then with a brass one. The result of these experiments, however, soon convinced them that the silk refused to conduct the electric fluid, not on account of its *smallness*, as they had supposed, but on account of some difference in the matter. The wires were smaller than the silk-thread, yet the electricity was effectually carried off by them. They had recourse, therefore, to thicker lines of silk; and, thus conveyed the electric matter to the distance of 765 feet; nor did they perceive the virtue to be at all diminished by the distance to which it was carried.

This discovery of the non-conducting power of silk, was quickly followed by a discovery of the same power in many other substances: and thus in fact, the foundation of almost all the subsequent improvements in electricity was laid; tho' in this science, as well as in most others, few discoveries have been made by reasoning, but many by accident. Mr Grey continued to study electricity as long as he lived; and has given a set of experiments, of which Dr Priestley says, "It is not easy to know what to make of them." He imagined that he had discovered in all electric substances a *perpetual attractive power*, which required no kind of excitation either by heating, rubbing, or any kind of attrition. He took 19 different substances, which were either rosin, gum-lac, shell-lac, bees-wax, sulphur, pitch, or two or three of these differently compounded. These he melted in a spherical iron ladle; except the sulphur, which was best done in a glass vessel. When these were taken out of the ladle, and their spherical surfaces hardened, he says they would not attract till the heat was abated, or till they came to a certain degree of warmth; that there was then a small attraction, which increased till the substance was cold, when it was very considerable. The manner in which he kept these substances in a state of attraction was, by wrapping them in any thing which would preserve them from the external air. At first, for the smaller bodies he used white paper, and for the larger ones white flannel; but afterwards, he found that black worsted stockings would do as well. When thus wrapped up, they were put into a large firm box, where they remained till he had occasion to use them. Thus prepared, they retained their attractive virtue for four months. These experiments are similar to some others lately made and

published as new discoveries.

Some other experiments were made by Mr Grey, with regard to the attraction of electric bodies *in vacuo*; and in this he determined with Mr Boyle against the opinion of Mr Beccaria abovementioned. But the most remarkable experiments mentioned by Mr Grey, are his imitations of the planetary motions. "I have lately made, (says he), several new experiments upon the projectile and pendulous motions of small bodies by electricity; by which small bodies may be made to move about large ones, either in circles or ellipses; and those either concentric or eccentric to the centre of the large body about which they move, so as to make many revolutions about them. And this motion will constantly be the same way that the planets move about the sun, *viz.* from the right hand to the left, or from west to east. But these little planets, if I may so call them, move much faster in their apogee than in the perigee parts of their orbits; which is directly contrary to the motion of the planets about the sun." The manner in which these experiments were made, as delivered by him on his death-bed to Dr Mortimer, was as follows: "Place a small iron globe, (said he), of an inch or an inch and an half in diameter, on the middle of a circular cake of rosin, seven or eight inches in diameter, gently excited; and then a light body suspended by a very fine thread, five or six inches long, held in the hand over the centre of the cake, will, of itself, begin to move in a circle round the iron globe, and constantly from west to east. If the globe is placed at any distance from the centre of the circular cake, it will describe an ellipse, which will have the same eccentricity as the distance of the globe from the centre of the cake. If the cake of rosin be of an elliptical form, and the iron globe be placed in the centre of it, the light body will describe an elliptical orbit of the same eccentricity with the form of the cake. If the globe be placed in or near one of the foci of the elliptical cake, the light body will move much swifter in the apogee than in the perigee of its orbit. If the iron globe is fixed on a pedestal an inch from the table, and a glass hoop, or a portion of a hollow glass cylinder excited, be placed round it, the light body will move as in the circumstances mentioned above, and with the same varieties." He said, moreover, that the light body would make the same revolutions, only smaller, round the iron globe placed on the bare table, without any electrical body to support it: but he acknowledged that he had not found the experiment succeed if the thread was supported by any thing but a human hand, though he imagined any other animal substance would have answered the purpose.

These experiments occasioned a great deal of speculation. Dr Mortimer was the only person who was able to repeat them with success, and he only when nobody but himself was present. It was therefore generally supposed that both he and Mr Grey had been deceived: but from some experiments to be related hereafter, it seems probable that the success of Mr Grey and Dr Mortimer was owing to their having performed their experiments with candle-light; and the failure of the others, to their having attempted them by day-light. Notwithstanding which, it is more than probable that Mr Grey has been deceived in a number of particulars; for no motion can be performed by an artificial excitation of the

6
He discovers a perpetual attractive power in electricities.

7
Imagines he can imitate the planetary motions.

History.
8
Vitrous
and refinous
electricity
discovered
by Mr Du
Fay.

the electric fluid, but what is attended with much irregularity.

Soon after Mr Grey's discovery of the difference between conductors and non-conductors of electricity, Mr Du Fay discovered the difference between positive and negative, or, as they were for some time called, the *vitreous* and *refinous* electricities. This discovery was quite accidental. It was made in consequence of his casually observing, that a piece of leaf-gold repelled by an excited glass tube, and which he meant to chafe about the room with a piece of excited gun copal, instead of being repelled by it as it was by the glass tube, it was eagerly attracted. The fame was the case with sealing-wax, sulphur, rosin, and a number of other substances. He discovered also, that it was impossible to excite a tube in which the air was condensed.

In the year 1742, the use of glass globes was again introduced by Mr Bosc, professor of philosophy at Wittenburgh; though some attribute this to Christian Augustus Hansen, professor of mathematics at Leipzig. He added also a prime conductor, which consisted of a tube of iron or tin. It was at first supported by a man standing upon cakes of rosin; but afterwards suspended by silk lines horizontally before the globe. A bundle of thread was put into the end next to the globe, which not only prevented any injury to the glass, but rendered the electricity stronger.

9
Electrical
shock discovered.

The most remarkable discovery that hath yet been made in the science of electricity, was in the end of the year 1745, and beginning of 1746. This was the method of giving the electric shock, or the accumulation of the power of electricity in a vial. This had its name of the *Leyden vial*, from Mr Cunæus, a native of Leyden, who exhibited it as he was repeating some experiments made by Messrs Muschenbroek and Allamand, professors in the university of that city. He was not, however, the inventor. The merit of this discovery (if any merit can arise from a discovery made by accident) belongs to Mr Van Kleit, dean of the cathedral at Camin. On the 4th of November 1745, he sent the following account of it to Dr Lieberkuhn at Berlin: "When a nail, or a piece of thick brass wire, &c. is put into a small apothecary's vial, and electrified, remarkable effects follow: but the vial must be very dry, or warm. I commonly rub it over before-hand with a finger, on which I put some powdered chalk. If a little mercury or a few drops of spirit of wine are put into it, the experiment succeeds the better. As soon as this phial and nail are removed from the electrifying glass, or the prime conductor to which it hath been exposed is taken away, it throws out a pencil of flame so long, that with this burning machine in my hand, I have taken above 60 steps in walking about my room. When it is electrified strongly, I can take it into another room, and there fire spirits of wine with it. If, while it is electrifying, I put my finger, or a piece of gold which I hold in my hand, to the nail, I receive a shock which stuns my arms and shoulders.

"A tin tube, or a man placed upon electrics, is electrified much stronger by this means than in the common way. When I present this vial and nail to a tin tube, which I have, 15 feet long, nothing but experience can make a person believe how strongly it is

electrified. Two thin glasses have been broken by the shock of it."

Soon after this, a method of giving the shock was discovered in Holland by Mr Cunæus, in the following manner. M. Muschenbroek and his friends, observing that electrified bodies exposed to the common atmosphere, which is always replete with conducting particles of various kinds, soon lost their electricity, and were capable of retaining but a small quantity of it; imagined, that, were the electrified bodies terminated on all sides by original electrics, they might be capable of receiving a stronger power, and retaining it for a longer time. Glass being the most convenient electric for this purpose, and water the most convenient non-electric, they first made these experiments with water in glass bottles: but no considerable discovery was made, till Mr Cunæus, happening to hold his glass vessel in one hand, and endeavouring to disengage it from the conductor with the other, (when he imagined the water had received as much electricity as the machine could give it), was surprised with a sudden shock in his arms and breast, which he had not in the least expected.

The discovery of such a terrible effect of the electric power, immediately raised the attention of all the philosophers in Europe. Many of them greatly exaggerated their accounts; either from a natural timidity, or their love of the marvellous. Mr Muschenbroek, who tried the experiment with a very thin glass bowl, told Mr Reamur in a letter wrote soon after the experiment, That he felt himself struck in his arms, shoulder, and breast, so that he lost his breath; and was two days before he recovered from the effects of the blow and the terror. He added, that he would not take a second shock for the whole kingdom of France. Mr Allamand, who made the experiment with a common beer-glass, said, that he lost his breath for some moments; and then felt such an intense pain all along his right arm, that he was apprehensive of bad consequences, but it soon after went off without any inconvenience, &c. Other philosophers, on the contrary, shewed their heroism and magnanimity, by receiving a number of electric shocks as strong as they could possibly make them. Mr Bosc abovementioned, wished that he might die by the electric shock, in order to furnish, by his death, an article for the memoirs of the academy of Sciences at Paris.

"But, (adds Dr Priestley, from whom this account is taken), it is not given to every electrician to die in so glorious a manner as the justly envied Richman."

From the time of this discovery, electricity became the general subject of conversation. A great number of people all over Europe, got their livelihood by going about and shewing the phenomena of it; and, at the same time, the passion for the marvellous strongly discovered itself in some effects of electricity, pretended to be found out in Italy and Germany. It was asserted by Signior Pivati at Venice, and after him by Verati at Bologna, Mr Bianchi at Turin, and Mr Winckler at Leipzig, that if odiferous substances were confined in glass vessels, and the vessels excited, the odours and other medicinal virtues would transpire through the the glass, infect the atmosphere of the conductor, and communicate the virtue to all persons in contact with it; also, that those substances, held in the hands of persons electrified, would communicate their virtues to

10
Behaviour
of different
philosophers
on this occasion.

11
Incredible
powers attributed to
electricity.

them; so that the medicines might be made to operate without being taken into the stomach. They even pretended to have wrought many cures by the help of electricity applied in this way. To see the wonderful effects of these *medicated tubes*, as they were called, Mr Nollet travelled into Italy, where he visited all the gentlemen who had published any account of these experiments. But tho' he engaged them to repeat their experiments in his presence, and upon himself; and though he made it his business to get all the information he could concerning them; he returned fully convinced, that in no instance had odours been found to transpire through the pores of excited glass, and that no drugs had ever communicated their virtues to people who had only held them in their hands while they were electrified. He was convinced, however, that, by continued electrification without drugs, several persons had found considerable relief in various disorders; particularly, that a paralytic person had been cured at Geneva, and that one who was deaf of an ear, another who had a violent pain in his head, and a woman with a disorder in her eyes, had been cured at Bologna; so that from this time we may date the introduction of electricity into the medicinal art. See (the *Index* subjoined to) MEDICINE.

Another wonderful experiment was the *beatification* of Mr Boze; which other electricians, for a long time, endeavoured to repeat after him, but to no purpose. His description of this remarkable experiment was, that if, in electrifying, large globes were employed, and the electrified person stood upon large cakes of pitch, a lambent flame would by degrees arise from the pitch, and spread itself around his feet; that from thence it would be propagated to his knees and body, till at last it ascended to his head; that then, by continuing the electrification, the person's head would be surrounded by a glory such as is in some measure represented by painters in their ornamenting the heads of saints. Dr Watson took the utmost pains to repeat this experiment. He underwent the operation several times, and was supported during the time of it by solid electrics three feet high. Being electrified very strongly, he felt a kind of tingling on the skin of his head, and in many other parts of his body. The sensation resembled what would arise from a vast number of insects crawling over him at the same time. He constantly observed the sensation to be the greatest in those parts of his body which were nearest to any non-electric; but no light appeared upon his head, tho' the experiment was several times made in the dark, and with some continuance. At last the doctor wrote to Mr Boze himself, and his answer shewed that the whole had been a trick. Mr Boze acknowledged that he had made use of a suit of armour, which was decked with many bullions of steel, some pointed like nails, others like wedges, and some pyramidal; and that when the electrification was very vigorous, the edges of the helmet would dart forth rays something like those which are painted on the heads of saints.

12
Identity of
electric fluid
with light-
ning suspec-
ted by Dr
Franklin.

The identity of the electrical matter with lightning is a discovery that hath been of more practical use to mankind than any other. From almost the first discovery of the electric light, and the crackling with which it is emitted, a similarity between it and the phenomena of thunder and lightning had been observed. This

is taken notice of by Dr Wall, one of the first who viewed the electric light in any perfect manner. The Abbe Nollet, Mr Winckler, and others, also enumerated many resemblances between the phenomena of electricity and those of thunder; but they did not think of any method by which their suspicions could be brought to the test of experience. This was first proposed by Dr Franklin in 1750. He had before discovered the effects of pointed bodies in drawing off the electric matter more powerfully than others. This was suggested to him by one Mr Thomas Hopkinson, who electrified an iron ball of three or four inches diameter with a needle fastened to it, expecting to draw a stronger spark from the point of it; but was surprised to find little or none. Dr Franklin, improving on this hint, supposed that pointed rods of iron, fixed in the air when the atmosphere was loaded with lightning, might draw from it the matter of the thunder-bolt, without noise or danger, into the body of the earth. His account of this supposition is given by himself in the following words. "The electric fluid is attracted by points. We do not know whether this property be in lightning; but since they agree in all the particulars in which we can already compare them, it is not improbable, that they agree likewise in this; let the experiment be made."

This suspicion of Dr Franklin's was verified in 1752, and the discovery is perhaps the only one in the whole science that hath not been the result of accident. The most active persons were two French gentlemen, Messrs Dalibard and Delor. The former prepared his apparatus at Marly la Ville, situated five or six leagues from Paris; the other at his own house, on some of the highest ground in that capital. Mr Dalibard's machine consisted of an iron rod 40 feet long, the lower extremity of which was brought into a centry-box, where the rain could not come; while on the outside it was fastened to three wooden posts by long silken strings defended from the rain. This machine happened to be the first that was favoured with a visit of the ethereal fire. Mr Dalibard himself was not at home; but, in his absence, he had entrusted the care of his apparatus to one Coiffier a joiner, who had served 14 years among the dragoons, and on whose courage and understanding he could depend. This artisan had all the necessary instructions given him; and was desired to call some of his neighbours, particularly the curate of the parish, whenever there should be any appearance of a thunder-storm. At length the long expected event arrived. On Wednesday the 10th of May 1752, between two and three in the afternoon, Coiffier heard a pretty loud clap of thunder. Immediately he ran to the machine, taking with him a vial furnished with a brass wire; and presenting the wire to the end of the rod, a small spark issued from it with a snap like that which attends a spark from an electrified conductor. Stronger sparks were afterwards drawn in the presence of the curate and a number of other people. The curate's account of them was, that they were of a blue colour, an inch and an half in length, and smelled strongly of sulphur. In making them, he received 3 strokes on his arm a little below the elbow; but he could not tell whether it came from the brass wire inserted into the vial, or from the bar. He did not attend to it at the time; but the pain continuing, he un-

13
His suspi-
cion veri-
fied.

covered

History.

History.

covered his arm when he went home in the presence of Coiffier. A mark was perceived round it, such as might have been made by a blow with the wire on his naked skin.

About a month after this, Dr Franklin himself had an opportunity of verifying his own hypothesis. He was waiting for the erection of a spire in the city of Philadelphia, not imagining that a pointed rod of a moderate height could answer the purpose. At last it occurred to him, that by means of a common kite he could have a readier access to the high regions of the atmosphere than any other way whatever. Preparing, therefore, a large silk handkerchief, and two cross sticks of a proper length on which to extend it, he took the opportunity of the first approaching thunder-storm to take a walk into a field where there was a shed convenient for his purpose. But dreading the ridicule which too commonly attends unsuccessful attempts in science, he communicated his intention to nobody but his son, who assisted him in raising the kite. A considerable time elapsed before there was any appearance of success. One very promising cloud had passed over the kite without any effect; when, just as he was beginning to despair, he observed some loose threads of the hempen string to stand erect and avoid one another just as if they had been suspended by the conductor of a common electrical machine. On this he presented his knuckle to a key which was fastened to the string, and thus obtained a very evident electric spark. Others succeeded even before the string was wet; but when the rain had begun to descend, he collected electric fire pretty copiously. He had afterwards an insulated iron rod to draw the lightning into his house; and performed almost every experiment with real lightning that had before been done with the artificial representations of it by electrical machines.

14
Danger of
making ex-
periments
with light-
ning.

Thus a new field was opened for philosophers; but it was soon found, that experiments of this kind were not always to be made without danger. This very year, 1752, the Abbe Nollet published some cautions to those who tried experiments on lightning. He had been informed by letters from Florence and Bologna, that some people there had received violent shocks while they drew sparks from an iron bar electrified by thunder. One of his correspondents informed him, that once, as he was endeavouring to fasten a small chain with a copper ball at one of its extremities to a great chain which communicated with the bar at the top of the building, there came a flash of lightning which he did not see, but which affected the chain with a noise like that of wild-fire. The observer instantly received such a shock, that the ball fell out of his hands, and he was struck backwards four or five paces.

15
Professor
Richman
killed by
lightning.

The greatest influence of the danger of these experiments, however, was the death of Mr Richman professor at Petersburg above-mentioned. This happened on the 6th of August 1753, as he was making experiments on lightning drawn into his own room. He had provided himself with an instrument for measuring the quantity of electricity communicated to his apparatus; and as he stood with his head inclined to it, Mr Solokow an engraver, who was near him, observed a globe of blue fire, as big as his fist, jump from the instrument, which was about a foot distant, to Mr Richman's

head. The professor was instantly dead, and Mr Solokow was also much hurt. The latter, however, could give no particular account of the way in which he was affected; for, at the time the professor was struck, there arose a sort of steam or vapour, which entirely benumbed him, and made him sink down to the ground, so that he could not even remember to have heard the clap of thunder, which was a very loud one. The globe of fire was attended with an explosion like that of a pistol; the instrument for measuring the electricity (called by the professor an *electrical gnomon*), was broken to pieces, and the fragments thrown about the room. Upon examining the effects of the lightning in the professor's chamber, they found the door-case half split through, and the door torn off and thrown into the room. They opened a vein in the body twice, but no blood followed; after which, they endeavoured to recover life by violent friction, but in vain: upon turning the corpse with the face downwards during the rubbing, an inconsiderable quantity of blood ran out of the mouth. There appeared a red spot on the forehead, from which spirted some drops of blood through the pores, without wounding the skin. The shoe belonging to the left foot was burst open, and uncovering the foot at that part, they found a blue mark; from whence it was concluded, that the electric matter having entered at the head, made its way out again at that foot. Upon the body, particularly on the left side, were several red and blue spots resembling leather shrunk by being burnt. Many more also became visible over the whole body, and particularly over the back. That upon the forehead changed to a brownish red, but the hair of the head was not singed. In the place where the shoe was unripped, the stocking was entire; as was the coat every where, the waistcoat only being singed on the forepart where it joined the hinder; but there appeared on the back of Mr Solokow's coat long narrow streaks, as if red-hot wires had burned off the nap, and which could not well be accounted for.

When the professor's body was opened next day, the cranium was very entire, having neither fissure nor contra-fissure: the brain was found; but the transparent pellicles of the wind-pipe were excessively tender, and easily rent. There was some extravasated blood in it, as also in the cavities below the lungs. Those of the breast were quite sound; but those towards the back of a brownish black colour, and filled with more of the blood above mentioned. The throat, the glands, and the small intestines, were all inflamed. The singed leather-coloured spots penetrated the skin only. In 48 hours the body was so much corrupted that they could scarce get it into a coffin.

Since the discovery of the identity of lightning and the electric matter, long rods of iron or other metal have been made use of with a view to protect buildings from the danger of strokes of lightning. A considerable dispute has been carried on whether these rods ought to be pointed or not; but a committee of the royal society have very lately determined it in favour of the former.

For some time, the science of electricity seems to have been at a stand. Numberless improvements indeed have been made upon what was before discovered, but scarce any thing new hath been added. The only

16
Conductors
used for
preserving
houses.

Phenomena thing which can properly be reckoned a new discovery is that of the *electrophorus* by Signior Volta an Italian; which on many accounts may be reckoned the most surprising machine hitherto invented.

SECT. II. Of the Phenomena of Electricity.

THESE are so many, and so various, that, in order to avoid confusion, it is necessary to divide them into distinct classes. It is, however, necessary, before entering upon any particular discussion of the phenomena, to say something concerning the general method by which the electrical phenomena are made to appear, and the distinction between electrics and non-electrics.

17
Methods of
producing
electricity.

The most common method by which any substance is made to exhibit signs of electricity, is by rubbing it. Warming without rubbing, or blowing air violently upon it, will also in many cases produce signs of electricity; and thus the discharge of cannon, blowing up of powder-magazines, &c. has been found to electrify glass-windows. But these appearances are comparatively slight; and the only effectual method by which any considerable effects can be produced, is by friction.

Every substance which, by any of the above-mentioned methods, is made to exhibit the signs of electricity, such as attracting and repelling light bodies, emitting light, &c. will communicate the same properties to any other that touches it; and the latter is said, during the time that these appearances continue, to be *electrified*.

19
Electrics
and non-
electrics.

Every substance which, by rubbing, warming, or blowing upon it, can be made to exhibit signs of electricity, is called an *electric per se*; and those substances which cannot be made to exhibit any appearances of this kind, without touching another substance which already shews them, are called *non-electrics*, or *conductors*.

At first the catalogue of electric substances was very small; but the industry of philosophers hath now enlarged it to such a degree, that, according to some, there is not a perfectly non-electric substance in nature. This, however, seems carrying the matter too far; for it is certain, that by rubbing a piece of metal as much as we please, it will never be made to exhibit the least sign of electricity while we hold it in our hands. If we fix it upon one of the substances generally called electrics, such as a stick of sealing-wax, a glass tube, &c. and then rub it, we shall in that case indeed produce signs of electricity; but here we certainly have a right to conclude, that it derives its electrical properties from its particular situation, and consequently is not an *electric per se*.

19
Electric
substances
to be classed
according
to their
different
powers.

The catalogue of electric substances is, as we have already said, prodigiously extensive. We are not, however, to imagine, that all of them are equally fit for electrical experiments. There is, in this case, a very great diversity; and some are found to be more proper for one purpose, and some for another. It is therefore very difficult to distinguish absolutely between the strength of one electric and another in all cases: for a substance that cannot be made to emit sparks but with great difficulty, will perhaps attract very strongly; and another which attracts but weakly, will emit sparks very vigorously.

This distinction, though hitherto not taken notice of, seems to be the most natural foundation for the classing of electric substances; and thus we may divide them in the following manner.

1. For exhibiting a permanent and very strong attractive and repulsive power, silk is preferable to all other substances yet discovered.

2. For exhibiting the electric light, attraction and repulsion in quick succession, and in general all the phenomena of electricity, in a very vigorous, though not a durable, manner, glass is preferable to every other body, and is the most generally made use of.

3. Those substances commonly called *negative electrics*, such as amber, gum-lac, sulphur, rosin, and all the resinous gums, exhibit electric appearances for the greatest length of time; a single friction being sufficient to make them do so for months together, in favourable circumstances. They are also very remarkable for the strong electric power they communicate to conducting bodies which come into contact with them, and which they will continue to do for a great length of time, as if they contained an inexhaustible supply of the fluid.

In this order, therefore, we shall treat of the electric powers of different substances. It is, however, still necessary to premise an explanation of some terms made use of by electricians, without the frequent repetition of which, it is impossible to speak intelligibly on the subject.

1. If any substance shall, by friction, or any other means, be made to exhibit signs of electricity, the electric virtue of that substance is said to be *excited*, or, to avoid a circumlocution, the substance itself is said to be excited. This phrase differs from the other already mentioned, of being *electrified*; because the latter implies that the electricity is communicated by some external body; whereas the being *excited* implies, that the electric power is originally inherent in the body itself.

20
Explan-
ation of
terms.

2. Any non-electric, or conducting body, being placed upon an *electric per se*, and thus having its communication with other non-electrics cut off, is said to be *insulated*.—Here it must be observed, that the common air we breathe is an electric substance, so that a body is perfectly insulated though it should remain in contact with the air all round. The great use of insulation, is to prevent any substance from losing its electric virtue in such a short time as otherwise it would do; and because this is found to be the case, it has been supposed that the current of electric matter is stopped by the electric or insulating substance; whence electricians have also obtained the name of *non-conductors*.

3. There is observed a very strange difference between the electricity produced by some bodies, and that exhibited by others. If two bodies electrified by glass are presented to each other, they will mutually repel, or separate to a greater distance than before. The same thing will happen to two bodies electrified by sulphur, sealing-wax, rosin, &c. But if a body electrified by glass is presented to one electrified by sulphur, or rosin, they will be mutually attracted; and when they meet, there will be no more signs of electricity in either of them, supposing both to have been equally electrified at first. That kind produced by the glass is called the *positive*, and that produced by the sulphur or rosin the *negative*, electricity.—Formerly it was thought, that these two kinds of electricity were essentially distinct, and belonged to the glass and sulphur without a possibility of alteration; but now it is found, that glass may be made to electri-

city

Phænomena trify *negatively*, and sulphur *positively*, by very slight alterations in the surface, or the substances with which they are rubbed.—We shall now present the reader with an ample catalogue of electric substances, and the different kinds of electricity produced by them.

Cavalle's Electricity, p. 17.

23 Catalogue of electric substances, with their different powers.

Electric sub- stances.	Quality of electricity.	Substances with which the electric is rubbed.
The back of a cat - -	Positive	Every substance hitherto tried.
Smooth glass	Positive	Every substance, except the back of a cat.
	Positive	Dry oiled silk, sulphur, or metals.
Rough glass	Negative	Woollen-cloth, quills, wood, paper, sealing-wax, white-wax, the human hand.
Tourmalin	Positive	Amber, or air blown upon it.
	Negative	Diamond, the human hand.
Hare's skin	Positive	Metals, silk, loadstone, leather, hand, paper, baked wood.
	Negative	Other finer furs.
	Positive	Sealing-wax.
Black silk	Negative	Hare's, weasel's, and ferret's skin, loadstone, brass, silver, iron, hand.
White silk	Positive	Black silk, metals, black cloth.
	Negative	Paper, hand, hare's, weasel's skin.
Sealing-wax	Positive	Metals.
	Negative	Hare's, weasel's, and ferret's skin, hand, leather, woollen-cloth, paper.
Baked wood	Positive	Silk.
	Negative	Flannel.

This table contains most of those substances that exhibit the strongest marks of electricity. The following is composed by Mr Henley, and contains a great number of substances whose electricity is much more equivocal. They were fixed or tied on the end of a stick of sealing-wax; and excited by friction against a woollen garment, or a piece of soft black silk, by which means they became electrified as below. The strongest in power are distinguished by the letter s, and the weakest by the letter w.

METALS.

A new guinea; a smooth sixpence; a brass ferule; tin, and tin-foil; enamelled copper, s; gilding on leather, s; lead ore; copper ore; iron ore; stream tin.	Wool.	Silk.
Milled lead; copper, s; a polished steel button, s; a new silver ditto; a metal button gilt, s; tutenague ditto, s; iron.	Neg.	Neg.
	Pos.	Pos.

Lead from a tea-chest, in which there is a mixture of tin, w.

A gilt button, basket-pattern; the juncture at the end of a brass ferule.

Wool.	Silk.	Phænomena
Neg.	Pos.	
Pos.	Neg.	

ANIMAL SUBSTANCES.

Tortoise-shell, w; ivory, s; bone, s; horn; lamb's-tooth; horse's-hoof; deer's-hoof; muscle of the leg of a deer, s; cartilage, s; spur of a young cock; bill, claw, and scale from the leg of a turkey, s; scale of a carp; the *chrysalis* of a moth, recent from the earth, cleaned; *crassamentum* of the human blood exsiccated, w; quills; claw of an unboiled lobster; cowrie and several other smooth shells, s; shell of a hen's egg; tail of a small fish; thigh of the elephant beetle; a small beetle, smooth surface; human hair; red and white horse's and bullock's hair, s; hog's bristles, s; wool; silk from the worm, w; oyster-shell, smooth surface; Mother of pearl, and several other shells.

Pos. Pos.

Neg. Pos.

Muscle and cockle-shells, recent; a recent snail-shell, rough surface; *elytra* of the stag-beetle; oyster-shell, rough surface.

Neg. Neg.

VEGETABLES.

Rind of chestnut, s; Barcelona nut-shell, s; cashew nut, s; cocoa nut-shell polished; Brazil; *lignum vite*; black ebony, s; box, w; cane, s; *quinaquina*, or Peruvian bark, s; tamarind-stone; coffee-berry roasted, s; nutmeg, s; ginger, s; white pepper, freed from the husk, s; cinnamon, s; cloves, s; mace, s; all-spice, s; capicum, both sides of the pod, s; hemlock, s; a clove of garlic; ditto of eschalot, freed from the husk, s; a green onion, s; rue, s; cork, s; leaves of laurel, bay, yew, holly, rosemary, with their berries, s; parsley, s; leaf of turnip; ditto of Savoy cabbage, s; celery, s; fago, s; thyme, s; carrot; turnip; potatoe; an acorn, s; rind of Seville orange, s; a large Windsor bean, s; a white pea; root of the white lily; snow-drop root; seeds of gourd, melon, cucumber, w; a species of long mofs, w; an apple, s; down of the cotton-rush, w; sea-flag; leaf of the American aloe, s; cotton, w.

Neg. Neg.

Hemp; flax; stalk of the tobacco-leaf; spike, from the leaf of the American aloe; *palma-christi* nut; horse-radish.

Neg. Pos.

A white kidney-bean, smooth surface; black negroe of the same; scarlet of the same.

Pos. Pos.

CORAL.

CORALLINES.

Sea fan, the horny part, w; rough coral, w.	Wool.	Silk.
Spunge, w; coral polished, w.	Neg.	Pof.
	Neg.	Pof.

SALTS.

Allum, w.	-	Neg.	Neg.
Borax,	} smooth surfaces;	Pof.	Pof.
Nitre purified,			

FOSSIL AND MINERAL SUBSTANCES.

Common pebble-stones of all colours, s; marble, s; pit-coal, s; black-lead, w; jet, s; <i>asbestos</i> ; mineralized sulphur; thunder-bolt stone; <i>cornu ammonis</i> ; shark's-tooth; coat of petrification.	Neg.	Neg.
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Several smooth native crystals; brown Iceland ditto; <i>talc</i> , s; Ceylon pebble, smooth and transparent; agate, s; cornelian; amethyst, s.	Pof.	Pof.
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A specimen of <i>gypsum</i> .	Neg.	Pof.
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ARTIFICIAL SUBSTANCES.

Staffordshire ware glazed; China ware, s; Wedgwood's ware glazed, s; whale's fin prepared, w; writing-paper; parchment, s; sheep's gut.	Pof.	Pof.
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Tobacco-pipe, s; Wedgwood's ware unglazed; elastic gum, s; hard under-crust of a leaf; a tallow-candle, w; oiled silk; painted paper, s; silver, burnt into glass, unburnished; pearl-barley, w; Indian ink, w; blue vitriol, s.	Neg.	Neg.
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Dr Lewis's Glass porcelain.	Neg.	Pof.
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Here it must be observed, that a great number of the substances in Mr Henly's table, particularly metals, would have been totally incapable of excitation had they not been insulated; and as they were rubbed against electric *per se*, it is by no means fair to conclude that the metal was excited. It seems much more likely that the rubber only was excited, and communicated its electricity to the metal. It must also be observed, that tho' there is a very remarkable difference between substances with regard to their non-electric or conducting power, yet there seems not to be a perfect electric in nature: for heat will destroy the electric power of glass, and every other substance; and, on the contrary, cold, if not attended with moisture, renders every electric substance more electric than before. The use of warming an electric therefore, before excitation, is only to free it from the moisture which may adhere to it.

§ 1. Of the Electrical Phenomena from Silk.

This substance was first discovered to be an electric by Mr Grey, in the manner we have already related*; but as it was by no means remarkable for emitting sparks, which most commonly engages the attention, its electric virtues were almost entirely overlooked till the year 1759. At that time Mr Symmer presented to the royal society, some papers, containing a number of very curious experiments made with silk stockings,

in substance as follows.

He had been accustomed to wear two pairs of silk stockings; a black and a white. When these were put off both together, no signs of electricity appeared; but on pulling off the black ones from the white, he heard a snapping or crackling noise, and in the dark perceived sparks of fire between them. To produce this and the following appearances in great perfection, it was only necessary to draw his hand several times backward and forward over his leg with the stockings upon it.

When the stockings were separated and held at a distance from each other, both of them appeared to be highly excited; the white stocking positively, and the black negatively. While they were kept at a distance from each other, both of them appeared inflated to such a degree, that they exhibited the entire shape of the leg. When two black, or two white stockings, were held in one hand, they would repel one another with considerable force, making an angle seemingly of 30 or 35 degrees. When a white and black stocking were presented to each other, they were mutually attracted; and if permitted, would rush together with surprising violence. As they approached, the inflation gradually subsided, and their attraction of foreign objects diminished, but their attraction of one another increased; when they actually met they became flat, and joined close together, like as many folds of silk. When separated again, their electric virtue did not seem to be in the least impaired for having once met; and the same appearances would be exhibited by them for a considerable time. When the experiment was made with two black stockings in one hand, and two white ones in the other, they were thrown into a strange agitation, owing to the attraction between those of different colours, and the repulsion between those of the same colour. This mixture of attractions and repulsions made the stockings catch at each other at greater distances than otherwise they would have done, and afforded a very curious spectacle.

When the stockings were suffered to meet, they stuck together with considerable force. At first Mr Symmer found they required from one to 12 ounces to separate them. Another time they raised 17 ounces, which was 20 times the weight of the stocking that supported them; and this in a direction parallel to its surface. When one of the stockings was turned inside out, and put within the other, it required 20 ounces to separate them; though at that time 10 ounces were sufficient when applied externally. Getting the black stockings new dyed, and the white ones washed, and whitened in the fumes of sulphur, and then putting them one within the other, with the rough sides together, it required three pounds three ounces to separate them. With stockings of a more substantial make, the cohesion was still greater. When the white stocking was put within the black one, so that the outside of the white was contiguous to the inside of the black, they raised nine pounds wanting a few ounces; and when the two rough surfaces were contiguous, they raised 15 pounds, one pennyweight and a half. Cutting off the ends of the thread, and the tufts of silk which had been left in the inside of the stockings, was found to be very unfavourable to these experiments.

Mr Symmer also observed, that pieces of white and black silk, when highly electrified, not only cohered with

Phenomena with each other, but would also adhere to bodies with broad and even polished surfaces, though these bodies were not electrified. This he discovered accidentally; having, without design, thrown a stocking out of his hand, which stuck to the paper-hangings of the room. He repeated the experiment, and found it would continue hanging near an hour. Having stuck up the black and white stockings in this manner, he came with another pair highly electrified; and applying the white to the black, and the black to the white, he carried them off from the wall, each of them hanging to that which had been brought to it. The same experiments held with the painted boards of the room, and likewise with the looking-glass, to the smooth surface of which both the white and the black silk appeared to adhere more tenaciously than to either of the former.

23 Similar experiments, but with a greater variety of circumstances, were afterwards made by Mr Cigna of Turin, upon white and black ribbons. He took two white silk ribbons just dried at the fire, and extended them upon a smooth plain, whether a conducting or electric substance, was a matter of indifference. He then drew over them the sharp edge of an ivory ruler, and found that both ribbons had acquired electricity enough to adhere to the plain; though while they continued there, they shewed no other sign of it. When taken up separately, they were both negatively electrified, and would repel each other. In their separation, electric sparks were perceived between them; but when again put on the plain, or forced together, no light was perceived without another friction. When, by the operation just now mentioned, they had acquired the negative electricity, if they were placed, not upon the smooth body on which they had been rubbed, but on a rough conducting substance, they would, on their separation, shew contrary electricities, which would again disappear on their being joined together. If they had been made to repel each other, and were afterwards forced together, and placed on the rough surface above-mentioned, they would in a few minutes be mutually attracted; the lowermost being positively, and the uppermost negatively electrified.

If the two white ribbons received their friction upon the rough surface, they always acquired contrary electricities. The upper one was negatively, and the lower one positively, electrified, in whatever manner they were taken off. The same change was instantaneously done by any pointed conductor. If two ribbons, for instance, were made to repel, and the point of a needle drawn opposite to one of them along its whole length, they would immediately rush together.

The same means which produced a change of electricity in a ribbon already electrified, would communicate electricity to one which had not as yet received it; viz. laying the unelectrified ribbon upon a rough surface, and putting the other upon it; or by holding it parallel to an electrified ribbon, and presenting a pointed conductor to it. He placed a ribbon that was not quite dry under another that was well dried at the fire, upon a smooth plain; and when he had given them the usual friction with his ruler, he found, that, in what manner soever they were removed from the plain, the upper one was negatively, and the lower one positively, electrified.—If both ribbons were black, all these experiments succeeded in the same manner as

with the white. If, instead of the ivory ruler, he made use of any skin, or a piece of smooth glass, the event was the same; but if he made use of a stick of sulphur, the electricities were in all cases the reverse of what they had been before the ribbon was rubbed, having always acquired the positive electricity.—When he rubbed them with paper either gilt or not gilt, the results were uncertain. When the ribbons were wrapped in paper gilt, or not gilt, and the friction was made upon the paper laid on the plain abovementioned, the ribbons acquired both of them the negative electricity. If the ribbons were one black, and the other white, whichever of them was laid uppermost, and in whatever manner the friction was made, the black generally acquired the negative, and the white the positive, electricity.

He also observed, that, when the texture of the upper piece of silk was loose, yielding, and retiform, like that of a stocking, so that it could move, and be rubbed against the lower one, and the rubber was of such a nature as could communicate but little electricity to glass, the electricity which the upper piece of silk acquired, did not depend upon the rubber, but upon the body on which it was laid. In this case, the black was always negative, and the white positive. But, when the silk was hard, rigid, and of a close texture, and the rubber of such a nature as would have imparted a great degree of electricity to glass, the electricity of the upper piece depended on the rubber. Thus, a white silk stocking rubbed with gilt paper upon glass became negatively, and the glass positively, electrified. But if a piece of silk of a firmer texture was laid upon a plate of glass, it was *always* electrified positively, and the glass negatively, if it was rubbed with sulphur, and for the most part if it was rubbed with gilt paper.

If an electrified ribbon was brought near an insulated plate of lead, it was attracted, but very feebly. On bringing the finger near the lead, a spark was observed between them, the ribbon was vigorously attracted, and both together shewed no signs of electricity. On the separation of the ribbon, they were again electrified, and a spark was perceived between the plate and the finger.

When a number of ribbons of the same colour were laid upon a smooth conducting substance, and the ruler was drawn over them, he found, that, when they were taken up singly, each of them gave sparks at the place where it was separated from the other, as did also the last one with the conductor; and all of them were negatively electrified. If they were all taken from the plate together, they cohered in one mass, which was negatively electrified on both sides. If they were laid upon the rough conductor, and then separated singly, beginning with the lowermost, sparks appeared as before, but all the ribbons were electrified positively, except the uppermost.—If they received the friction upon the rough conductor, and were all taken up at once, all the intermediate ribbons acquired the electricity, either of the highest or lowest, according as the separation was begun with the highest or the lowest. If two ribbons were separated from the bundle at the same time, they clung together, and in that state shewed no sign of electricity, as one of them alone would have done. When they were separated, the outermost one

had

Phenomena

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had acquired an electricity opposite to that of the bundle, but much weaker.

A number of ribbons were placed upon a plate of metal to which electricity was communicated by means of a glass globe, and a pointed conductor held to the other side of the ribbons. The consequence was, that all of them became possessed of the electricity opposite to that of the plate, or of the same, according as they were taken off; except the most remote, which always kept an electricity opposite to that of the plate.

§ 2. *Of the phenomena produced by excited or electrified Glass.*

THAT glass is an electric substance, was first discovered by Dr Gilbert. It was for a long time, however, thought to possess but a very weak electric virtue; tho' now it is found to be one of the best, if not the very best electric as yet known. Notwithstanding the many experiments made upon this substance, it is not yet ascertained what kind of glass is most proper for electrical purposes. It has been observed, that the hardest and most completely vitrified glass is often a very bad electric, being sometimes quite a conductor. Glass vessels made for electrical purposes are often rendered fit for them by use and time, though very bad electric when new. Mr Bergman of Upsal says, that very often, when his glass globes could not be excited to a sufficient degree of strength, he lined them with a thin coating of sulphur, and that then they gave a much stronger positive electricity than before. In Italy, and other places, according to Mr Nollet, it is the custom of electricians to put a coating of pitch or other resinous matter on the inside of their globes, which they say always makes them work well. He gives the preference to the crystal glass of England, Bohemia, &c. It seems doubtful, however, whether the common bottle glass does not answer equally well, or even better.

The most remarkable phenomenon producible by excited glass is that of the Leyden vial. It depends entirely upon the following property of glass, viz. that it is impossible to electrify the outside of a glass positively, at least to any considerable degree, without at the same time electrifying the inside of it negatively: in like manner, it is impossible to electrify the outside negatively; without at the same time electrifying the inside positively. It is also the nature of glass and all other electric substances, when once electrified either by excitation or communication, to part with their electricity very slowly and gradually. Thus, supposing a tube, cylinder, or plate of glass, to be highly electrified; if a finger is brought near any part of it, a spark will be felt to strike the finger with a snapping noise. Part of the electricity will then be discharged from the glass, but not all. If the finger is brought near another part of the glass, a similar spark will be again produced; and so on, by moving the finger to different parts of the glass, till all its electricity is exhausted.—It is the nature of conducting substances to discharge all their electricity at once, by a single spark, if another conducting substance is brought near them. This being the case, therefore, it follows, that if every part of one side of a glass plate is covered over with a conducting substance, every point of the glass will give out its

electricity to the conductor; and consequently, if another conducting substance is brought near to that by which the glass is covered, the whole electric power in the glass ought to be discharged in one single flash or large spark.

This would no doubt be the case, if it was possible to electrify the glass only on one side. But this is found to be impossible. No method hath yet been found of electrifying one side of a piece of glass positively, without electrifying the other negatively at the same time. There is therefore a necessity for taking off the electricity from both sides of the glass at the same time. This can only be done by covering both sides of the glass with a conducting substance, and presenting other conductors to both sides at the same time. Then the electricity of both is discharged in an instant. A strong spark is perceived between both sides of the coated glass and the conducting substances; and if a person holds one in each hand, he will, at the instant of the discharge, feel a very disagreeable sensation, which cannot well be described, in his arms and breast: and this is said to be receiving the *electric shock*.

If, instead of presenting a conducting substance to both sides of the plate at once, a finger is presented to one side, suppose that which is positively electrified, and another substance very highly electrified positively is presented to the negative side of the glass, a like discharge will ensue, but the shock will be much gentler than in the former case, and probably the electricity of the glass will not be all discharged. If two conducting substances, insulated, suppose two cylinders of metal fixed upon sticks of sealing wax, or suspended by silk threads, are brought to the sides of the coated glass at the same time; each of them will receive a spark of positive or negative electricity, according as the side to which it was applied is positively or negatively electrified. When the metallic cylinders are taken away, they will communicate the electricity they have received to other bodies; and if again applied to the coated glass, they will receive sparks as before; and thus the electricity of both sides will be gradually discharged.

After the discharge has been once made, the glass is found in a short time to recover its electricity, tho' in a small degree. The side which was originally electrified positively, becomes electrified in the same manner the second time, and so of the negative side. This second electrification is called the *residuum* of a charge; and, where there is a large surface of coated glass, hath a very considerable degree of power. The same thing, which we have just now observed with regard to a flat surface of glass, takes place with tubes and vials, or glass vessels of any kind; and it is always observed, that the thinnest glass answers best for this purpose. The Leyden vial consists of a glass vial, jar, or bottle, covered on the outside and inside with tin-foil, yet leaving an interval of two or three inches at top without any metallic covering, that the electricity of the one side may not be communicated to the other as fast as it is collected. A more particular description of it will be given when we speak of the electric apparatus. The above will be sufficient to render the following experiments intelligible.

Mr Symmer, when making the experiments we have already related, concerning the strong cohesive power of

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All kinds of glass not equally proper for electric experiments.

25
Leyden vial explained.

26
Experiments on glass plates by Mr Symmer.

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of electrified silk, was induced to try the cohesive power of electrified glass. For this purpose, he got two panes of common window-glass, the thinnest and smoothest he could meet with. He coated one of the sides with tinfoil, leaving a space uncovered near the edges. The uncovered sides were then put together, and electricity communicated to one of the coatings by means of a machine. In consequence of this, the other side, which was also coated, became electrified with an electricity opposite to the first, and both panes were charged with the electric power, as if they had been but one. After they had received a considerable degree of electric power, they cohered pretty strongly together, but he had no apparatus by which the strength of their cohesion could be measured. He then turned the plates upside down; and discharging from his machine, positive electricity upon the negative side of the glass, both panes were immediately discharged, and their cohesion ceased. Placing two panes of glass, each of them coated on both sides, one upon the other, each of them had a positive and negative side, by communicating electricity to one of them, and they did not cohere.

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Experiments on
glass plates
by Mr Bec-
caria.

In consequence of these experiments made by Mr Symmer, and another (which we shall presently give an account of) made at Pekin, Mr Beccaria made the following ones.—Having charged a coated plate of glass, he took off the coating from the negative side, and applied another uncoated and uncharged (or unelectrified) plate of glass close to it. After this, putting a coating upon the uncharged glass, (so that the whole resembled one coated plate, consisting of two laminæ), he made a communication between the two coatings. The consequence of this was an explosion, a discharge of the positive and negative electricity, and a cohesion of the plates. If the plates were separated before the explosion after they had been in conjunction for some time, the charged plate was positive on both sides, and the uncharged one negative on both sides.—If after the explosion he separated and joined them alternately, a small circle of paper, placed under the uncharged plate, adhered to it upon every separation, and was thrown off again upon every conjunction. This could be repeated even 500 times with once charging the plate. This is the experiment made at Pekin as above mentioned.

If, in these experiments, the charged plate was inverted, and the positive side applied to the uncharged plate, all the effects were exactly the reverse of the former. If it was inverted ever so often, after remaining some time in contact with the uncharged plate, it would produce a change in the electricity. In the dark, a light was always seen upon the separation of these plates.—Laying the two plates together like one, and coating the outides of them, he discharged them both together; and at the distance of about four feet, he distinguished six of the coloured rings mentioned by Sir Isaac Newton, all parallel to one another, and nearly parallel to the edge of the coating. At the angles of the coatings the rings spread to a greater distance. Where the coatings did not quite touch the glass, the rings bent inwards; and where the coatings adhered very close, they retired farther from them. Upon discharging these two plates, the coloured rings vanished, and the electric cohesion ceased with them. On separating the plates before the explosion, that which had

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received the positive electricity was positive on both sides, and the other negative on both sides. If they were separated after the explosion, each of them was affected in a manner quite the reverse. Upon inverting the plates, that which was the thinner appeared to be possessed of the stronger electricity, and brought the other plate to correspond with it. Charging the two plates separately, and taking off two of the coatings, so that two positive or two negative sides might be placed together, there was no cohesion or explosion. But joining a positive and a negative side, they immediately cohered; and a communication being formed on the outside, there was an explosion which increased the cohesion.

Mr Henley repeated these experiments with success, when he made use of plates of looking-glass, or window and crown glass; but when two plates of Nuremberg glass, commonly called *Dutch plates*, were used, the result was very different. Each of the plates, when separated after charging, had a positive and a negative surface. When they were replaced, and a discharge made, by forming a communication between the two coatings, the electricity of all the surfaces was changed. It appeared, however, still to be very strong, and the plates continued to give repeated flashes of light when they were alternately closed, touched, and separated, like the other plates above-mentioned. If a clean, dry, uncoated plate of looking-glass was placed between the coated plates, either of looking-glass or crown-glass, before they were charged, that uncoated plate was always found, upon separating them after charging, to be electrified negatively on both sides; but if it was put between the Dutch plates, it acquired, like them, a positive and negative electricity.

The following observation of Mr Æpinus is very remarkable. He pressed close together two pieces of looking-glass, each containing some square inches; and found, that when they were separated, and not suffered to communicate with any conductor, they acquired a strong electricity, the one positive, and the other negative. When put together again, the electricity of both disappeared; but not if either of them had been deprived of their electricity when they were asunder: for in that case, the two, when united, had the electricity of the other.

These are the most remarkable experiments that have been made with electrified flat plates of glass. Tubes of the same matter, however, afford a variety of curious phenomena of a different nature. One very remarkable one is the conducting power of new flint-glass, which is most easily perceived in tubes, and on which Dr Priestley makes the following observations.—He several times got tubes made two or three yards long, terminating in solid rods. These he took almost warm from the furnace, in the finest weather possible; and having immediately insulated them, perceived that the electricity of a charged vial would presently diffuse itself from one end to the other; and this he thought would have been the case at any distance at which the experiment could have been made. When the same tubes were a few months older, the electricity could not be diffused along their surface farther than half a yard.

This diffusive power of glass he thought proper to try in a different manner. A tube was procured of

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about

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By Mr
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about three feet long, but of very unequal width. About three inches of the middle part of it were coated on both sides. This coated part was afterwards charged, by communicating electricity to the inside of it by means of a wire. The consequence of this was, that not only the part through which the wire was introduced became strongly electrical on the outside, but at the opposite end, where there was neither coating nor wire, the fire crackled under the fingers as the tube was drawn through the hand, and a flame seemed continually to issue out at both ends, while it was at rest and charged.—One end of this tube was broken and rough, the other was smooth.

Another tube was procured about three feet and an half in length, and very thin. It was about an inch in diameter, and closed at one end. Three inches of it were coated on both sides, about nine inches below the mouth. This part being charged, the whole tube, to the very extremity of it, was strongly electrical, crackling very loud when the hand was drawn along it, and emitting sparks at about an inch distance all the way. After drawing the whole tube through the hand, all the electricity on the outside was discharged; but, on putting a finger into the mouth, a light streamed from the coating, both towards the finger, and towards the opposite end of the tube. After this, all the outside of the tube was become strongly electrical as before; and this electricity might be taken off and recovered many times without charging the tube anew, only it was weaker each time.—Holding this tube by the coated part, and communicating electricity to the uncoated outside, both sides became charged; and, upon introducing a wire, a considerable explosion was made. The discharge made the outside strongly electrical, and by taking off this electricity, the tube became sensibly charged.—The residuum of these charges was very considerable; and, in one tube, there was a residuum after 20 or 30 discharges.

By being kept for six or seven months, most of the tubes employed in these experiments lost the above-mentioned properties, and the electricity could no longer diffuse itself upon their surfaces. At length they were all broken except one, which had been the most remarkable of the whole. With this old tube, the Doctor tried to repeat the above-mentioned experiments; but to no purpose. He then took it to a glass-house; and having made it red all over, its diffusive property was restored as before.

He then tried two other tubes which had been made about six weeks, but without being used during all that time, and they answered exactly as if they had been quite new. The charge from a small coated part diffused itself all over the tube; so that, at the distance of a yard from the coating, it gave sparks to the finger of an inch long. On this occasion he observed, that when his finger was brought to the tube about two inches above the coating, a great quantity of the diffused electricity was discharged; and his whole arm was violently shocked. The old tube, after being heated as abovementioned, shewed a prodigious diffusive power. Upon charging a small coated part, the electricity was diffused to the end of the tube; and it gave sparks at the distance of an inch over every part of it. When it was drawn through the hand, in order to take off the diffused electricity, it instantly returned again,

and the extremity of the tube would be highly electrified, even while its communication with the coating was cut off by the hand. The middle part of the tube also, which had been oftenest heated, had a much greater diffusive power than any other. It was no sooner taken off, than it appeared again; so that it gave a continual stream of fire. The quantity of residuum after a discharge of this tube was prodigious; so that the outside coating would immediately after give almost a constant stream of fire for some time to any conducting substance placed near it.

The Doctor also observed, that in all the tubes which had the diffusion, there was a considerable noise at the orifice when his hand was drawn from the extremity towards the coating, as if the tube had been gradually discharging itself. In the dark, the electric matter seemed perpetually to pour from the open end, or both ends if they were open; and whenever his hand was drawn over it, the fire streamed from the coating to his hand in a very beautiful manner. The first time he charged any of these tubes after they had stood a while, the diffusion was the most remarkable. It was lessened by every successive charge, and at last became exceedingly small; but after the tube had stood a few hours uncharged, it was as vigorous as ever.

Mr Cavallo hath also made some curious discoveries concerning glass-tubes. He took the hint from observing accidentally, that by agitating quicksilver in a glass tube hermetically sealed, and in whose cavity the air was very much rarefied, the outside of the tube was sensibly electrified. The electricity, however, was not constant, nor in proportion to the agitation of the quicksilver. In order to ascertain the properties of these tubes, he constructed several of them, one of which is represented Plate XCIX. fig. 13. Its length was 31 inches, and its diameter something less than half an inch. The quicksilver contained in it was about three fourths of an ounce; and in order to exhaust it of air, one end of it was closed, while the quicksilver boiled in the other. Before this tube is used, it must be made a little warm and cleaned; then, holding it nearly horizontal, the quicksilver in it is suffered to run from one end to the other, by gently and alternately elevating and depressing its extremities. This operation immediately renders the outside electrical; but with the following remarkable property, *viz.* that the end of the tube where the quicksilver actually stands is always positive, and all the remaining part of it negative. If elevating this positive end of the tube a little, the quicksilver runs to the opposite end which was negative, then the former instantly becomes negative, and the latter positive. The positive end has always a stronger electricity than the negative. If when one end of the tube, for instance, A, is positive, *i. e.* when the quicksilver is in it, that electricity is not taken off by touching it; then, on elevating this end A, so that the quicksilver may run to the opposite end B, it appears negatively electrified in a very small degree. If by depressing it again it is a second time rendered positive, and that positive electricity is not taken off, then, on elevating the end A again, it appears positive in a small degree. But if, whilst it is positive, its electricity is taken off, then on being elevated, it appears strongly negative. When about two inches of each extremity of this tube is coated with tin-foil, as represented in

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Cavallo's
experiments with
glass tubes.

the

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Experiments by
Mr Wilcke,
Æpinus,
&c.

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Durability of the electric virtue in glass.

the figure, that coating renders the electricities at the extremities more perceptible, so that sometimes they will give sparks to a conductor brought near them. Tubes whose glass is about one twentieth of an inch thick answer better for these experiments than any others.

We shall close this account of the phenomena of excited glass, with some experiments which show the durability of the electric virtue in that substance in certain circumstances. Mr Canton procured some thin glass balls of about an inch and a half in diameter, with stems or tubes of eight or nine inches in length. He electrified them, some positively, and others negatively, on the inside, and then sealed them hermetically. Soon after, he found that they had lost all signs of electricity; but holding them to the fire at the distance of five or six inches, they became strongly electrical in a short time, and more so as they cooled. Heating them frequently he found would diminish their power; but keeping one of them under water a week did not appear in the least to impair it. That which he kept under water was charged on the 22d of September 1760, was heated several times before it was kept in water, and had been frequently heated afterwards; yet it still retained its virtue to a considerable degree till the 31st of October following. The breaking of two of his balls gave him an opportunity of observing their thickness, which he found to be between seven and eight parts of a thousand of an inch. The balls retained their virtue for six years, but in a less degree. Mr Lullin also found, that a glass tube charged and hermetically sealed, would shew signs of electricity when heated.

The most remarkable instances of the continuance of this power in glass, however, are those given by Mr Henly in the 6th volume of the Phil. Trans. One is, of a small bottle, which shewed signs of electricity for 70 days after it had been charged, and stood in a cupboard all that time. The other is of a glass cylinder, which after excitation continued to shew very strong signs of electricity from the 5th day of February to the 10th of March, though various methods had been used during that time to destroy the electric virtue. These means always proved effectual when they were applied, and the cylinder for some time shewed no signs of electricity. They never failed however to return without any fresh excitation; and became stronger and weaker, nay, sometimes quite vanished and returned, without any visible cause. In general, the electricity was weak when a fire was kept in the room, or when the door was kept open. When the wind blew from the north, the electricity was vigorous, and likewise after it had been for some time destroyed by flame. The cylinder, however, did not at all times retain its electric virtue for such a length of time without excitation. Very often it would lose all signs of electricity in 12 hours, and at other times in a fortnight, without returning till it was again excited.

§ 3. *The Phenomena of excited Sulphur, Gum-lac, Amber, Rosin, baked Wood, &c.*

THE most remarkable property of these, as already mentioned, is the durability of their electric virtue when

once excited. They are also capable of being excited by heat without any friction. This last property was discovered by Mr Wilcke, who distinguishes it by the name of *spontaneous electricity*. He melted sulphur in an earthen vessel, which he placed upon conductors: then, letting them cool, he took out the sulphur, and found it strongly electrical; but it was not so when it stood to cool upon electric substances. He then melted sulphur in glass vessels, whereby they both acquired a strong electricity whether placed upon electrics or not; but a stronger in the former case than in the latter: they acquired a stronger virtue still, if the glass vessel was coated with metal. In these cases, the glass was always positive and the sulphur negative. It was particularly remarkable, that the sulphur acquired no electricity till it began to cool and contract, and was the strongest in the greatest state of contraction; whereas the electricity of the glass was, at the same time, the weakest; and was the strongest of all when the sulphur was shaken out before it began to contract, and acquired any negative electricity.

Pursuing experiments of this kind, he found, that melted sealing-wax poured into glass acquired a negative electricity, but poured into sulphur a positive one, leaving the sulphur negative. Sealing-wax also, poured into wood, was negative, and the wood positive; but sulphur poured into sulphur, or into rough glass, acquired no electricity at all.

Similar experiments were also made by Mr Æpinus. He poured melted sulphur into metal cups; and observed, that, when the sulphur was cold, the cup and sulphur together shewed no signs of electricity, but very strong signs of it the moment they were separated. The electricity always disappeared when the sulphur was replaced in the cup, and revived upon its being taken out. The cup had acquired a negative, and the sulphur a positive, electricity; but, if the electricity of either of them had been taken off while they were separate, they would both, when united, shew signs of that electricity which had not been taken off.

Mr Wilcke also made several curious experiments concerning the effects of different rubbers upon electric substances, the most remarkable of which is the following: viz. that sulphur rubbed against metals was always positive; and this was the only case in which it was so. But, being rubbed against lead, it became negative, and the metal positive.

With regard to the perpetual attractive power of sulphur, &c. which Mr Grey fancied he had discovered*, the most remarkable example he gives is of a large cone of stone sulphur, covered with a drinking glass in which it was made. This he said would never fail to shew an attractive power when the glass was taken off. In fair weather, the glass would attract also; but not so strongly as the sulphur, which never failed to attract, let the wind or weather be ever so variable. This experiment has been repeated by Mr Henly, who says he has never known the sulphur to fail of shewing signs of electricity on the removal of the glass. Gum lac, rosin, &c. agree in the same general properties with sulphur, but do not become so strongly electrified spontaneously, nor are they so easily excited.

* See no 6.

SECT. III. *Of the Apparatus necessary for exciting electricity, and communicating it to other bodies, &c.*

THE instruments most in use for this purpose are those called *electrical machines*, of which there have been so many different forms, that it would be tedious and difficult to give only a very short description of them all. We shall therefore first lay down the most necessary rules for constructing electrical machines in general; and then give a particular description of those machines which are most generally useful, and contain all the improvements hitherto made.

§ 1. *Of the Construction of Electrical Machines.*

Cavallo's Electricity.

The principal parts of the machine are the electric, the moving engine, and the prime conductor, *i. e.* an insulated conductor, which immediately receives the electricity from the excited electric.

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What substances are most proper.

Formerly, different kinds of electrics were used, as glass, rosin, sulphur, sealing-wax, &c. Their forms were also various, as globes, cylinders, spheroids, &c. The reason of this variety was, in the first place, that it was not then ascertained what substance acted most powerfully; and secondly, in order to produce a positive or negative electricity at pleasure. At present smooth glass only is used; for when the machine has an insulated rubber, the operator may produce positive or negative electricity at his pleasure, without changing the electric. In regard to the form of the glass, those commonly used at present are globes and cylinders. The most convenient size for a globe, is from nine to twelve inches diameter. They are made with one neck, which is cemented to a strong brass cap in order to adapt them to a proper frame. The best cement for electrical purposes is made with two parts of rosin, two of bees-wax, and one of the powder of red okre. These ingredients are melted, and mixed together in any vessel over the fire; and afterwards kept for use. This kind of cement sticks very fast; and is much preferable to rosin only, as it is not so brittle, and at the same time insulates equally well. The cylinders are made with two necks; they are used to the greatest advantage without any axis; and their common size is from four inches diameter and eight inches long, to twelve inches diameter and two feet long, which are perhaps as large as the workmen can conveniently make them. The glass generally used is the best flint; though it is not yet absolutely determined which kind of metal is the best for electrical globes or cylinders. The thickness of the glass seems immaterial, but perhaps the thinnest is preferable. It has often happened, that glass globes, and cylinders, in the act of whirling, have burst in innumerable pieces, with great violence, and with some danger to the by-standers. Those accidents are supposed to happen when the globes, or cylinders, after being blown, are suddenly cooled. It will therefore be necessary to enjoin the workman to let them pass gradually from the heat of the glass-house, to the atmospheric temperature.

It has been long questioned, whether a coating of some electric substance, as rosin, turpentine, &c. on the inside surface of the glass, has any effect to increase its electrical power; but now it seems pretty well deter-

mined, that if it does not increase the power of a good glass globe or cylinder, at least it does considerably improve a bad one.

The most approved composition for lining glass globes, or cylinders, is made with four parts of Venice turpentine, one part of rosin, and one part of bees-wax. This composition must be boiled for about two hours over a gentle fire, and must be stirred very often: afterwards it is left to cool, and reserved for use. When a globe or cylinder is to be lined with this mixture, a sufficient quantity of it is to be broken into small pieces, and introduced into the glass; then, by holding the glass near the fire, the mixture is melted, and equally spread over all its internal surface, to about the thickness of a sixpence. In this operation care must be taken, that the glass be made hot gradually, and be continually turned, so as to be heated equally in all parts, otherwise it is apt to break in the operation.

In respect to the engine which is to give motion to the electric; multiplying wheels have been generally used, which, properly adapted, might give the electric a quick motion, while they are conveniently turned by a winch. The usual method is, to fix a wheel on one side of the frame of the machine, which is turned by a winch, and has a groove round its circumference. Upon the brass cap of the neck of the glass globe, or one of the necks of the cylinder, a pulley is fixed, whose diameter is about the third or fourth part of the diameter of the wheel: then a string or strap is put over the wheel and the pulley; and by these means, when the wheel is turned, the globe or cylinder makes three or four revolutions, for one revolution of the wheel. There is an inconvenience generally attending this construction, which is, that the string is sometimes so very slack, that the machine cannot work. To remedy this inconvenience, the wheel should be made moveable with respect to the electric, so that by means of a screw it might be fixed at the proper distance; or else the pulley should have several grooves of different radii upon its circumference.

It has been customary with some, to turn the cylinder simply with a winch, without any accelerated motion; but that seems not sufficient to produce the greatest electric power the glass is capable of giving; for the globe or cylinder should properly make about six revolutions in a second, which is more than can be conveniently done with the winch only. This method, however, on account of its simplicity and easy construction, should not be disregarded, and it may be conveniently used when no very great power is required.

Instead of the pulley and the string as above described, a wheel and pinion, or a wheel and an endless screw, has been also used. This construction answers perhaps as well as any other: but it must be constructed with great nicety; otherwise it is apt to make a disagreeable rattling, and, without frequent oiling, soon wears away by the great friction of its parts.

The next thing belonging to the electrical machine, necessary to be described, is the rubber which is to excite the electric. The rubber, as it is now made, is nothing more than a silk-cushion stuffed with hair; and over this cushion is put a piece of leather, on which some

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Composition for coating globes.

35
How the machine is to be set in motion.

36
Construc- tion of the rubber.

Apparatus. some amalgam has been rubbed so as to stick as fast as possible to the leather. This amalgam has been found to excite smooth glass the most powerfully of any thing yet tried. That generally used, is made with two parts of quicksilver and one of tin-foil, with a small quantity of powdered chalk, mixed together until they become a mass like paste. But an amalgam of quicksilver and bismuth is now found to be much more powerful. Some time ago it was generally used, and it is now customary also, to make the rubber of red bañ skin stuffed with hair; but the silk one, as above described (which is an improvement of Dr Nooth) is much preferable. If this silk cushion, on account of adapting it to the surface of the glass, is to be fixed upon a metal plate, then care should be taken to make the plate free from sharp points, edges, or corners; and it should be as much as possible concealed, or covered with silk. In short, to construct the rubber properly, it must be made in such a manner, that the side of it, which the surface of the glass enters in whirling, may be as perfect a conductor as it can be made, in order to supply electricity as quick as possible; and the opposite part should be as much a non-conductor as possible, in order that none of the fluid accumulated upon the glass may return back to the rubber; which has been found by experiment to be the case when the rubber is not made in a proper manner.

The rubber should be supported by a spring, by which means it may easily suit any inequalities that may be found on the surface of the glass; and by a screw, it may be made to press harder or softer as occasion requires. It should also be insulated, in whatever manner is most convenient; for, whenever insulation is not required, a chain or wire, &c. may be occasionally hung upon it, and thus communicate with the earth, or with any other body, at pleasure; whereas, when there is not a contrivance for insulating the rubber, many of the most curious experiments in electricity will never be performed with the machine.

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Prime conductor, &c. We come now to consider the prime conductor, or first conductor; which is nothing more than an insulated conducting substance furnished with one or more points at one end, in order to collect the electricity immediately from the electric. When the conductor is of a moderate size, it is usual to make it of hollow brass; but when it is very large, then, on account of the price of the materials, it is made of pasteboard covered with tin-foil or gilt paper. The conductor is generally made cylindrical; but let the form be what it will, it should always be made perfectly free from points, or sharp edges: and if holes are to be made in it, which on many accounts are very convenient, they should be well rounded, and made perfectly smooth. Further, that end of the prime conductor which is at the greatest distance from the electric, ought to be made larger than the rest, as the strongest exertion of the electric fluid in escaping from the conductor is always at that end.

It has been constantly observed, that the larger the prime conductor is, the longer and denser spark can be drawn from it; and the reason of this is, that the quantity of electricity discharged in a spark, is nearly proportional to the size of the conductor; on this account, the prime conductor is now made much larger than what was formerly used. Its size, however, may be so large, that the dissipation of the electricity from

its surface, may be greater than what the electric can supply; in which case, so large a conductor would be nothing more than an unweildy and disagreeable incumbrance.

Before we quit the electrical machine, it should be observed, that, besides the above-mentioned parts, it is necessary to have a strong frame to support the electric, the rubber, and the wheel. The prime conductor should be supported by stands with pillars of glass, or baked wood; and not by silk strings, which admit of continual motion. In short, the machine, the prime conductor, and any other apparatus actually used, should be made to stand as steady as possible, otherwise many inconveniences will arise.

Besides the electrical machine, the electrician should be provided with glass tubes of different sizes, a pretty large stick of sealing-wax, or a glass tube covered with sealing-wax, for the negative electricity. He should, at least, not be without a glass tube about three feet long and one inch and a half in diameter. This tube should be closed at one end, and at the other end should have fixed a brass cap with a stop-cock; which is useful in case it should be required to condense or rarify the air within the tube.

The best rubber for a tube of smooth glass, is the rough side of black oiled silk, especially when it has some amalgam rubbed upon it; but the best rubber for a rough glass tube, a stick of baked wood, sealing-wax, or sulphur, is soft new flannel.

The instruments necessary for the accumulation of ³⁸ Directions electricity, are coated electrics; among which, glass for coating jars, &c. coated with conductors obtains the principal place: on account of its strength, it may be formed into any shape, and it will receive a very great charge. The form of the glass is immaterial with respect to the charge it will contain; its thickness only is to be considered: for the thinner it is, the higher charge it is capable of receiving; but it is at the same time more subject to be broken: for this reason, therefore, a thin coated jar or plate may be used very well by itself, and it is very convenient for many experiments; but when large batteries are to be constructed, then it is necessary to use glass a little thicker, and care should be taken to have them perfectly well annealed. If a battery is required of no very great power, as containing about eight or nine square feet of coated glass, common pint or half-pint phials may be made use of. They may be easily coated with tin-foil, sheet-lead, or gilt paper, on the outside, and brass-filings on the inside; they occupy a small space, and, on account of their thinness, hold a very good charge. But when a large battery is required, then these phials cannot be used, for they break very easily; and for that purpose, cylindrical glass jars of about 15 inches high, and four or five inches in diameter, are the most convenient.

When glass plates or jars, having a sufficiently large opening, are to be coated, the best method is to coat them with tin-foil on both sides, which may be fixed upon the glass with varnish, gum-water, bees-wax, &c. but in case the jars have not an aperture large enough to admit the tin-foil, and an instrument to adapt it to the surface of the glass, then brass-filings, such as are sold by the pin-makers, may be advantageously used; and they may be stuck with gum-water, bees-wax, &c. but not with varnish, for this is apt to be set on fire by the

Apparatus.

the discharge. Care must be taken that the coatings do not come very near the mouth of the jar, for that will cause the jar to discharge itself. If the coating is about two inches below the top, it will in general do very well; but there are some kinds of glass, especially tinged glass, that, when coated and charged, have the property of discharging themselves more easily than others, even when the coating is five or six inches below the edge. There is another sort of glass, like that of which Florence flasks are made, which, on account of some unvitrified particles in its substance, is not capable of holding the least charge; on these accounts, therefore, whenever a great number of jars are to be chosen for a large battery, it is advisable to try some of them first, so that their quality and power may be ascertained.

39
Another
substance
capable of
answering
the purpose
of glass.

Electricians have often endeavoured to find some other electric, which might answer better than glass for this purpose, at least be cheaper; but, except Father Bucciari's method, which may be used very well, no remarkable discovery has been made relating to this point. He took equal quantities of very pure colophonium, and powder of marble sifted exceedingly fine, and kept them in a hot place a considerable time, where they became perfectly free from moisture: he then mixed them, and melted the composition in a proper vessel over the fire; and, when melted, poured it upon a table, upon which he had previously stuck a piece of tin-foil, reaching within two or three inches of the edge of the table. This done, he endeavoured with a hot iron to spread the mixture all over the table as equally as possible, and to the thickness of one tenth of an inch: he afterwards coated it with another piece of tin-foil reaching within about two inches of the edge of the mixture: in short, he coated a plate of this mixture like a plate of glass. This coated plate, from what he says, seems to have had a greater power than a glass plate of the same dimensions, even when the weather was not very dry: and if it is not subject to break very easily by a spontaneous discharge, it may be very conveniently used; for it doth not very readily attract moisture, and consequently may hold a charge of electricity better, and longer, than glass: besides, if broken, it may be repaired by a hot iron; but glass, when broke, can never be repaired.

40
Discharging
rod,
electrometers,
&c,

When a jar, a battery, or in general a coated electric, is to be discharged, the operator should be provided with an instrument called the *discharging rod*, which consists of a metal rod sometimes straight, but more commonly bended in the form of a C: they are made also of two joints, so as to open like a kind of compasses. This rod is furnished with metal knobs at its extremities, and has a non-conducting handle, generally of glass or baked wood, fastened to its middle. When the operator is to use this instrument, he holds it by the handle; and touching one of the coated sides of the charged electric with one knob, and approaching the other knob to the other coated side, or some conducting substance communicating with it, he completes the communication between the two sides, and discharges the electric.

The instruments to measure the quantity, and ascer-

tain the quality, of electricity, are commonly called *Apparatus, electrometers*, and they are of four sorts: 1. The single thread; 2. the cork or pith balls; 3. the quadrant; and, 4. the discharging electrometer. The second sort of electrometer, *i. e.* the cork-balls electrometer, was invented by Mr Canton; the discharging electrometer was invented by Mr Lane, and hath been improved by Mr Henly; another on a different principle by Mr Kinnersley; and the quadrant electrometer, which is of latest invention, is a contrivance of Mr Henly.

Besides the apparatus above described, there are several other instruments useful for various experiments; but these will be described occasionally. The electrician, however, ought to have by him, not only a single coated jar, a single discharging rod, or, in short, only what is necessary to perform the common experiments; but he should provide himself with several plates of glass, with jars of different sizes, with a variety of different instruments of every kind, and even tools for constructing them; in order that he may readily make such new experiments as his curiosity may induce him to try, or that may be published by other ingenious persons who are pursuing their researches in this branch of philosophy.

§ 2. Description of the most useful Electrical Machines.

The first which may be mentioned is that described by Dr Priestley in his history of electricity which, on account of its extensive use, may be deservedly called a *universal electrical machine*.—The basis consists of two oblong boards, which are kept in a situation parallel to one another, about four inches asunder, by two small pieces of board properly adapted to that purpose. These boards, when set horizontally upon a table, and there fixed by fastening the lower of them with iron cranks, form the support of two perpendicular pillars of baked wood, and of the rubber of the machine. One of the pillars, together with the spring supporting the rubber, slides in a groove, which reaches almost the whole length of the upper board: and, by means of screws, may be placed at any required distance from the other pillar, which is fixed, being let through a mortise in the upper board, and strongly fastened to the lower. In these two pillars are several holes for the admittance of the spindles of different globes; and as they may be situated at any distance from one another, they may be adapted to receive not only globes, but also cylinders, or spheroids of different sizes. In this machine, says Dr Priestley, more than one globe or cylinder may be used at once, by fixing them one above the other in the different holes of the pillars; and, by adapting to each a proper pulley, they may be whirled all at once, and their power united in order to increase the electricity (A): but in this construction different rubbers cannot be conveniently applied to them all; which is a capital imperfection.

41
Description
of Dr
Priestley's
machine.

The rubber ought to be made as above-directed. It is supported by a socket, which receives the cylindrical axis of a round and flat piece of baked wood, the opposite part of which is inserted into the socket of a bent steel spring. These parts are easily separated, so that

(A) When several globes are used at once, and their power united, it has been found by experiment, that the electricity does not increase in proportion to their number, although it is more than what may be produced by a single globe. Plate CII. fig. 1. shews a machine of this kind formerly used by Dr Watson.

Apparatus.

that the rubber, or the piece of wood that serves to insulate it, may be changed at pleasure. The spring admits of a twofold alteration of position. It may be either slipped along the groove, or moved in the contrary direction (the groove being wider than the screw which fastens the spring), so as to give it every desirable position with respect to the globe or cylinder; and it is, besides, furnished with a screw, which makes it press harder or lighter, as the operator chooses.

The wheel of this machine is fixed to the table; it has several grooves, for admitting more strings than one, in case that two or three globes or cylinders are used at a time; and as it is disengaged from the frame of the machine, the latter may be screwed at different distances from the former, and thus suited to the variable length of the string.

The prime conductor is hollow copper, made in the shape of a pear, situated with its neck upwards, and with its bottom or rounder part upon a stand of baked wood; and an arched wire proceeds from its neck, having an open ring at its end, in which some small pointed wires are hung, that, by playing lightly upon the electric, collect the electric fluid from it.

Next to Dr Priestley's machine is one invented by Dr Ingenhoufz, and which for its simplicity and conciseness makes a fine contrast with the former.—This machine consists of a circular glass plate about one foot diameter, which is turned vertically by a winch fixed to the iron axis that passes through its middle; and it is rubbed by four cushions, each about two inches long, situated at the opposite ends of the vertical diameter. The frame consists of a bottom board, about a foot square, or a foot long and six inches broad, which, when the machine is to be used, may be fastened by an iron crank to the table. Upon this board two other slender and smaller ones are raised, which lie parallel to one another, and are fastened together at their top by a small piece of wood. These upright boards support in their middle the axis of the plate, and to them the rubbers are fastened. The conductor is of hollow brass; and from its extremities branches are extended, which, coming very near the extremity of the glass, collect the electricity from it.

The power of this machine is perhaps more than a person would imagine by looking at it. It may be objected, that this construction will not easily admit of the rubbers being insulated, nor consequently be adapted to a great variety of experiments: but at the same time it must be allowed, that it is very portable, that it is not very liable to be out of order, and that it has a power sufficiently strong for physical purposes; on which account it may be conveniently used.

The last machine we shall describe, is that represented in fig. 1. (Plate XCIX.) which has all the improvements hitherto made, except that it is not capable of admitting different kinds, or more than one electric; but which, indeed, it seems not to stand in need of. The electric power of such a machine is equal to what may be obtained by any other construction; and at the same time its size, being neither remarkably large, nor at all inconvenient, renders it the completest hitherto contrived.—These machines are made and sold

by Mr George Adams, in Fleet-street, London, philosophical instrument-maker to his majesty.

The frame of this machine consists of the bottom board ABC, which, when the machine is to be used, is fastened to the table by two iron cranks, one of which appears in the figure near C. Upon the bottom board are perpendicularly raised two strong wooden pillars KL, and AH, which support the cylinder and the wheel. From one of the brass caps of the cylinder FF, an axle of steel proceeds, which passes quite through a hole in the pillar KL, and has on this side of the pillar a pulley I fixed upon its square extremity. Upon the circumference of this pulley there are three or four grooves, in order to suit the variable length of the string *ab*, which goes round one of them, and round the groove of the wheel D. The other cap of the cylinder has a small cavity, which fits the conical extremity of a strong screw, that proceeds from the pillar H. The wheel D, which is moved by the handle E, turns round a strong axle, proceeding from almost the middle of the pillar KL.

The rubber G of this machine is on each end two inches shorter than the cylinder, (*i. e.* the cylinder exclusive of the necks), and it is made to rub about one fourth part of the cylinder's circumference. It consists of a thin quilted cushion of silk, stuffed with hair, and fastened by silk strings upon a piece of wood, which is properly adapted to the surface of the cylinder. From the upper extremity of the cushion proceeds a piece of oiled silk, that covers almost all the upper part of the cylinder; and to the lower extremity of the cushion, or rather of the piece of wood to which the cushion is tied, a piece of leather is fastened, which is turned over the cushion, *i. e.* stands between it and the surface of the cylinder. Upon this leather, which reaches from the lower to almost the upper extremity of the cushion, some of the above-described amalgam is to be worked, so as to be forced as much as possible into its substance. This rubber is supported by two springs, screwed to its back, and from which it may be easily unscrewed when occasion requires. The two springs proceed from the wooden cap of a strong glass pillar (B), perpendicular to the bottom board of the machine. This pillar has a square wooden base, that slides in two grooves in the bottom board ABC, upon which it is fastened by a screw. In this manner the glass pillar may be fastened at any required distance, and in consequence the rubber may be made to press harder or lighter upon the cylinder. The rubber in this manner is perfectly insulated: and when insulation is not required, a chain with a small hook may be hung to it, so as to have a regular communication with the piece of leather; the chain then falling upon the table, renders the rubber uninsulated.

Fig. 2. represents the prime conductor AB belonging to this machine. This is of hollow brass; and is supported by two glass pillars varnished, which by two brass sockets are fixed in the board C C. This conductor receives the electric fluid through the points of the collector L, which are set at about half an inch distance from the surface of the cylinder of the machine.

If

(B) This glass pillar, as well as the glass feet of insulating stools in general, should be covered with varnish, or rather with sealing-wax; otherwise they will insulate very imperfectly, on account of the moisture that they attract from the air in damp weather.

42
Of Dr Ingenhoufz's.

43
Of the most improved one.

Apparatus.

44
Of exciting
positive and
negative elec-
tricity.

If the handle E, fig. 1. of the wheel, be turned, (and, on account of the rubber, it should be turned always in the direction of the letters a b c) this machine, standing in the situation that is represented in the figure, will give positive electricity, *i. e.* the prime conductor will be electrified positively, or overcharged with electric fluid; for, by the action of rubbing, the cylinder pumps as it were the fluid from the rubber, and every other body properly connected with it, and gives it to the prime conductor. But if a negative electricity is required, then the chain must be removed from the rubber and hung to the prime conductor; for in this case the electricity of the prime conductor will be communicated to the ground, and the rubber remaining insulated will appear strongly negative. Another conductor equal to the conductor A B, fig. 2. may be connected with the insulated rubber, and then the operator may obtain as strong negative electricity from this, as he can positive from the conductor A B, fig. 2.

45
Different electro-
meters descri-
bed.

Fig. 4. represents a stand supporting the electrometers D D C C. B is the basis of it, made of common wood. A is a pillar of wax, glass, or baked wood. To the top of the pillar, if it be of wax or glass, a circular piece of wood is fixed; but if the pillar be of baked wood, that may constitute the whole. From this circular piece of wood proceed four arms of glass, or baked wood, suspending at their ends four electrometers, two of which D D are silk threads about eight inches long, suspending each a small downy feather at its end. The other two electrometers C C are those with very small balls of cork, or of the pith of alder; and they are constructed in the following manner. *ab* is a stick of glass about six inches long, covered with sealing-wax, and shaped at top in a ring: from the lower extremity of this stick proceed two fine linen threads (*c c*) about five inches long, each suspending a cork or pith-ball *d* about one-eighth of an inch in diameter. When this electrometer is not electrified, the threads *cc* hang parallel to each other, and the cork-balls are in contact; but when electrified, they repel one another, as represented in the figure. The glass stick *ab* serves for an insulating handle, by which the electrometer may be supported when it is used without the stand A B.

Another species of the above electrometer is represented in fig. 3. which consists of a linen thread, having at each end a small cork-ball. This electrometer is suspended by the middle of the thread on any conductor proper for the purpose, and serves to show the kind and quantity of its electricity.

Fig. 7. represents Mr Henley's quadrant electrometer fixed upon a small stand, from which it may be occasionally separated and fixed upon the prime conductor, or in any other place at pleasure. This electrometer consists of a perpendicular stem formed at the top like a ball, and furnished at its lower end with a brass ferule, by which it may be fixed in one of the holes of the prime conductor, or in its proper stand, as occasion requires. To the upper part of the stem or pillar, a graduated ivory femicircle is fixed; about the middle of which is a brass arm, which contains a pin, or the small axis of the index. The index consists of a very slender stick, which reaches from the centre of the

graduated femicircle to the brass ferule, and at its lower extremity is fastened a small cork-ball, nicely turned in a lathe.

The properest wood, for the purpose of making the pillar and index of this electrometer, is box; and this pillar and index should be well rounded, and made as smooth as possible. When this electrometer is not electrified, the index hangs parallel to the pillar, as in fig. 7.: but, when it is electrified, the index recedes more or less, according to the quantity of electricity, from the stem; as represented on the prime conductor E, fig. 2.

The main of M. Lane's discharging electrometer consists in a brass ball, about one inch and a half in diameter, screwed to a brass graduated rod, and adapted to a proper frame, so that it may be set at any required distance from the prime conductor, or the knob of an electric jar. The principal use of this electrometer is to let a jar discharge by itself through any proper circuit, without using any discharging rod, or removing any part of the apparatus; and to give shocks nearly of the same strength. Suppose, for instance, that the above-mentioned brass ball be set at half an inch distance from the prime conductor, and that a coated jar be situated so as to touch the prime conductor with its knob, and to have its outside coating communicating with the above-mentioned brass ball. Now, it is evident, that the circuit, from the outside to the inside of the jar, is interrupted only between the prime conductor and the brass ball, which lie half an inch asunder: therefore, when the jar is charging, and the charge is become so high as to strike through half an inch of air, the jar will discharge itself; and by keeping the brass ball at the same distance from the prime conductor, and charging the jar successively, the shocks will be of the same strength.

This electrometer is, however, subject to a great inconvenience; which is, that the surface of the brass ball is often deprived of its smoothness by the force of the explosion, in which case it becomes unfit for use. The principal use for which this electrometer is intended, *i. e.* to give shocks of the same strength, may be more elegantly obtained by the above-described quadrant electrometer, which suffers no damage by the discharges; hence a delineation and a more particular description of the discharging electrometer is unnecessary.

Fig. 5. represents Mr Henley's universal discharger, which is of a very extensive use, and is composed of the following parts. A is a flat board 15 inches long, four inches broad, and one thick, or thereabouts, which forms the basis of the instrument. B B are two glass pillars cemented in two holes upon the board A, and furnished at their top with brass caps, each of which has a turning joint, and supports a spring tube, through which the wire D C slides: each of these caps is composed of three pieces of brass, connected so, that the wire D C, besides its sliding through the socket, has two other motions, *viz.* an horizontal and a vertical one. Each of the wires D C, D C, is furnished with an open ring at one end, and at the other end has a brass ball D, which, by a short spring socket, is slipped upon its pointed extremity, and it may be removed from it at pleasure. E is a strong circular piece

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Mr Hen-
ley's uni-
versal dis-
charger.

(c) These threads should be wetted in a weak solution of salt.

piece of wood five inches in diameter, having, on its surface, a slip of ivory inlaid, and furnished with a strong cylindrical foot, which fits the cavity of the socket F, which is fastened in the middle of the bottom board, and has a screw G, which serves to fasten the foot of the circular board E at any required height. H is a small press belonging to this instrument: it consists of two oblong pieces of board, which may be pressed against each other by means of two screws *aa*: the lower of these boards has a cylindrical foot equal to the foot of the circular board E. When this press is to be used, it is fixed into the socket F, in the place of the circular board E, which must, in that case, be removed.

Fig. 11. is an electric jar coated with tinfoil on the inside and outside, within three inches of the top of the cylindrical part of the glass, having a wire with a round brass knob A at its extremity. This wire passes through the cork D, that stops the mouth of the jar, and at its lower end is bended so as to touch the inside coating in several places. When corks are used to stop electric jars, they should be made very dry, and dipped in melted bees-wax or varnished.

Fig. 10. represents a battery composed of 16 jars coated in the inside and outside with tinfoil, which all together contain about 12 feet of coated glass. About the middle of each of these jars is a cork that sustains a wire, which at the top is fastened round or soldered to the wire E knotted at each end, which connects the inside coatings of four jars; and by the wires F F F the inside coatings of all the 16 jars are connected together. Each of the wires F has a ring at one end, through which one of the wires E passes, and the other end has a brass knob. If the whole force of the battery is not required, one, two, or three rows of jars may be used at pleasure: for as each of the wires F F F is moveable round the wire E, which passes thro' its ring, and rests upon the next wire E, it may be easily removed from that, and turned upon the contrary wire E; and thus the communication between one row of jars and another may be discontinued at pleasure. See the figure.

The square box that contains these jars is of wood lined at the bottom with sheet-lead or tin, and has two handles on two opposite sides, by which it may be easily removed. In one side of the box is a hole, thro' which an iron hook B passes, which communicates with the metallic lining of the box, and consequently with the outside coating of all the jars. To this hook is fastened a wire, the other end of which is connected with the discharging rod.

The discharging rod consists of a glass handle A, and two curved wires B B, which move by a joint C, fixed to the brass cap of the glass handle A. The wires B B are pointed, and the points enter the knobs D D, to which they are screwed, and may be unscrewed from them at pleasure. By this construction we have the opportunity of using the balls or the points, as occasion requires; and as the wires are moveable by the joint C, they may be adapted to smaller or larger jars at pleasure.

The battery, represented in the plate, is a small one

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in comparison to those now frequently used, and much too weak for the purpose of some experiments, hereafter to be described. But when a large battery is to be constructed, it is better to make two, three, or more small ones, as represented in the plate, than a single large battery, which is heavy, and, on several accounts, inconvenient. The force of several small batteries may be easily united by a wire or a chain, and thus they may be made to act in every respect like a large one.

In fig. 2. is a circular brass plate hung on the prime conductor by a chain, and resting in an horizontal position. Underneath this, there is another plate P parallel and equal to the former (but it would be better if it was a little larger), which is supported by a stand H of brass, having also a socket to receive the foot of the plate, and a screw G to fix it at different distances.

D in fig. 2. is a fly made of small brass wires fixed in a cap of brass also, which is to be put upon the pointed wire K, that is screwed to the prime conductor, upon which it must stand in equilibrium, like the needle of a compass. The other ends *a, b, c, d*, of the wires are pointed and bent all one way.

It is highly requisite for an electrician to have by him several insulating stools, or stands, they being very necessary for several experiments. The best materials to construct these are glass covered with sealing-wax, and baked wood (A). A large stool, proper to insulate a chair upon, or two or three persons standing, may be made with a strong board, about two feet and a half square; and may be supported by four feet of glass, or baked wood, about eight inches long. But small stands are better made with one foot or pillar, and all of baked wood or glass, without any conducting substance in their construction. Drinking-glasses, either varnished, or in part covered with sealing wax, answer this purpose very well.

§ 3. *Practical Rules concerning the Use of the electrical Apparatus, and the performing of Experiments.*

1. The first thing to be observed is, the preservation and care of the instruments. The electrical machine, the coated jars, and in short every part of the electrical apparatus, should be kept clean, and as free as possible from dust and moisture.

2. When the weather is clear, and the air dry, especially in clear and frosty weather, the electrical machine will always work well. But when the weather is very hot, the electrical machine is not so powerful: nor in damp weather, except it be brought into a warm room; and the cylinder, the stands, the jars, &c. be made thoroughly dry.

3. Before the machine be used, the cylinder should be first wiped very clean with a soft linen cloth that is dry, clean, and warm; and afterwards with a clean hot flannel, or an old silk handkerchief: this done, if the winch be turned when the prime conductor, and other instruments are removed from the electrical machine, and the knuckle be held at a little distance from the surface of the cylinder, it will be soon perceived, that

15 N

that

(A) The wood should be baked very well, even till it becomes quite brown, it being then in the best state for insulation; and to make it fill better, *i. e.* to defend it from moisture, it may be slightly varnished as soon as it comes out of the oven, or else boiled in linseed oil; but in this case, after boiling, it should be made hot again, and then it is fit for use.

Apparatus.

that the electric fluid comes like a wind from the cylinder to the knuckle; and, if the motion be a little continued, sparks and crackling will soon follow. This indicates that the machine is in good order, and the electrician may proceed to perform his experiments. But if, when the winch is turned for some time, no wind is felt upon the knuckle, then the fault is, very likely, in the rubber; and to remedy that, use the following directions: By loosening the screws on the back of the rubber, remove it from its glass pillar, and keep it a little near the fire, so that its silk part may be dried; take now a dry piece of mutton suet, or a little tallow from a candle, and just pass it over the leather of the rubber; then spread a small quantity of the above-described amalgam over it, and force it as much as possible into the leather. This done, replace the rubber upon the glass pillar; let the glass cylinder be wiped once more, and then the machine is fit for use.

4. Sometimes the machine will not work well because the rubber is not sufficiently supplied with electric fluid; which happens when the table, upon which the machine stands, and to which the chain of the rubber is connected, is very dry, and consequently in a bad conducting state. Even the floor and the walls of the room are, in very dry weather, bad conductors, and they cannot supply the rubber sufficiently. In this case the best expedient is, to connect the chain of the rubber, by means of a long wire, with some moist ground, a piece of water, or with the iron work of a water-pump; by which means the rubber will be supplied with as much electric fluid as is required.

5. When a sufficient quantity of amalgam has been accumulated upon the leather of the rubber, and the machine does not work very well, then, instead of putting on more amalgam, it will be sufficient to take the rubber off, and to scrape a little that which is already upon the leather.

6. It will be often observed, that the cylinder, after being used some time, contracts some black spots, occasioned by the amalgam, or some foulness of the rubber, which grow continually larger, and greatly obstruct its electric power. These spots must be carefully taken off, and the cylinder must be frequently wiped in order to prevent its contracting them.

7. In charging electric jars in general, it must be observed, that not every machine will charge them equally high. That machine whose electric power is the strongest, will always charge the jars highest. If the coated jars, before they are used, be made a little warm, they will receive and hold the charge the better.

8. If several jars are connected together, among which there is one that is apt to discharge itself very soon, then the other jars will soon be discharged with that; although they may be capable of holding a very great charge by themselves. When electric jars are to be discharged, the electrician must be cautious, lest, by some circumstance not adverted to, the shock should pass through any part of his body; for an unexpected shock, though not very strong, may occasion several disagreeable accidents. In making the discharge, care must be taken that the discharging rod be not placed on the thinnest part of the glass, for that may cause the breaking of the jar.

Experiments.

9. When large batteries are discharged, jars will be often found broken in it, which burst at the time of the discharge. To remedy this inconvenience, Mr Nairne says, he has found a very effectual method, which is, never to discharge the battery through a good conductor, except the circuit be at least five feet long. Mr Nairne says, that ever since he made use of this precaution, he has discharged a large battery near a hundred times without ever breaking a single jar, whereas before he was continually breaking them. But here it must be considered, that the length of the circuit weakens the force of the shock proportionably; the highest degree of which is in many experiments required.

10. It is advisable, when a jar, and especially a battery, has been discharged, not to touch its wires with the hand, before the discharging rod be applied to its sides a second and even a third time; as there generally remains a residuum of the charge, which is sometimes very considerable.

11. When any experiment is to be performed, which requires but a small part of the apparatus, the remaining part of it should be placed at a distance from the machine, the prime conductor, and even from the table, if that is not very large. Candles, particularly, should be placed at a considerable distance from the prime conductor, for the effluvia of their flames carry off much of the electric fluid.

SECT. IV. Entertaining Experiments.

I. The electrified cork-ball Electrometer.

Fix at the end of the prime conductor the knobbed rod I B, fig. 2. and hang on it the electrometer with the cork-balls, fig. 3. The balls will now touch one another, the threads hanging perpendicularly, and parallel to each other. But if the cylinder of the machine be whirled by turning the winch E, then the cork-balls will repel one another; and more or less, according as the electricity is more or less powerful.— If the electrometer be hung to a prime conductor negatively electrified, *i. e.* connected with the insulated rubber of the machine, the cork-balls will also repel each other. If, in this state of repulsion, the prime conductor is touched with some conducting substance not insulated, the cork-balls will immediately come together. But if, instead of the conducting substance, the prime conductor is touched with an electric, as for instance a stick of sealing-wax, a piece of glass, &c. then the cork-balls will continue to repel each other; because the electric fluid cannot be conducted through that electric: hence we have an easy method of determining what bodies are conductors, and what electrics. This electrical repulsion is also shewn by the quadrant electrometer, with a large downy feather, or the like; for if these be connected with the prime conductor, and the winch be turned, the electrometer will raise its index, and the feather, by the divergency of its down, will appear swelled in a beautiful manner.

II. Attraction and Repulsion of light Bodies.

CONNECT with the prime conductor the two parallel brass plates F, P, as represented in fig. 2. at about three inches distance from one another; and upon the lower plate put any kind of light bodies, as bran, bits

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of paper, bits of leaf-gold, &c.; then work the machine, and the light bodies will soon move between the two plates, leaping alternately from one to the other with great velocity. If, instead of bran or irregular pieces of other matter, small figures of men or other things cut in paper and painted, or rather made of the pith of alder, be put upon the plate, they will generally move in an erect position, but will sometimes leap one upon another, or exhibit different postures, so as to afford a pleasing spectacle to an observing company.

III. *The Flying-feather, or Shuttle-cork.*

THE phenomena of electric attraction and repulsion may be represented also with a glass tube, or a charged bottle, and some of them in a manner more satisfactory than with the machine.

Take a glass tube (whether smooth or rough is not material); and after having rubbed it, let a small light feather be let out of your fingers at the distance of about eight or nine inches from it. This feather will be immediately attracted by the tube, and will stick very close to its surface for about two or three seconds, and sometimes longer; after which time it will be repelled; and if the tube be kept under it, the feather will continue floating in the air at a considerable distance from the tube, without coming near it again, except it first touches some conducting substance; and if you manage the tube dexterously, you may drive the feather through the air of a room at pleasure.

There is a remarkable circumstance attending this experiment; which is, that if the feather be kept at a distance from the tube by the force of electric repulsion, it always presents the same part towards the tube:—You may move the excited tube about the feather very swiftly, and yet the same side of the feather will always be presented to the tube.

This experiment may be agreeably varied in the following manner: A person may hold in his hand an excited tube of smooth glass, and another person may hold an excited rough glass tube, a stick of sealing-wax, or in short another electric negatively electrified, at about one foot and a half distance from the smooth glass tube: a feather now may be let go between these two differently electrified bodies, and it will leap alternately from one electric to the other; and the two persons will seem to drive a shuttle-cork from one to the other, by the force of electricity.

IV. *The electric Well.*

PLACE upon an electric stool a metal quart-mug, or some other conducting body nearly of the same form and dimension; then tie a short cork-ball electrometer, of the kind represented fig. 3. at the end of a silk thread proceeding from the ceiling of the room, or from any other support, so that the electrometer may be suspended within the mug, and no part of it may be above the mouth: this done, electrify the mug by giving it a spark with an excited electric or otherwise; and you will see that the electrometer, whilst it remains in that insulated situation, even if it be made to touch the sides of the mug, is not attracted by it, nor does it acquire any electricity; but if, whilst it stands suspended within the mug, a conductor, standing out of the mug, be made to communicate with, or only

presented to it, then the electrometer is immediately attracted by the mug.

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THE following experiments require to be made in the dark: for although the electric light in several circumstances may be seen in the day-light, yet its appearance in this manner is very confused; and that the electrician may form a better idea of its different appearances, it is absolutely necessary to perform such experiments in a darkened room.

V. *The Star and Pencil of electric Light.*

WHEN the electrical machine is in good order, and the prime conductor is situated with the collector sufficiently near the glass cylinder, turn the winch, and you will see a lucid star at each of the points of the collector. This star is the constant appearance of the electric fluid that is entering a point. At the same time you will see a strong light proceeding from the rubber, and spreading itself over the surface of the cylinder; and if the excitation of the cylinder is very powerful, dense streams of fire will proceed from the rubber, and, darting round almost half the circumference of the cylinder, will reach the points of the collector. If the prime conductor is removed, the dense streams of fire will go quite round the cylinder; reaching from one side of the rubber to the other. If the chain of the rubber is taken off, and a pointed body, as for instance the point of a needle or a pin, is presented to the back of the rubber, at the distance of about two inches, a lucid pencil of rays will appear to proceed from the point presented, and diverge towards the rubber. If another pointed body be presented to the prime conductor, it will appear illuminated with a star; but if a pointed wire or other pointed conducting body be connected with the prime conductor, it will throw out a pencil of rays.

VI. *Drawing Sparks.*

LET the prime conductor be situated in its proper place, and electrify it by working the machine; then bring a metallic rod with a round knob at each end, or the knuckle of a finger, within a proper distance of the prime conductor, and a spark will be seen between that and the knuckle or knobbed wire. The longer and stronger spark is drawn from that end of the prime conductor, which is farthest from the cylinder, or rather from the end of the knobbed rod IB, fixed at its end B, fig. 2.; for the electric fluid seems to acquire an impetus by going through a long conductor, when electrified by a powerful machine.—This spark (which has the same appearance whether drawn from a prime conductor positively, or negatively electrified) appears like a long line of fire, reaching from the conductor to the opposed body, and often (particularly when the spark is long, and different conducting substances are near the line of its direction) it will have the appearance of being bended to sharp angles in different places, exactly resembling a flash of lightning. It often darts brushes of light sideways in every direction.

VI. *The electric Light flashing between two metallic Plates.*

LET two persons, one standing upon an insulated stool, and communicating with the prime conductor, and another standing upon the floor, each hold in one

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of his hands a metal plate, in such a manner, that the plates may stand back to back in a parallel situation, and about two inches asunder. Let the winch of the machine be turned, and you will see the flashes of light between the two plates so dense and frequent, that you may easily distinguish any thing in the room. By this experiment the electric light is exhibited in a very copious and beautiful manner, and it bears a striking resemblance to lightning.

VIII. To fire inflammable Spirits.

THE power of the electric spark to set fire to inflammable spirits, may be exhibited by several different methods, but more easily thus: Hang to the prime conductor a short rod having a small knob at its end; then pour some spirits of wine, a little warmed, into a spoon of metal; hold the spoon by the handle, and place it in such a manner, that the small knob on the rod may be about one inch above the surface of the spirits. In this situation, if, by turning the winch, a spark be made to come from the knob, it will set the spirits on fire.

This experiment may be varied different ways, and may be rendered very agreeable to a company of spectators. A person, for instance, standing upon an electric stool, and communicating with the prime conductor, may hold the spoon with the spirits in his hand, and another person, standing upon the floor, may set the spirits on fire by bringing his finger within a small distance of it. Instead of his finger, he may fire the spirits with a piece of ice, when the experiment will seem much more surprising. If the spoon is held by the person standing upon the floor, and the insulated person brings some conducting substance over the surface of the spirits, the experiment succeeds as well.

IX. The artificial Bolognian Stone illuminated by the electric Light.

THE most curious experiment to shew the penetrability of the electric light, is made with the real, or more easily with the artificial, Bolognian stone, invented by the late Mr J. Canton. This phosphorus is a calcareous substance, generally used in the form of a powder, which has the property of absorbing light when exposed to it, and afterwards to appear lucid when brought into the dark*.—Take some of this powder, and, by means of spirits of wine or ether, stick it all over the inside of a clear glass phial, and stop it with a glass stopper, or a cork and sealing-wax. If this phial be kept in a darkened room (which for this experiment must be very dark), it will give no light; but let two or three strong sparks be drawn from the prime conductor, when the phial is kept at about two inches distance from the sparks, so that it may be exposed to that light, and this phial will receive that light, and afterwards will appear illuminated for a considerable time.—The powder may be stuck upon a board by means of the white of an egg, so as to represent figures of planets, letters, or any thing else at the pleasure of the operator; and these figures may be illuminated in the dark, in the same manner as the above-described phial.

A beautiful method to express geometrical figures with the above phosphorus, is to bend small glass tubes

of about the tenth part of an inch diameter, in the shape and figure desired, and then fill them with the phosphorus powder. These may be illuminated in the manner described, and they are not so subject to be spoiled, as the figures represented upon the board frequently are.—The best method of illuminating this phosphorus, and which Mr W. Canton generally used, is to discharge a small electric jar near it.

X. The luminous Conductor.

FIG. 6. Plate XCIX. represents a prime conductor invented by Mr Henly, which shews clearly the direction of the electric fluid passing through it, from whence it is called the *luminous conductor*. The middle part E F of this conductor is a glass tube about 18 inches long and three or four inches in diameter. To both ends of this tube the hollow brass pieces F D, B E, are cemented air-tight, one of which has a point C, by which it receives the electric fluid, when set near the excited cylinder of the electrical machine, and the other has a knobby wire G, from which a strong spark may be drawn; and from each of the pieces F D, B E, a knobby wire proceeds within the cavity of the glass tube. The brass piece F D, or B E, is composed of two parts; *i. e.* a cap F cemented to the glass tube, and having a hole with a valve, by which the cavity of the glass tube is exhausted of air; and the ball D, which is screwed upon the cap F. The supporters of this instrument are two glass pillars fastened in the bottom-board H, like the prime conductor represented fig. 2. When the glass tube of this conductor is exhausted of air by means of an air-pump, and the brass ball is screwed on, as represented in the figure, then it is fit for use, and may serve for a prime conductor to an electrical machine. If the point C of this conductor is set near the excited cylinder of the machine, it will appear illuminated with a star; at the same time the glass tube will appear all illuminated with a weak light; but from the knobby wire that proceeds within the glass from the piece F D, a lucid pencil will issue out, and the opposite knob will appear illuminated with a star, which, as well as the pencil of rays, is very clear, and discernible among the other light that occupies the greatest part of the cavity of the tube. If the point C, instead of being presented to the cylinder, be connected with the rubber of the machine, the appearance of light within the tube will be reversed; the knob which communicates with the piece F D appearing illuminated with a star, and the opposite with a pencil of rays; because in this case the direction of the electric fluid is just the contrary of what it was before; it then going from D to B, and now coming from B and going to D.—If the wires within the tube E F, instead of being furnished with knobs, be pointed, the appearance of light is the same; but it seems not so strong in this, as in the other case.

XI. The conducting Glass Tube.

TAKE a glass tube of about two inches diameter, and about two feet long; fix to one of its ends a brass cap, and to the other a stop-cock or a valve; then, by means of an air-pump, exhaust it of air. If this tube be held by one end, and its other end be brought near the electrified prime conductor, it will appear to be full of light whenever a spark is taken by it from the prime conductor,

* See Chemistry, n^o 484.

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conductor, and much more so if an electric jar be discharged through it.—This experiment may also be made with the receiver of an air-pump: take, for instance, a tall receiver, clean and dry; and through a hole at its top insert a wire, which must be cemented air-tight. The end of the wire that is within the tube, must be pointed, but not very sharp; and the other end must be furnished with a knob. Put this receiver upon the plate of the air-pump, and exhaust it. If now the knob of the wire at the top of the receiver be touched with the prime conductor, every spark will pass through the receiver in a dense and large body of light, from the wire, to the plate of the air-pump. When any thing is to be touched with the prime conductor that is not very portable, as the air-pump above-mentioned, the communication between the former and the latter may be made by means of a rod furnished with an electric handle, or the like.

XII. *The Aurora Borealis.*

TAKE a phial nearly of the shape and size of a Florence flask; fix a stop-cock or a valve to its neck, and exhaust it of air as much as possible with a good air-pump. If this glass is rubbed in the common manner used to excite electrics, it will appear luminous within, being full of a flashing light, which plainly resembles the aurora borealis or northern light. This phial may also be made luminous, by holding it by either end, and bringing the other end to the prime conductor; in this case, all the cavity of the glass will instantly appear full of flashing light, which remains in it for a considerable time after it has been removed from the prime conductor.—Instead of the above-described glass vessel, a glass tube, exhausted of air and hermetically sealed, may be used, and perhaps with better advantage. The most remarkable circumstance of this experiment is, that if the phial, or tube, after it has been removed from the prime conductor (and even several hours after its flashing light hath ceased to appear), be grasped with the hand, strong flashes of light will immediately appear within the glass, which often reach from one of its ends to the other.

XIII. *The visible electric Atmosphere.*

G I, fig. 1. Plate C. represents the receiver with the plate of an air-pump. In the middle of the plate I F, a short rod is fixed, having at its top a metal ball B nicely polished, whose diameter is nearly two inches. From the top of the receiver, another rod A D, with a like ball A, proceeds, and is cemented air-tight in the neck C; the distance of the balls from one another being about four inches, or rather more. If, when the receiver is exhausted of air, the ball A be electrified positively, by touching the top D of the rod A D with the prime conductor, or an excited glass tube, a lucid atmosphere appears about it, which although it consists of a feeble light, is yet very conspicuous, and very well defined; at the same time, the ball B has not the least light. This atmosphere does not exit all round the ball A; but reaches from about the middle of it, to a small distance beyond that side of its surface which is towards the opposite ball B. If the rod with the ball A be electrified negatively, then a lucid atmosphere, like the above described, will appear upon the ball B, reaching from its middle to a small distance beyond

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that side of it that is towards the ball A; at the same time, the negatively electrified ball A remains without any light.—The operator in this experiment must be careful not to electrify the ball A too much; for then the electric fluid will pass in a spark from one ball to the other, and the experiment will not have the desired effect. A little practice, however, will render the operation very easy and familiar.

XIV. *Of charging and discharging a Phial in general.*

TAKE a coated jar, as D E, fig. 2. Plate XCIX. and place it upon the table near the prime conductor, so that the knob of its wire, and that only, may be in contact with it: fix the quadrant electrometer E, fig. 2, upon the prime conductor, and then turn the winch of the machine. You will observe, that as the jar is charging, the index of the electrometer will rise gradually as far as 90°, or thereabouts, and then rest: when this happens, you may conclude that the jar has received its full charge. If now you take a discharging rod, and holding it by the glass handle, apply first one of its knobs to the outside coating of the jar, and then bring the other knob near the knob of the wire of the jar, or near the prime conductor that communicates with it, you will hear a report, and see very vivid sparks between the discharging rod, and the conducting substance, communicating with the sides of the jar. This operation discharges the jar. If, instead of using the discharging rod, you touch the outside of the jar with one hand, and bring the other hand near the wire of the jar, the same spark and report will follow; but now you will feel a shock which affects your wrists, elbows, and, if strong, your breast also. If a number of persons join hands, and the first of them touches the outside of the jar, and the last touches the wire communicating with the inside, they will all feel the shock, and precisely at the same perceivable time. This shock, bearing no resemblance to any sensation otherwise felt, cannot consequently be described; and in order that a person may form a just idea of it, he must absolutely feel it.—A shock may be given to any single part of the body, if that part only be brought into the circuit.

XV. *The Leyden Vacuum.*

Fig. 8. and 9. of Plate XCIX. represent a small phial coated on the outside, about three inches up the sides, with tin-foil; at the top of the neck of this phial, a brass cap is cemented, having a hole with a valve, and from the cap a wire proceeds a few inches within the phial, terminating in a blunt point. When this phial is exhausted of air, a brass ball is screwed upon the brass cap, which is cemented into its neck, so as to defend the valve, and prevent any air from getting into the exhausted glass. This phial exhibits clearly the direction of the electric fluid, both in charging and discharging; for if it be held by its bottom, and its brass knob be presented to the prime conductor positively electrified, you will see that the electric fluid cauleth the pencil of rays to proceed from the wire within the phial, as represented fig. 9; and if it is discharged, a star will appear in the place of the pencil, as represented in fig. 8. But if the phial is held by the brass cap, and its bottom be touched with the prime conductor, then the point of the wire on its inside will appear illuminated with a star when charging, and with

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with a pencil when discharging. If it be presented to a prime conductor electrified negatively, all these appearances, both in charging and discharging, will be reversed.

XVI. To pierce a Card and other Substances with the electric Explosion.

TAKE a card, a quire of paper, or the cover of a book, and keep it close to the outside coating of a charged jar; put one knob of the discharging rod upon the card, quire of paper, &c. so that between the knob and coating of the jar, the thickness of that card, or quire of paper, only is interposed; lastly, by bringing the other knob of the discharging rod near the knob of the jar, make the discharge, and the electric matter will pierce a hole (or perhaps several) quite through the card, or quire of paper. This hole has a bur raised on each side, except the card, &c. be pressed hard between the discharging rod and the jar; which shows that the hole is not made in the direction of the passage of the fluid, but in every direction from the centre of the resisting body.—If this experiment be made with two cards instead of one, which however must be kept very little distant from one another, each of the cards, after the explosion, will be found pierced with one or more holes, and each hole will have burrs on both surfaces of each card. The hole, or holes, are larger or smaller, according as the card, &c. is more damp or more dry. It is remarkable, that if the nozzles are presented to it, they will be affected with a sulphureous, or rather a phosphoreous, smell, just like that produced by an excited electric.

If, instead of paper, a very thin plate of glass, rosin, sealing-wax, or the like, be interposed between the knob of the discharging rod and the outside coating of the jar, on making the discharge, this will be broken in several pieces. Small insects may also be killed in this manner. They may be held between the outside coating of the jar, and the knob of the discharging rod, like the above card; and a shock of a common phial sent through them, will instantly deprive them of life, if they are pretty small: but if larger, they will be affected in such a manner, as to appear quite dead on first receiving the stroke; but will, after some time, recover: this, however, depends on the quantity of the charge sent through them.

XVII. To shew the Effect of the Shock sent over the Surface of a Card or other Substances.

Put the extremities of two wires upon the surface of a card, or other body of an electric nature, so that they may be in one direction, and about one inch distance from one another; then, by connecting one of the wires with the outside of a charged jar, and the other wire with the knob of the jar, the shock will be made to pass over the card or other body.—If the card be made very dry, the lucid track between the wires will be visible upon the card for a considerable time after the explosion. If a piece of common writing paper be used instead of the card, it will be torn by the explosion into very small bits.

If, instead of the card, the explosion is sent over the surface of a piece of glass, this will be marked with an indelible track, which generally reaches from the extremity of one of the wires to the extremity of the

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other. In this manner, the piece of glass is very seldom broken by the explosion. But Mr Henly has discovered a very remarkable method to increase the effect of the explosion upon the glass; which is by pressing with weights that part of the glass which lies between the two wires, (i. e. that part over which the shock is to pass). He puts first a thick piece of ivory upon the glass, and places upon that ivory a weight at pleasure, from one quarter of an ounce to six pounds: The glass in this manner is generally broken by the explosion into innumerable fragments, and some of it is absolutely reduced into an impalpable powder. If the glass is very thick, and resists the force of the explosion, so as not to be broken by it, it will be found marked with the most lively prismatic colours, which are thought to be occasioned by very thin laminæ of the glass, in part separated from it by the shock. The weight laid upon the glass is always shook by the explosion, and sometimes it is thrown quite off from the ivory. This experiment may be made conveniently made with the universal discharger, fig. 5. of Plate XCIX.

XVIII. To swell Clay, and break small Tubes, by the electric Explosion.

ROLL up a piece of soft tobacco-pipe clay in a small cylinder C D, fig. 2. Plate C. and insert in it two wires A, B, so that their ends without the clay may be about a fifth part of an inch from one another. If a shock be sent through this clay, by connecting one of the wires A or B with the outside of a charged jar, and the other with the inside, it will be inflated by the shock, i. e. by the spark, that passes between the two wires, and, after the explosion, will appear as represented fig. 3. If the shock sent through it is too strong, and the clay not very moist, it will be broken by the explosion, and its fragments scattered in every direction. To make this experiment with a little variation, take a piece of the tube of a tobacco-pipe, about one inch long, and fill its bore with moist clay; then insert in it two wires, as in the above rolled clay; and send a shock through it. This tube will not fail to burst by the force of the explosion, and its fragments will be scattered about to a great distance. If, instead of clay, the above-mentioned tube of the tobacco-pipe, or a glass tube (which will answer as well), be filled with any other substance, either electric or non-electric, inferior to metal, on making the discharge, it will be broken in pieces with nearly the same force. This experiment is the invention of Mr Lane, F. R. S.

XIX. To make the electric Spark visible in Water.

FILL a glass tube of about half an inch diameter, and six inches long, with water; and to each extremity of the tube adapt a cork, which may confine the water; through each cork insert a blunt wire, so that the extremities of the wires within the tube may be very near one another; lastly, connect one of these wires with the coating of a small charged phial, and touch the other wire with the knob of it; by which means the shock will pass through the wires, and cause a vivid spark to appear between their extremities within the tube. In performing this experiment, care must be taken that the charge be exceedingly weak, otherwise the tube will burst. C in fig. 4. Plate C. represents

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presents a common drinking glass almost full of water. A B are two knotted wires, so bent, that their knobs may be within a little distance of one another in the water. If one of these wires be connected with the outside coating of a pretty large jar, and the other wire be touched with the knob of it; the explosion which must pass through the water from the knob of one of the wires to that of the other, will disperse the water, and break the glass with a surprising violence. This experiment is very dangerous if not conducted with great caution.

XX. To fire Gun-powder.

MAKE a small cartridge of paper, and fill it with gun-powder, or else fill the tube of a quill with it; insert two wires, one at each extremity, so that their ends within the quill, or cartridge, may be about one fifth of an inch from one another: this done, send the charge of a phial through the wires; and the spark between their extremities, that are within the cartridge, or quill, will set fire to the gun-powder. If the gun-powder be mixed with steel-filings, it will take fire more readily, and with a very small shock.

XXI. To strike Metals into Glass.

TAKE two slips of common window-glass about three inches long, and half an inch wide; put a small slip of gold, silver, or brass leaf, between them, and tie them together, or else press them together between the boards of the press H, belonging to the universal discharger fig. 5. Plate XCIX. leaving a little of the metallic leaf out between the glasses at each end; then send a shock through this metallic leaf, and the force of the explosion will drive part of the metal into so close a contact with the glass, that it cannot be wiped off, or even be affected by the common menstrua which otherwise would dissolve it. In this experiment the glasses are often shattered to pieces; but whether they are broken or not, the indelible metallic tinge will always be found in several places, and sometimes thro' the whole length of both glasses.

XXII. To stain Paper or Glass.

LAY a chain, which forms a part of the circuit between the two sides of a charged jar, upon a sheet of white paper; and if a shock be sent through it, the paper will be found stained with a blackish tinge at the very juncture of the links. If the charge be very large, the paper, instead of being stained with spots, is burnt through. If the chain be laid upon a pane of glass instead of paper, the glass will often be found stained with spots in several places, but (as might be expected) not so deep as the paper. If this experiment be made in the dark, a spark will be seen at every juncture of the links; and if the links are small, and the shock pretty strong, the chain will appear illuminated like a line of fire.

XXIII. The lateral Explosion.

If a jar be discharged with a discharging rod that has no electric handle, the hand that holds it, in making the discharge, feels some kind of shock, especially when the charge is considerable. In other words: A person, or any conducting substance, that is connected with one side of a jar, but forms no part of the

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circuit, will feel a kind of shock, *i. e.* some effect of the discharge. This may be rendered visible in the following manner. Connect with the outside of a charged jar a piece of chain; then discharge the jar thro' another circuit, as for instance with a discharging rod in the common way, and the chain that communicates with the outside of the jar, and which makes no part of the circuit, will appear lucid in the dark, *i. e.* sparks will appear between the links; which shows, that the electric fluid, natural to that chain, must by some means have been disturbed. This chain will also appear luminous, if it is not in contact with the outside of the jar, but only very near it; and on making the discharge, a spark will be seen between the jar, and the end of the chain near it. This electrical appearance out of the circuit of a discharging jar, is that which we call the *lateral explosion*; and to make it appear in the most conspicuous manner, observe the following method, which is of that Dr Priestley.

When a jar is charged, and stands upon the table as usual, insulate a thick metallic rod, and place it so that one of its ends may be contiguous to the outside coating of the jar; and within about half an inch of its other end, place a body of about six or seven feet in length, and a few inches in breadth: then put a chain upon the table, so that one of its ends may be about an inch and a half distant from the coating of the jar: at the other end of the chain apply one knob of the discharging rod, and bring the other knob to the wire of the jar, in order to make the explosion. On making the discharge in this manner, a strong spark will be seen between the insulated rod, which communicates with the coating of the jar, and the body near its extremity, which spark does not alter the state of that body in respect to electricity. Whether this lateral explosion is received on flat and smooth surfaces, or upon sharp points, the spark is always equally long and vivid.

XXIV. To discharge a Jar silently.

WHEN a large jar is fully charged, which would give a terrible shock, put one of your hands in contact with its outside coating; with the other hold a sharp pointed needle, and keeping the point directed towards the knob of the jar, proceed gradually near it, until the point of the needle touches the knob. This operation discharges the jar entirely; and you will either receive no shock at all, or so small a one as can hardly be perceived. The point of the needle, therefore, has silently and gradually drawn all the superfluous fluid from the inside surface of the electric jar.

XXV. Drawing the Electricity from the prime Conductor by a Point.

LET a person hold the knob of a brass rod at such a distance from the prime conductor, that sparks may easily fly from the latter to the former, when the machine is in motion. Then let the winch be turned; and while the sparks are following one another, present the sharp point of a needle at nearly twice the distance from the prime conductor, that the knotted rod is held; and you will observe that no more sparks will go to the rod:—remove the needle entirely, and the sparks will be seen again;—present the needle, and the sparks disappear: which evidently shows, that the point of the

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the needle draws off silently almost all the fluid that the cylinder throws upon the prime conductor.

If the needle be fixed upon the prime conductor with the point outward, and the knob of a discharging rod, or the knuckle of a finger, be brought very near the prime conductor, though the excitation of the cylinder may be very strong, yet you will perceive that no spark, or an exceeding small one, can be obtained from the prime conductor.

XXVI. The electric Fly.

Fix the fly formerly described upon the prime conductor, as represented by D, fig. 2. of Plate XCIX. then turn the winch of the machine, and the fly will immediately begin to move round, in an horizontal position, and in the direction of the letters *adcb*, i. e. contrary to the direction of the points of the wires. If the experiment is repeated with a conductor negatively electrified, the fly will turn the same way as before, viz. in the direction of the letters *adcb*. The above fly does not move *in vacuo*; and even if placed under a clofe receiver, it will turn but for a little while, and then stop; for the quantity of air contained in the receiver may become readily and equally electrified. If, when the fly under the clofe receiver is stopped, you put the end of your finger on the outside of the glass, opposite to one of the points of the fly, this will move again briskly: and by altering the position of your finger occasionally round the glass, you may continue its action a considerable time, viz. till most of that part of the glass is charged.

XXVII. The electrified Cotton.

TAKE a small lock of cotton, extended in every direction as much as conveniently can be done; and by a linen thread about five or six inches long, or by a thread drawn out of the same cotton, tie it to the end of the prime conductor: then let the winch of the machine be turned, and the lock of cotton, on being electrified, will immediately swell, by repelling its filaments from one another, and will stretch itself towards the nearest conductor. In this situation let the winch be kept turning, and present the end of your finger, or the knob of a wire, towards the lock of cotton, which will then immediately move towards the finger, and endeavour to touch it; but take with the other hand a pointed needle, and present its point towards the cotton, a little above the end of the finger, and you will observe the cotton immediately to shrink upward, and move towards the prime conductor.—Remove the needle, and the cotton will come again towards the finger.—Present the needle, and the cotton will shrink again.

XXVIII. The electrified Bladder.

TAKE a large bladder well blown, and cover it with gold, silver, or brads leaf, sticking it with gum-water: suspend this bladder at the end of a silk thread, at least six or seven feet long, hanging from the ceiling of the room; and electrify the bladder, by giving it a strong spark with the knob of a charged bottle: this done, take a knobbed wire, and present it to the bladder when motionless; and you will perceive, that as the knob approaches the bladder, the bladder also moves towards the knob, and, when nearly touching it, gives

it the spark, which it received from the charged phial, and thus it becomes unelectrified. Give it another spark, and, instead of the knobbed wire, present the point of a needle towards it, and you will perceive that the bladder will not be attracted by, but rather recede from, the point, especially if the needle be very suddenly presented towards it.

XXXI. The electrified Capillary Syphon.

LET a small bucket of metal, full of water, be suspended from the prime conductor; and put in it a glass syphon of so narrow extremity, as that the water will just drop from it. If, in this disposition of the apparatus, the winch of the machine be turned, the water, which, when not electrified, only dropt from the extremity of the syphon, will now run in a full stream, which will even be subdivided into smaller streams; and if the experiment be made in the dark, it will appear beautifully illuminated.

XXX. The electrified Bells.

FIGURE 5, of Plate C. represents an instrument having three bells, which are caused to ring by the power of electric attraction and repulsion. B is a brads piece furnished with a hook, by which it may be suspended from the rod proceeding from the extremity of the prime conductor A. The brads bells C and E, are suspended by brads chains; but the middle bell D, and the two small brads clappers between C D and D E, are suspended by silk threads. From the concave part of the bell D a brads chain proceeds, which falls upon the table, and has a silk thread F at its extremity. The apparatus being disposed as in the figure, if the cylinder of the machine be turned, the clappers will fly from bell to bell with a very quick motion, and the bells will ring as long as they are kept electrified.

The two bells C and E, being suspended by brads chains, are first electrified: hence they attract the clappers, communicate to them a little electricity, and repel them to the unelectrified bell D; upon which the clappers deposit their electricity, and then run again to the bells C, E, from which they acquire more electricity, &c. If, by holding the silk thread F, the chain of the middle bell be raised from the table, the bells, after ringing a little while, will stop; because bell D, remaining insulated, will soon become as strongly electrified as either of the two other bells; in which case the clappers, having no opportunity to deposit the electricity that they acquire from the bells C, E, must consequently stop.

If this experiment be made in the dark, sparks will be seen between the clappers and the bells.

XXXI. The Spider seemingly animated by Electricity.

FIG. 6. of Plate C. represents an electric jar, having a wire C D E fastened on its outside, which is bended so as to have its knob E as high as the knob A. B is a spider made of cork, with a few short threads run through it to represent its legs. This spider is fastened at the end of a silk thread, proceeding from the ceiling of the room, or from any other support, so that the spider may hang mid-way between the two knobs A, E, when the jar is not charged. Let the place of the jar upon the table be marked; then charge

charge the jar, by bringing its knob A in contact with the prime conductor, and replace it in its marked place. The spider will now begin to move from knob to knob, and continue this motion for a considerable time, sometimes for several hours.

The inside of the jar being charged positively, the spider is attracted by the knob A, which communicates to it a small quantity of electricity; the spider then becoming possessed of the same electricity with the knob A, is repelled by it, and runs to the knob E, where it discharges its electricity, and is then attracted by the knob A, and so on. In this manner the jar is gradually discharged; and when the discharge is nearly completed, the spider finishes its motion.

XXXII. *The Spiral Tube.*

FIG. 7. of Plate C. represents an instrument composed of two glass tubes CD, one within another, and clofed with two knobbed bras caps A and B. The innermost of these tubes has a spiral row of small round pieces of tin-foil stuck upon its outside surface, and lying at about one thirtieth of an inch from each other. If this instrument be held by one of its extremities, and its other extremity be presented to the prime conductor, every spark that it receives from the prime conductor will cause small sparks to appear between all the round pieces of tin-foil stuck upon the innermost tube; which in the dark affords a pleasing spectacle, the instrument appearing encompassed by a spiral line of fire.

The small round pieces of tin-foil are sometimes stuck upon a flat of glass ABCD, fig. 8. so as to represent curve lines, flowers, letters, &c.; and they are illuminated after the same manner as the spiral tube, *i. e.* by holding the extremity C or B in the hand, and presenting the other extremity to the prime conductor, when the machine is in motion.

XXXIII. *The Dancing Balls.*

Fix a pointed wire upon the prime conductor, with the point outward; then take a glass tumbler, grasp it with your hands, and present its inside surface to the point of the wire upon the prime conductor, while the machine is in motion: the glass in this manner will soon become charged; for its inside surface acquires the electricity from the point, and the hands serve as a coating for the outside. This done, put a few pith balls upon the table, and cover them with this charged glass tumbler. The balls will immediately begin to leap up along the sides of the glass, as represented fig. 9. Plate C. and will continue their motion for a considerable time.

XXXIV. *The Electrical Jack.*

THIS is an invention of Dr Franklin's, and turns with considerable force, so that it may sometimes be used for the purposes of a common jack. A small upright shaft of wood passes at right angles through a thin round board of about 12 inches diameter, and turns on a sharp point of iron fixed in the lower end, while a strong wire in the upper end, passing through a small hole in a thin brass plate, keeps the shaft truly vertical. About 30 radii, of equal length, made of

fast-glass cut into narrow slips, issue horizontally from the circumference of the board, the ends most distant from the centre being about four inches apart. On the end of every one a brass thimble is fixed. If now the wire of a bottle electrified in the common way be brought near the circumference of this wheel, it will attract the nearest thimble, and so put the wheel in motion. That thimble, in passing by, receives a spark; and thereby being electrified, is repelled, and so driven forwards; while a second, being attracted, approaches the wire, receives a spark, and is driven after the first; and so on, till the wheel has gone once round; when the thimbles before electrified approaching the wire, instead of being attracted, as they were at first, are repelled, and the motion presently ceases. But if another bottle which had been charged thro' the coating, or otherwise negatively electrified, is placed near the same wheel, its wire will attract the thimble repelled by the first, and thereby double the force that carries the wheel round. The wheel therefore moves very swiftly, turning round 12 or 15 times in a minute, and with such force, that a large fowl spitted on the upper shaft may be roasted by means of it.

XXXV. *The Self-moving Wheel.*

THIS appears more surprising than the former, tho' constructed upon the same principles. It is made of a thin round plate of window-glass 17 inches in diameter, well joint on both sides, all but two inches next the edge. Two small hemispheres of wood are then fixed with cement to the middle of the upper and under sides, centrally opposite; and in each of them a strong thick wire eight or ten inches long, which together make the axis of the wheel. It turns horizontally on a point at the lower end of its axis, which rests on a bit of brass cemented within a glass salt-celler. The upper end of its axis passes through a hole in a thin brass plate, cemented to a long and strong piece of glass; which keeps it fix or eight inches distant from any non-electric, and has a small ball of wax or metal on its top to keep in the fire.

In a circle on the table which supports the wheel, are fixed 12 small pillars of glass, at about 11 inches distance, with a thimble on the top of each. On the edge of the wheel is a small leaden bullet, communicating by a wire with the gilding of the upper surface of the wheel; and about six inches from it, is another bullet communicating in like manner with the under surface. When the wheel is to be charged by the upper surface, a communication must be made from the under surface to the table. As soon as it is well charged, it begins to move. The bullet nearest to a pillar moves towards the thimble on that pillar; and, passing by, electrifies it, and is then repelled from it. The succeeding bullet, which communicates with the other surface of the glass, more strongly attracts that thimble on account of its being electrified before by the other bullet; and thus the wheel increases its motion, till the resistance of the air regulates it. It will go half an hour; and make, one minute with another, 20 turns in a minute, which is 600 turns in the whole; the bullet in the upper surface giving in each turn 12 sparks to the thimbles, making in all 2500 sparks; while the same quantity of fire is thought to be received by the under bullet. The whole space moved over

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by these bullets in the mean time is 2500 feet. If, instead of two bullets, you put eight, four communicating with the upper and four with the under surface, the force and swiftness will be greatly increased, and the wheel will make about 50 turns in a minute; but then, it will not continue moving for such a long time. These wheels may be applied to the ringing of chimes, and the moving of small orreries, &c.

XXXVI. *The Magic Picture.*

THIS is a contrivance of Mr Kinnerley; and is perhaps more calculated to give surprise, than any other experiment in electricity. It is made in the following manner: Having a large mezzotint, with a frame and glass, (suppose of the king), take out the print, and cut a pannel out of it near two inches distant from the frame all round. If the cut be through the picture, it is nothing the worse. With thin paste, or gum water, fix the board that is cut off on the inside of the glass, pressing it smooth and close; then fill up the vacancy, by gilding the brags well with leaf-gold or brags. Gild likewise the inner edge of the back of the frame all round, except the top part, and form a communication between that gilding and the gilding behind the glass; then put in the board, and that side is finished. Turn up the glass, and gild the fore-side exactly over the back gilding; and when it is dry, cover it, by pasting on the pannel of the picture that has been cut out; observing to bring the correspondent parts of the board and picture together, by which the picture will appear of a piece as at first; only part is behind the glass, and part before. Lastly, hold the picture horizontally by the top, and place a little moveable gilt crown on the king's head. If now the picture is moderately electrified, and another person take hold of the frame with one hand, so that his fingers touch its inside gilding, and with the other endeavour to take off the crown, he will receive a terrible blow, and fall in the attempt. The operator, who holds the picture by the upper end, where the inside of the frame is not gilt, to prevent its falling, feels nothing of the shock; and may touch the face of the picture without danger, which he pretends to be a test of his loyalty.

XXXVII. *Imitations of the Planetary Motions.*

FROM the prime conductor suspend six concentric hoops of metal, at different distances from each other; and under them, on a stand, place a metal plate at the distance of about half an inch. Then place upon the plate within each hoop, and near to it, a round glass bubble blown very light: these bubbles and the distances between the hoops should correspond to the different diameters of the planets and those of their orbits; but as that cannot be on account of the vast disproportion between them, it must suffice here to make a difference that bears some relation to them. Now, the hoops being electrified, the bubbles placed upon the plate, near the hoops, will be immediately attracted by them, and they will continue to move round the hoops as long as the electrification continues. If the electricity is very strong, the bubbles will frequently be driven off from the hoops, and make a variety of surprising motions round their axis, and running hither and thither on the plate, after which they will come back to the hoops and run round them as before.

If the room is darkened, all the glass balls will appear beautifully illuminated.

Another method of imitating the planetary motions is, by means of a hollow cork or pith ball, suspended by a silk thread, as mentioned under the article *ΑΣΤΡΟΝΟΜΗ*, n° 102. The same experiment will succeed with a metallic ball strongly electrified either way. It is similar to those by Mr Grey formerly mentioned. As it will not succeed without the candle, (for a vial charged with an electricity opposite to the former will not do), it seems most likely that Mr Grey had succeeded in his experiments by the unheeded circumstance of sometimes having a candle near him when he made them. Other imitations of these motions have been contrived, and an ingenious person may contrive to vary these and other electrical experiments almost infinitely. Small orreries, planetariums, clocks, &c. have been constructed to go by the blast of electric matter issuing from a point: but as these are in no way connected with electricity, and would move as well by means of the draught of air through a chimney, or a current of water, we apprehend it is needless to give any particular description of them.

XXXVIII. *The Thunder-house.*

FIG. 10. of Plate C. is an instrument representing the side of a house, either furnished with a metallic conductor, or not; by which both the bad effects of lightning striking upon a house not properly secured, and the usefulness of metallic conductors, may be clearly represented. A is a board about three quarters of an inch thick, and shaped like the gable-end of a house. This board is fixed perpendicularly upon the bottom-board B, upon which the perpendicular glass pillar CD is also fixed in a hole about eight inches distant from the basis of the board A. A square hole ILMK, about a quarter of an inch deep, and nearly one inch wide, is made in the board A, and is filled with a square piece of wood nearly of the same dimensions. It is mentioned nearly of the same dimensions, because it must go so easily into the hole, that it may drop off by the least shaking of the instrument. A wire LK is fastened diagonally to this square piece of wood. Another wire IH of the same thickness, having a brass ball H, screwed on its pointed extremity, is fastened upon the board A; so also is the wire MN, which is shaped in a ring at O. From the upper extremity of the glass pillar CD, a crooked wire proceeds, having a spring socket F, through which a double knobbed wire slips perpendicularly, the lower knob G of which falls just above the knob H. The glass pillar DC must not be made very fast into the bottom board; but it must be fixed so as it may be pretty easily moved round its own axis, by which means the brass ball G may be brought nearer or farther from the ball H, without touching the part EFG. Now when the square piece of wood LMIK (which may represent the shutter of a window or the like), is fixed into the hole so, that the wire LK stands in the dotted representation IM, then the metallic communication from H to O is complete, and the instrument represents a house furnished with a proper metallic conductor: but if the square piece of wood LMIK is fixed so, that the wire LK stands in the direction LK, as represented in the figure, then the metallic conductor HO, from the top of

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Theory. of the house to its bottom, is interrupted at IM, in which case the house is not properly secured.

Fix the piece of wood LMIK so, that its wire may be as represented in the figure, in which case the metallic conductor HO is discontinued. Let the ball G be fixed at about half an inch perpendicular distance from the ball H; then, by turning the glass pillar DC, remove the former ball from the latter; by a wire or chain connect the wire EF with the wire Q of the jar P, and let another wire or chain, fastened to the hook O, touch the outside coating of the jar. Connect the wire Q with the prime conductor, and charge the jar; then, by turning the glass pillar DC, let the ball G come gradually near the ball H; and when they are arrived sufficiently near one another, you will observe, that the jar explodes, and the piece of wood LMIK is pushed out of the hole to a considerable distance from the thunder-house. Now the ball G, in this experiment, represents an electrified cloud, which when it is arrived sufficiently near the top of the house A, the electricity strikes it; and as this house is not secured with a proper conductor, the explosion breaks off a part, *i. e.* knocks off the piece of wood IM.

Repeat the experiment with only this variation, *viz.* that this piece of wood IM is situated so, that the wire LK may stand in the situation IM, in which case the conductor HO is not discontinued; and you will observe, that the explosion will have no effect upon the piece of wood LM, this remaining in the hole unmoved; which shows the usefulness of the metallic conductor.

Further. Uncrew the brass ball H from the wire HI, so that this may remain pointed. With this difference only in the apparatus, repeat both the above experiments; and you will find that the piece of wood LM is in neither case moved from its place, nor any explosion will be heard; which not only demonstrates the preference of the conductors with pointed termination to those with blunted ones; but also shows that a house, furnished with sharp terminations, although not furnished with a regular conductor, is almost sufficiently guarded against the effects of lightning. See THUNDER.

SECT. V. Of the different Theories of Electricity, with the principal Experiments brought in favour of each, and which tend more particularly to shew the nature of the Electric Fluid.

It is not to be supposed, that the phenomena of electricity would long be observed without attempts to account for them. In fact, this was attempted by Thales, who first observed the attractive power of amber. At this property he was so much surprised, that he reckoned the amber to be animated. With regard to the sentiments of Theophrastus on this subject, we are entirely in the dark; but, among the first electricians, all the phenomena were derived from *unctuous effluvia* emitted by the excited electric. These were supposed to fasten upon all bodies in their way, and to carry back with them all that were not too heavy. For, at that time, effluvia of every kind were supposed to return to the bodies from which they were emitted; since nobody could otherwise account for the substance not being sensibly wasted by the constant emission. When these light bodies on which the un-

ctuous effluvia had fastened were arrived at the excited electric, a fresh emission of the effluvia was supposed to carry them back again. But this effect of the effluvia was not thought of till electric repulsion, as well as attraction, had been fully observed.

The discovery of a difference between conducting and non-conducting substances, threw considerable difficulties in the way of those who maintained the hypothesis of unctuous effluvia. When the Newtonian philosophy began to be pretty generally received, the terms *attraction* and *repulsion* were quickly introduced into electricity, as well as other branches of philosophy; and the electric effluvia, instead of being of an *unctuous* nature, were said to be of an attractive or repulsive one. At the same time, the apparent flow which is put to the progress of these effluvia by any electric substance, introduced a question not yet well decided, *viz.* Whether electric bodies are penetrable by the fluid or not.

When Mr Du Fay discovered the two opposite species of electricity, at that time distinguished by the names of *vitreous* and *resinous*, and afterwards by those of *plus* and *minus*, or positive and negative, he formed the idea of two distinct electric fluids. Both these were supposed to have a *repulsive* power with respect to themselves, but an *attractive* one with regard to one another.

As long as electrical attraction and repulsion were the only phenomena to be accounted for, this theory formed the purpose well enough. To account for attraction and repulsion by an *attractive* and *repulsive* power, was indeed no explication at all; but it afforded a change of terms, which is frequently enough mistaken for an explanation both in electricity and other parts of philosophy.—At last, however, Mr Du Fay dropped his opinion concerning the existence of two electric fluids, and thought that all the phenomena might be accounted for from the action of a single one. The vitreous or positive electricity, which was supposed to be the stronger, he thought might attract the negative, or weaker, electricity.—It is indeed true, that, in all experiments, the positive electricity doth manifest a superiority in strength over the negative, something like that superior degree of vigour which is observed in the north pole of a loadstone over the south pole. According to Mr Du Fay's own principles, however, had this been the case, a body positively electrified ought to have attracted one electrified negatively more weakly than one not electrified at all; which is contrary to experience.

During all this time, however, it was imagined, that the electric matter, whether it consisted of one or more fluids, was produced from the electric body by friction; but by a discovery of Dr Watson's, it became universally believed, that the glass globes and tubes served only to set the fluid in motion, but by no means to produce it.—He was led to this discovery by observing, that, upon rubbing the glass tube, while he was standing upon cakes of wax or rosin, (in order, as he expected, to prevent any discharge of the electric matter upon the floor), the power was, contrary to his expectation, so much lessened, that no snapping could be observed upon another person's touching any part of his body; but that, if a person not electrified held his hand near the tube while it was rubbed, the snapping

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Two electric fluids
supposed by
Mr du Fay.

47
Electric
phenomena
ascribed to
unctuous ef-
fluvia.

49
Electric
matter dis-
covered to
come from
the earth.

Theory.

Theory.

ping was very sensible.—The event was the same when the globe was whirled in similar circumstances. For, if the man who turned the wheel, and who, together with the machine, was suspended upon silk, touched the floor with one foot, the electric fire appeared upon the conductor; but if he kept himself free from any communication with the floor, little or no fire was produced.—He observed, that only a spark or two would appear between his hand and the insulated machine, unless he at the same time formed a communication between the conductor and the floor; but that then, there was a constant and copious flux of the electric matter observed between them. From these, and some other experiments of a similar kind, the Doctor discovered what he called the *complete circulation* of the electric matter. When he found, that, by cutting off the communication of the glass globe with the floor, all electric operations were stopped, he concluded, that the electric fluid was conveyed from the floor to the rubber, and from thence to the globe. For the same reason, seeing the rubber, or the man who had a communication with it, gave no sparks but when the conductor was connected with the floor, he as naturally concluded, that the globe was supplied from the conductor, as he had before concluded that it was supplied from the rubber.—From all this he was at last led to form a new theory of electricity, namely, that, in all electric operations, there was both an *afflux* of electric matter to the globe and the conductor, and likewise an *efflux* of the same electric matter from them.—Finding that a piece of leaf-silver was suspended between a plate electrified by the conductor, and another communicating with the floor, he reasons from it in the following manner. “No body can be suspended in equilibrium but by the joint action of two different directions of power: so here the blast of electric ether from the floor setting through it, drives the silver towards the plate electrified. We find from hence, likewise, that the draught of electric ether from the floor is always in proportion to the quantity thrown by the globe over the gun-barrel (the prime conductor at that time made use of), or the equilibrium by which the silver is suspended could not be maintained.”—Some time after, however, the Doctor retracted this opinion concerning the afflux and efflux, and supposed that all the electric phenomena might be accounted for from the excess or diminution of the quantity of electric matter contained in different bodies. This theory was afterwards adopted by Dr Franklin, and continues to be generally received.

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Dr Watson's theory of afflux and efflux.

⁵¹
Difficulty concerning the direction of the electric fluid.

One great difficulty with which the first electricians were embarrassed, (and which is yet scarcely removed), was to ascertain the direction of the fluid. At first, all electric powers, as we have already observed, were supposed to reside in the excited globe or glass tube. The electric spark therefore was supposed to proceed from the electrified body towards any conductor that was presented towards it. It was never imagined there could be any difference in this respect, whether it was amber, glass, sealing-wax, or any thing else that was excited. This progress of the electric matter was thought to be quite evident to the senses; and therefore, the observation of electric appearances at an insulated rubber occasioned the greatest astonishment.—In this case, the current could not be supposed to flow

both from the rubber and the conductor, and yet the first appearances were the same. To provide a supply of the electric matter, therefore, philosophers were obliged to suppose, that, notwithstanding appearances were in both cases much the same, the electric fluid was really emitted in one case by the electrified body, and received by it in the other. But now being obliged to give up the evidence from sight for the manner of its progress, they were at a loss, whether, in the usual method of electrifying by excited glass, the fluid proceeded from the rubber to the conductor, or from the conductor to the rubber.—It was, however, soon found, that the electricity at the rubber was the reverse of that at the conductor, and in all respects the same with that which had before been produced by the friction of sealing-wax, sulphur, resin, &c. Seeing, therefore, that both the electricities were produced at the same time, by one and the same electric, and by the same friction, all philosophers were naturally led to conclude, that both were modifications of one fluid; though in what manner that fluid was modified throughout the immense variety of electric phenomena, was a matter not easy to be determined.

On this subject, the Abbe Nollet adopted the doctrine of *afflux* and *efflux* already mentioned. He supposed, that, in all electrical operations, the fluid is thrown into two opposite motions; that the afflux of this matter drives all light bodies before it by impulse upon the electrified body, and its efflux carries them back again. He was, however, very much embarrassed in accounting for facts where both these currents must be considered; as in the quick alternate attraction and repulsion of light bodies by an excited glass tube, or other excited electric. To obviate this difficulty, he supposes that every excited electric, and likewise every body to which electricity is communicated, has two orders of pores, one for the emission of the effluvia, and another for the reception of them.—Mr de Tour improved upon Nollet's hypothesis, and supposed that there is a difference between the affluent and effluent current; and that the particles of the fluid are thrown into vibrations of different qualities, which makes one of these currents more copious than the other, according as sulphur or glass is used.—It is impossible, however, that suppositions so very arbitrary could be at all satisfactory, or received as proper solutions of the electric phenomena.

⁵²
Abbe Nollet's theory.

No less difficult was it for philosophers to determine the nature of the electric fluid, than its manner of acting.—It had been in a manner generally believed, that fire was not a distinct element, but arose from some violent repulsions, rarefactions, &c. among the particles of ignited bodies. The great resemblance of the electric fluid to elementary fire, however, seemed strongly to militate against this opinion. The hypothesis therefore of fire as a distinct principle or element, began to revive. Some maintained, that the electric fluid was really this principle; others thought that it was a fluid *à la generis*, very much resembling that of fire; while others, with Mr Boulanger at their head, imagined that it was nothing more than the finer parts of the atmosphere, which crowded upon the surfaces of electric bodies, when the grosser parts had been driven away by the friction of the rubber.

⁵³
Different opinions concerning the nature of the electric fluid.

This last opinion, however, soon received a full refutation

Theory.

Theory.

futation from the experiments of Dr Watson above-mentioned; by which it was proved, that the electric matter came not from the atmosphere, but from the earth.---About the same time the Leyden phial was discovered, and the extraordinary effects of it rendered the inquiries into the nature of the electric fluid much more general than before. But still, the violent prejudice against the existence of fire as a real element or fluid distinct from terrestrial bodies, continued in its full vigour, and the most extravagant theories were acquiesced in, rather than the simple position above-mentioned.---It would be tedious, and indeed impossible, to give an account of all the theories which were now invented. One of the most remarkable, and most consistent, was that of Mr Wilson ---According to this gentleman, the chief agent in all the operations of electricity, is Sir Isaac Newton's ether; which is more or less dense in all bodies in proportion to the finallness of their pores, except that it is much denser in sulphureous and unctuous bodies. To this ether are ascribed the principal phenomena of attraction and repulsion: the light, the sulphureous or rather phosphoreal smell with which violent electricity is always attended, and other sensible qualities, are ascribed to the grosser particles of bodies driven from them by the forcible action of this ether. He also endeavours to explain many electrical phenomena by means of a subtile medium at the surface of all bodies; which is the cause of the refraction and reflection of the rays of light, and also resists the entrance and exit of this ether. This medium, he says, extends to a small distance from the body, and is of the same nature with what is called the *electric fluid*. On the surface of conductors this medium is rare, and easily admits the passage of the electric fluid; whereas, on the surface of electrics, it is dense and resists it. The same medium is rarefied by heat, which thus changes conductors into non-conductors. By far the greater number of philosophers, however, rejected the opinion of Mr Wilson; and as they neither chose to allow the electric fluid to be *fire* nor *ether*, they were obliged to own that it was a fluid *fui generis*, i. e. one of whose nature they were totally ignorant.

But, while philosophers were thus embarrassed in their electrical theories, a vast number of interesting phenomena were discovered by the assiduity of a number of different electricians in different countries.---Mr Winckler observed, that if glass was rubbed on the inside, it would shew strong appearances of electricity on the outside; which seemed to favour the opinion of the permeability of glass to the electric matter.---Other German electricians used several globes at a time, and imagined they found effects proportionable; though this has since been denied. Such a prodigious force, however, could they excite by means of these globes whirled by a large wheel, and rubbed by the hand or with woollen cloth, that, according to their own accounts, blood could be drawn from a finger by means of the electric spark, the skin would burst, and a wound appear, as if made by a caustic. If several globes or tubes were used, they said, that the motion of the heart and arteries would be very perceptibly increased in such as were electrified; and that if a vein was opened in these circumstances, the blood issuing from it would appear like lucid phosphorus, and run out faster

than when the person was not electrified.---Mr P. Gordon, a Scots Benedictine monk, and professor of philosophy at Erfurd, increased the electric sparks to such a degree, that they were felt from a man's head to his foot, so that he could hardly take them without falling down with giddiness, and small birds were killed by them. This was effected by conveying the electricity with iron wires to the distance of 200 ells from the place of excitation. He also found, that the sparks were stronger when the wires were thick than when they were small.

While the power of electricity was thus tried, another question of great importance was likewise decided, namely, Whether electricity acted according to the largeness of the surface of bodies. This was found to be in proportion to the surface, and not the solid contents. The magnetic effluvia also were found not to interfere in the least with the electrical ones. An electrified loadstone attracted light bodies of all kinds by its electric virtue, at the same time that it attracted iron and steel by its peculiar magnetic virtue.---The attractive virtue of electricity was also found to pervade glass so powerfully, that a thread was attracted thro' five exhausted receivers, and seemingly with more vigour than it would have been by the excited tube alone in the open air.

Such was the state of philosophical opinions concerning electricity, when Dr Franklin first invented his theory concerning positive and negative, or *plus* and *minus*, electricity. This had been already suggested by Dr Watson, but was not so fully explained by him as by Dr Franklin; on which account the latter is generally reckoned to be the sole inventor. According to this theory, all the operations in electricity depend upon one fluid *fui generis*, extremely subtile and elastic. Between the particles of this fluid there subsists a very strong repulsion with regard to each other, and as strong an attraction with regard to other matter. Thus, according to Dr Franklin's hypothesis, one quantity of electric matter will repel another quantity of the same, but will attract and be attracted by any terrestrial matter that happens to be near it. The pores of all bodies are supposed to be full of this subtile fluid; and when its equilibrium is not disturbed, that is, when there is in any body neither more nor less than its natural share, or than that quantity which it is capable of retaining by its own attraction, the fluid does not manifest itself to our senses. The action of the rubber upon an electric disturbs this equilibrium, occasioning a deficiency of the fluid in one place, and a redundancy of it in another. This equilibrium being forcibly disturbed, the mutual repulsion of the particles of the fluid is necessarily exerted to restore it. If two bodies be both of them overcharged, the electric atmospheres repel each other, and both the bodies recede from one another to places where the fluid is less dense. For as there is supposed to be a mutual attraction between all bodies and the electric fluid, such bodies as are electrified must go along with their atmospheres. If both the bodies are exhausted of their natural share of this fluid, they are both attracted by the denser fluid existing either in the atmosphere contiguous to them, or in other neighbouring bodies; which occasions them still to recede from one another as if they were overcharged.

This is the Franklinian doctrine concerning the cause of

54
Mr Wilson's theory.

56
Electric fluid found to act according to the largeness of electrified surface.

57
Dr Franklin's theory.

55
Great power of electricity excited by some philosophers.

Theory.

58
Difficulty concerning the reason why bodies negatively electrified repel one another.

* Franklin's Letters.

59
Different solutions of this difficulty.

of electric attraction and repulsion; but it is evident, that the reason just now given why bodies negatively attracted ought to repel one another, is by no means satisfactory. Dr Franklin himself had framed his hypothesis before he knew that bodies negatively electrified would repel one another; and when he came afterwards to learn it, he was surpris'd, and acknowledged that he could not satisfactorily account for it. *—Other philosophers therefore invented different solutions of this difficulty, of which that above mentioned is one. But by some this was rejected. They said, that as the denser electric fluid, surrounding two bodies negatively electrified, acts equally on all sides of those bodies, it cannot occasion their repulsion. The repulsion, according to them, is owing rather to an accumulation of the electric on the surfaces of the two bodies; which accumulation is produced by the attraction and the difficulty the fluid finds in entering them. This difficulty is supposed chiefly to be owing to the air on the surface of bodies, which Dr Priestley says is probably a little condensed there. This he deduces from an experiment of Mr Wilson, corrected by Mr Canton. The experiment was made in order to observe the course of the electric light through a Torricellian vacuum. A singular appearance of light was observed upon the surface of the quicksilver, at which the fluid was supposed to enter. Mr Wilson supposed that this was owing to a subtle medium spread over the surface of the quicksilver, and which prevented the easy entrance of the electric fluid. But this was afterwards discovered by Mr Canton to be owing to a small quantity of air which had been left in the tube. It is plain, however, that as the attraction is equal all round, and likewise the difficulty with which the fluid penetrates the air, bodies negatively electrified ought not to repel one another on this supposition more than the former. Nay, they ought to attract each other; because, in the place of contact, the resistance of the air would be taken off, and the electric fluid could come from all other quarters by the attraction of the bodies.

60
Mr Cavallo's solution.

Mr Cavallo, who seems to have undertaken the defence of this hypothesis in all cases, gives another reason why bodies negatively electrified should repel each other. In a chapter entitled, "A Compendious view of the principal properties of Electricity," among others he gives the following: "No electricity can be observed upon the surface of any electrified body, except that surface is contiguous to an electric, which electric can some how or other acquire a contrary electricity at a little distance. Otherwise:—No electricity can appear upon the surface of any electrified body, except that surface is opposite to another body which has actually acquired the contrary electricity, and these contrarily electrified bodies are separated by an electric. On considering this principle, (adds he), it may be asked, Why any electricity can be observed upon the surface of an electrified body that is insulated at a considerable distance from other conductors? Or, Which is the electric that is contiguous to the surface of an electrified conductor or excited electric, and which has actually acquired a contrary electricity at a little distance from the said surface? To this question it is answered, that the air is, in general, the electric which is opposite to the surface of any electrified body; which, not being a perfect conductor, does easily acquire a con-

trary electricity on a stratum of its substance that is at a little distance from the electrified body; and, in consequence of this stratum, it acquires another stratum contrarily electrified, and at a little distance from the former: to this, other strata succeed, alternately possessed of positive and negative electricities, and decreasing in power till they vanish. This assertion is easily proved by several experiments, particularly the following. If the end of a pretty long glass tube be presented to a body electrified, for instance, positively, the tube will be found electrified positively also for the space of one or two inches at that end; but beyond that space, will be found two or three inches electrified negatively: after that another positive electricity will appear; and so alternately, a positive and a negative zone will follow one another, always weaker and weaker in power, till at last they quite vanish. This shows, that, in general, when an electric sufficiently dense is presented to an electrified body, it acquires successive zones or strata of positive and negative electricity."

From this fact, (which, with the utmost impropriety, he terms a law of electricity, whereas it is most evidently the effect of a law, and not the law itself,) Mr Cavallo gives the following reason why bodies negatively electrified repel one another. "As to the repulsion existing between bodies possessed of the same electricity; in order to understand its explanation thoroughly, the reader must be reminded of the principle above-mentioned, which is, that no electricity, *i. e.* the electric fluid proper to a body, can either be augmented or diminished upon the surface of that body, except the said surface is contiguous to an electric, which can acquire a contrary electricity at a little distance: from whence it follows, that no electricity can be displayed upon the facing surfaces of two bodies that are sufficiently near to one another, and both possessed of the same electricity; for the air that lies between those contiguous surfaces has no liberty of acquiring any contrary electricity. This being premised, the explanation of electric repulsion becomes very easy. Suppose, for instance, that two small bodies are freely suspended by insulated threads; so that, when they are not electrified, they may hang contiguous to one another. Now suppose these bodies to be electrified either positively or negatively, and then they must repel one another: for either the increased or the diminished natural quantity of electric fluid in these bodies will endeavour to diffuse itself equally over every part of the surfaces of these bodies; and this endeavour will cause the said bodies to recede from each other, so that a quantity of air may be interposed between their surfaces, sufficient to acquire a contrary electricity at a little distance from the said surfaces. Otherwise: If the bodies possessed of the same electricity do not repel each other, so that a sufficient quantity of air may be interposed between their surfaces, the increased quantity of electric fluid when the bodies are electrified positively, or the remnant of it when they are electrified negatively, by the above principle cannot be diffused equally throughout or over the surfaces of these bodies; for no electricity can appear upon the surfaces of bodies in contact, or that are very near each other. But the electric fluid, by attracting the particles of matter, endeavours to diffuse itself equally throughout or over the surfaces of these bodies; therefore the said bodies are, by this endeavour,

Theory.

Theory. deavour, forced to repel one another."

⁶¹ Insufficient. This theory is evidently no solution of the difficulty; seeing it is only explaining one fact by another, which requires explanation at least as much as the first. But though this should be overlooked, it is still insufficient; for, granting that bodies negatively electrified ought to repel one another till the electricity is equally diffused along their surfaces, yet when this is accomplished, the repulsion ought to cease. Now, there is no occasion for supposing the bodies to be electrified while they are in contact, or nearly so. One may be electrified negatively in one corner of a room, and another in the other. The electrification may also be continued for any length of time we please, so that it is not possible to suppose but the electric matter must have diffused itself equally along the surfaces of both: yet, if we attempt to bring these bodies together, we shall find that they will repel each other very violently; which ought not to be the case, according to Mr Cavallo's supposition.

⁶² Dr Franklin's explanation of the phenomena of the Leyden phial. What gave the greatest reputation to Dr Franklin's theory, however, is the easy solution which it affords of all the phenomena of the Leyden phial. The fluid is supposed to move with the greatest ease in bodies which are conductors, but with extreme difficulty in *electrics per se*; inasmuch that glass is absolutely impermeable to it. It is moreover supposed, that all electrics, and particularly glass, on account of the smallness of their pores, do at all times contain an exceeding great, and always an equal quantity of this fluid; so that no more can be thrown into any one part of any electric substance, except the same quantity go out at another, and the gain be exactly equal to the loss. These things being previously supposed, the phenomena of charging and discharging a plate of glass admit of an easy solution. In the usual manner of electrifying by a smooth glass globe, all the electric matter is supplied by the rubber from all the bodies which communicate with it. If it be made to communicate with nothing but one of the coatings of a plate of glass, while the conductor communicates with the other, that side of the glass which communicates with the rubber must necessarily be exhausted in order to supply the conductor, which must convey the whole of it to the side with which it communicates. By this operation, therefore, the electric fluid becomes almost entirely exhausted on one side of the plate, while it is as much accumulated on the other; and the discharge is made by the electric fluid rushing, as soon as an opportunity is given it by means of proper conductors, from the side which was overloaded, to that which is exhausted.

It is not, however, necessary to this theory, that the very same individual particles of electric matter which were thrown upon one side of the plate, should make the whole circuit of the intervening conductors, especially in very great distances, so as actually to arrive at the exhausted side. It may be sufficient to suppose, that the additional quantity of fluid displaces and occupies the space of an equal portion of the natural quantity of fluid belonging to those conductors in the circuit which lay contiguous to the charged side of the glass. This displaced fluid may drive forwards an equal quantity of the same matter in the next conductor; and thus the progress may continue till the exhausted side of the glass is supplied by the fluid naturally existing in the

conductors contiguous to it. In this case, the motion of the electric fluid, in an explosion, will rather resemble the vibration of the air in sounds, than a current of it in winds.

It will easily be acknowledged, (says Dr Priestley,) that while the substance of the glass is supposed to contain as much as it can possibly hold of the electric fluid, no part of it can be forced into one of the sides, without obliging an equal quantity to quit the other side: but it may be thought a difficulty upon this hypothesis, that one of the sides of a glass plate cannot be exhausted, without the other receiving more than its natural share; particularly, as the particles of this fluid are supposed to be repulsive of one another. But it must be considered, that the attraction of the glass is sufficient to retain even the large quantity of electric fluid which is natural to it, against all attempts to withdraw it, unless that eager attraction can be satisfied by the admission of an equal quantity from some other quarter. When this opportunity of a supply is given, by connecting one of the coatings with the rubber, and the other with the conductor, the two attempts to introduce more of the fluids into one of the sides are made, in a manner, at the same instant. The action of the rubber tends to disturb the equilibrium of the fluid in the glass; and no sooner has a spark quitted one of the sides, to go to the rubber, than it is supplied by the conductor on the other; and the difficulty with which these additional particles move in the substance of the glass, effectually prevents its reaching the opposite exhausted side. It is not said, however, but that either side of the glass may give or receive a small quantity of the electric fluid, without altering the quantity on the opposite side. It is only a very considerable part of the charge that is meant, when one side is said to be filled while the other is exhausted.

It is a little remarkable, adds Dr Priestley, that the electric fluid in this, and in every other hypothesis, should so much resemble the ether of Sir Isaac Newton in some respects, and yet differ from it so essentially in others. The electric fluid is supposed to be, like ether, extremely subtle and elastic, that is, repulsive of itself; but instead of being, like the ether, repelled by all other matter, it is strongly attracted by it: so that, far from being, like the ether, rarer in the small than in the large pores of bodies, rarer within the bodies than at their surfaces, and rarer at their surfaces than at any distance from them; it must be denser in small than in large pores, denser within the substance of bodies than at their surfaces, and denser at their surfaces than at a distance from them.

To account for the attraction of light bodies, and other leetrical appearances, in air of the same density and repulsion with the common atmosphere, when glass (which is supposed to be impermeable to electricity) is interposed; it is conceived, that the addition or subtraction of the electric fluid, by the action of the excited electric on one side of the glass, occasions, as in the experiment of the Leyden phial, a subtraction or addition of the fluid on the opposite side. The state of the fluid, therefore, on the opposite side being altered, all light bodies within the sphere of its action must be affected in the very same manner as if the effluvia of the excited electric had actually penetrated the glass, according

Theory.

⁶³ Attraction and repulsion through glass accounted for.

Theory. cording to the opinions of all electricians before Dr Franklin.

This hypothesis has been in some measure improved by Mr Æpinus, in a treatise entitled, "Tentamen theoriæ Electricitatis & Magnetismi." He extends the property of impermeability to air, and all electric, as well as glass. He supposes *impermeability* to consist in the great difficulty with which electric substances admit the fluid into their pores, and the slowness with which it moves in them. In consequence of this impermeability of air to the electric fluid, he denies the existence of electric atmospheres, and thinks that Dr Franklin's theory will do much better without them. He also imagines, that all the particles of matter are repulsive of one another: for that otherwise (since all substances have in them a certain quantity of the electric fluid, the particles of which repel one another and are attracted by all other matter), it could not happen, that bodies in their natural state with respect to electricity, should neither attract nor repel one another. He also introduces a number of mathematical calculations; the result of which (says Dr Priestley, with a great deal of probability) cannot be depended upon.

63
Principles
on which
Dr Franklin's theory
depends.

The above is a full explanation of the theory of electricity at present most generally received. It depends on the following principles. 1. All terrestrial substances, as well as the atmosphere which surrounds the earth, are full of electric matter. 2. Glass, and other electric substances, though they contain a great deal of electric matter, are nevertheless *impermeable* by it. 3. This electric matter violently repels itself, and attracts all other matter. 4. By the excitation of an electric, the equilibrium of the fluid contained in it is broken; and one part of it is overloaded with electricity, while the other contains too little. 5. Conducting substances are permeable to the electric matter through their whole substance, and do not conduct it merely over their surface. 6. Positive electricity is when a body has too much of the electric fluid, and negative electricity when it has too little. Of these positions we shall now adduce those proofs drawn from different facts, which seem in the strongest manner to confirm them.

I. "All terrestrial substances, as well as the atmosphere which surrounds the earth, are filled with electric fluid."—Of this the proofs are very easy. There is no place of the earth or sea, where the electric fire may not be collected by making a communication between it and the rubber of an electric machine. Therefore, considering that the whole earth is moist, that moisture is a conductor of electricity, and that every part of the earth must thus communicate with another, it is certain that the electric matter must diffuse itself as far as the moisture of the earth reaches; and this we may reasonably suppose to be to the very centre.

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Proofs of
atmospheric
electricity.

With regard to the atmosphere, the case is equally clear. We have formerly mentioned in general, that Dr Franklin, and others, had collected electricity from the atmosphere in great quantity during the time of thunder-storms; but it is now found that it may be collected from the air at any time. The best instrument for this purpose is the electrical kite. Mr Cavallo, who hath made a great many experiments in atmospheric electricity, observes that the whole power of this

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Mr Cavallo's directions
concerning the
electrical
kite.

machine lies in the string. A common school-boy's kite answers the purpose as well as any other. The best method of making the string is by twisting two threads of common twine with one of that copper-thread which is used for trimmings. When a kite contrived in this manner was raised, he says, he always observed the string to give signs of electricity, except once. The weather was warm, and the wind so weak, that the kite was raised with difficulty, and could hardly be kept up for a few minutes. Afterwards, however, when the wind increased, he obtained, as usual, a pretty strong positive electricity. Concerning the management of this kite he gives the following directions.

"In raising the kite, when the weather is very cloudy and rainy, in which time there is danger of meeting with a great quantity of electricity, I generally use to hang upon the string AB (Plate CI. fig. 2.) the hook of a chain C, the other extremity of which falls on the ground. Sometimes I use another caution besides, which is to stand upon an insulating stool; in which situation, I think, that if any quantity of electricity, suddenly discharged by the clouds, strikes the kite, it cannot much affect any person. As to insulated reels, and other such like instruments that some gentlemen have used to raise the kite without any danger of receiving a shock; fit for the purpose as they may appear in theory, they are yet very inconvenient to be managed. Except the kite be raised in the time of a thunder-storm, there is no great danger for the operator to receive any shock. Although I have raised my electrical kite hundreds of times without any caution whatever, I have very seldom received a few exceedingly slight shocks in my arms. In time of a thunder-storm, if the kite has not been raised before, I would not advise a person to raise it while the stormy clouds are just overhead; the danger at such a time being very great, even with the precautions above-mentioned: at that time the electricity of the clouds may be observed, without raising the kite, by a cork-ball electrometer held in the hand in an open place, or, if it rains, by the electrometer for rain, to be described hereafter.

"When the kite has been raised, I generally introduce the string thro' a window into a room of the house, and fasten it to a strong silk lace, the extremity of which is generally tied to a heavy chair in the room. In fig. 14. of Plate XCIX. AB represents part of the string of the kite which comes within the room; C represents the silk lace; DE a small prime conductor, which, by means of a small wire, is connected with the string of the kite; and F represents the quadrant electrometer fixed upon a stand of glass covered with sealing wax, which I used to put near the prime conductor rather than to fix it in a hole upon the conductor, because the string AB sometimes shakes so as to pull the prime conductor down, in which case the quadrant electrometer would be broken. G represents a glass tube about 18 inches long, with a knobbed wire cemented to its extremity; which instrument I use to observe the quality of the electricity, when the electricity of the kite is so strong, that I think it not safe to come very near the string. The method is as follows. I hold the instrument by that extremity of the glass tube which is farthest from the wire, and touch the string of the kite with the knob of its wire; which being insu-

66
Quality of
electricity
how ob-
served.

Theory.

fulated, acquires a small quantity of electricity from it, which is sufficient to ascertain its quality when the knob of the instrument is brought near an electrified electrometer. Sometimes when I raise the kite in the night-time, out of the house, where I have not the convenience of observing the quality by the attraction and repulsion, or even by the appearance of the electric light, I make use of a coated phial, which I can charge at the string; and, when charged, put into my pocket, where it will keep charged even for several hours. The construction of this phial is as follows. Besides the coating on the inside and outside, which this phial has in common with others of the same kind, a glass tube open at both ends is cemented into its neck, and proceeds within the phial, having a small wire fastened to its lower extremity, which touches the inside non-electric coating. The wire, with the knob of this phial, is cemented into another glass tube, which is nearly twice as long, and smaller than the tube cemented into the neck of the phial. The wire is cemented so, that only its knob projects out of one end, and a small length of it out of the other end of the tube. If this piece with the wire be held by the middle of the glass tube, it may be put in or out of the tube which is in the neck of the phial, so as to touch the small wire at the lower extremity of it, and that without discharging the phial if it is charged. I have kept such a phial charged for six weeks together, and probably it would keep much longer if it was to be tried.

“By making use of this instrument, I am obliged to keep the kite up no longer than it is necessary to charge the phial, in order to observe the quality of the electricity in the atmosphere; for after the kite has been drawn in, and brought home, I can then examine the electricity of the inside of the phial, which is the same as that of the kite. When the electricity of the kite is very strong, I fix a chain communicating with the ground, at about six inches distance from the string, which may carry off its electricity in case this should increase so much as to put the bystanders in danger.”

With all his caution, however, it seems Mr Cavallo could not always avoid danger, even when there was no thunder; as appears from the following account.—“October 18th, 1775. After having rained a great deal in the morning and night before, the weather became a little clear in the afternoon, the clouds appearing separated, and pretty well defined. The wind was west, and rather strong, and the atmosphere in a temperate degree of heat. In these circumstances, at three P.M. I raised my electrical kite with 360 feet of string. After the end of the string had been insulated, and a leather ball covered with tin-foil had been hanged to it, I tried the power and quality of the electricity, which appeared to be positive and pretty strong. In a short time, a small cloud passing over, the electricity increased a little; but the cloud being gone, it decreased again to its former degree. The string of the kite was now fastened by the silk lace to a post in the yard of the house, and I was repeatedly charging two coated phials and giving shocks with them. While I was so doing, the electricity, which was still positive, began to decrease, and in two or three minutes it became so weak that it could hardly be perceived with a very sensible cork-ball electrometer. Observing at the same time,

that a large and black cloud was approaching the zenith (which, no doubt, caused the decrease of electricity), indicating imminent rain, I introduced the end of the string through a window in a first-floor room, wherein I fastened it by the silk lace to an old chair. The quadrant electrometer was set upon the same window, and was by means of a wire connected with the string of the kite. Being now three quarters after three o'clock, the electricity was absolutely imperceptible: however, in about three minutes time it became again perceptible; but, upon trial, was now found to be negative. It is therefore plain, that its stopping was nothing more than a change from positive to negative; which was evidently occasioned by the approach of the cloud, part of which by this time had reached the zenith of the kite, and the rain also had begun to fall in large drops. The cloud also came farther on; the rain increased; and the electricity keeping pace with it, the electrometer soon arrived at 15°. Seeing now that the electricity was pretty strong, I began again to charge the two coated phials, and to give shocks with them; but the phials had not been charged above three or four times, before I perceived that the index of the electrometer was arrived at 35°, and was keeping still increasing. The shocks being now very smart, I desisted from charging the phials any longer; and, considering the rapid advance of the electricity, thought to take off the insulation of the string, in case that, if it should increase farther, it might silently be conducted to the earth without causing any bad accident by being accumulated in the insulated string. To effect this, as I had no proper apparatus near me, I thought to remove the silk lace, and fasten the string itself to the chair. Accordingly I disengaged the wire that connected the electrometer with the string; laid hold of the string; untied it from the silk lace, and fastened it to the chair: but while I effected this, which took up less than half a minute of time, I received about 12 or 15 very strong shocks, which I felt all along my arms, in my breast, and legs; shaking me in such a manner, that I had hardly power enough to effect my purpose, and to warn the people in the room to keep their distance. As soon as I took my hands off the string, the electricity (in consequence of the chair being a bad conductor) began to snap between the string and the shutter of the window, which was the nearest body to it. The snappings, which were audible at a good distance out of the room, were at first isochronous with the shocks which I had received; but, in about a minute's time, oftener; so that the people of the house compared their sound to the rattling noise of a jack going when the fly is off. The cloud now was just over the kite; it was black, and well defined, almost of a circular form, its diameter appearing to be about 40°. The rain was copious, but not remarkably heavy. As the cloud was going off, the electrical snapping began to weaken, and in a short time became inaudible. I went then near the string, and finding the electricity weak, but still negative, I insulated it again, thinking to keep up the kite some time longer: but observing that another larger and denser cloud was approaching towards the zenith, and I had then no proper apparatus at hand to prevent every possible bad accident, resolved to pull the kite in: accordingly a gentleman who was by me began pulling it in, while I was wind-

Theory.

67
Great quantity of Electricity brought down from a cloud.

Theory.

Theory.

ing up the string. The cloud was now very nearly over the kite; and the gentleman told me that he had received one or two slight shocks in his arms; and that, if he was to receive another, he would certainly let the string go: upon which I laid hold of the string, and pulled the kite in as fast as I could without any farther observation; being then ten minutes after four o'clock.—*N. B.* There was neither thunder nor lightning perceived that day, nor indeed for some days before or after."

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Another
instrument
for obser-
ving the e-
lectricity of
the atmo-
sphere.

Besides the kite, Mr Cavallo has given us the following description of some other instruments he uses for discovering the electricity of the atmosphere. "Fig. 11. of Plate C. represents a very simple instrument for making experiments on the electricity of the atmosphere; and which, on several accounts, seems to be the most proper for that purpose. A B is a common jointed fishing-rod, without the last or smallest joint. From the extremity of this rod proceeds a slender glass tube C, covered with sealing-wax, and having a cork D at its end, from which a pith-ball electrometer is suspended. H G I is a piece of twine fastened to the other extremity of the rod, and supported at G by a small string F G. At the end (I) of the twine, a pin is fastened; which when pushed into the cork D, renders the electrometer E uninfluenced. When I would observe the electricity of the atmosphere with this instrument, I thrust the pin (I) into the cork D; and holding the rod by its lower end A, project it out from a window in the upper part of the house, into the air, raising the end of the rod with the electrometer, so as to make an angle of about 50 or 60° with the horizon. In this situation I keep the instrument for a few seconds; and then pulling the twine at H, the pin is disengaged from the cork D: which operation causes the string to drop in the dotted situation K L; and leaves the electrometer insulated, and electrified with an electricity contrary to that of the atmosphere. This done, I draw the electrometer into the room; and examine the quality of the electricity, without obstruction either from wind or darkness. With this instrument I have made observations on the electricity of the atmosphere several times in a day, for several months; and from them I have deduced the following general observations, which seem to coincide with those made with the kites.

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Conclu-
sions drawn
from the
experi-
ments.

"1. That there is in the atmosphere at all times a quantity of electricity; for whenever I use the above-mentioned instrument, it always acquires some electricity.

"2. That the electricity of the atmosphere, or fogs, is always of the same kind, namely, positive; for the electrometer is always negative, except when it is evidently influenced by heavy clouds near the zenith.

"3. That, in general, the strongest electricity is observable in thick fogs, and also in frosty weather; and the weakest, when it is cloudy, warm, and very near raining; but it does not seem to be less by night than in the day.

"4. That in a more elevated place the electricity is stronger than in a lower one; for having tried the atmospheric electrometer both in the stone, and iron gallery on the cupola of St Paul's cathedral, I found that the balls diverged much more in the latter than in

the former less elevated place. Hence it appears, that if this rule takes place at any distance from the earth, the electricity in the upper regions of the atmosphere must be exceedingly strong."

The conclusions drawn from the experiments with the kites, are as follow.

"1. The air appears to be electrified at all times; its electricity is constantly positive, and much stronger in frosty than in warm weather; but it is by no means less in the night than in the day time.

"2. The presence of the clouds generally lessens the electricity of the kite; sometimes it has no effect upon it; and it is very seldom that it increases it a little." To this, the above-mentioned instance is a most remarkable exception.

"3. When it rains, the electricity of the kite is generally negative, and very seldom positive.

"4. The aurora borealis seems not to affect the electricity of the kite."

"5. The electric spark taken from the string of the kite, or from any insulated conductor connected with it, especially when it does not rain, is very seldom longer than a quarter of an inch; but it is exceedingly pungent. When the index of the electrometer is not higher than 20°, the person that takes the spark will feel the effect of it in his legs; it appearing more like the discharge of an electric jar, than the spark taken from the prime conductor of an electrical machine.

"6. The electricity of the kite is generally stronger or weaker, according as the string is longer or shorter; but it does not keep any exact proportion to it. The electricity, for instance, brought down by a string of 100 yards, may raise the index of the electrometer to 20, when, with double that length of string, the index of the electrometer will not go higher than 25.

"7. When the weather is damp, and the electricity is pretty strong, the index of the electrometer, after taking a spark from the string, or presenting the knob of a coated vial to it, rises surprisingly quick to its usual place; but in dry and warm weather it rises exceedingly slow."

From these observations, little doubt can be enter-
tained of the atmosphere's being always full of electric matter. From Mr Cavallo's observations, however, it appears also, that the rain which descends from the clouds is full of electric matter. The method of proving this, is by an instrument called by Mr Cavallo an *electrometer for rain*, and of which he gives the following description. "A B C I, Plate XCIX. fig. 12. is a strong glass tube about two feet and a half long, having a tin funnel D E cemented to its extremity, which funnel defends part of the tube from the rain. The outside surface of the tube from A to B, is covered with sealing-wax; so also is the part of it which is covered by the funnel. F D is a piece of cane, round which brass wires are twisted in different directions, so as to catch the rain easily, and at the same time to make no resistance to the wind. This piece of cane is fixed into the tube; and a slender wire proceeding from it goes through the bore of the tube, and communicates with the strong wire A G, which is thrust into a piece of cork fastened to the end A of the tube. The end G of the wire A G is formed in a ring, from which I suspend a more or less sensible pith-ball electrometer

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Electrometer for rain described.

Theory.

Theory.

as occasion requires. This instrument is fastened to the side of the window-frame, where it is supported by strong brass hooks at CB; which part of the tube is covered with a silk lace, in order to adapt it better to the hooks. The part FC is out of the window, with the end F elevated a little above the horizon. The remaining part of the instrument comes through a hole in one of the lights of the sash within the room, and no more of it touches the side of the window than the part CB. When it rains, especially in passing showers, this instrument, standing in the situation above described, is frequently electrified; and, by the diverging of the electrometer, the quantity and quality of the electricity of the rain may be observed, without any danger of a mistake. With this instrument I have observed, that the rain is generally, though not always, electrified negatively; and sometimes so strongly, that I have been able to charge a small coated phial at the wire A G. This instrument should be fixed in such a manner that it may be easily taken off from the window, and replaced again as occasion requires; for it will be necessary to clean it very often, particularly when a shower of rain is approaching.

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Pocket-electrometer described.

“Plate C. fig. 12. represents a pocket electrometer, which on several accounts seems preferable to those generally in use. The case or handle of this electrometer is formed by a glass tube about three inches long, and three tenths of an inch in diameter, half of which is covered with sealing-wax. From one extremity of this tube, viz. that without sealing-wax, a small loop of silk proceeds, which serves occasionally to hang the electrometer on a pin, &c. To the other extremity of the tube a cork is adapted, which, being cut tapering on both ends, can fit the mouth of the tube with either end. From one extremity of this cork, two linen threads proceed, a little shorter than the length of the tube, suspending each a little cone of pith of alder. When this electrometer is to be used, that end of the cork which is opposite to the threads, is pushed into the mouth of the tube; then the tube forms the insulated handle of the pith electrometer as represented fig. 13. But when the electrometer is to be carried in the pocket, then the threads are put into the tube, and the cork stops it as represented fig. 12. The peculiar advantages of this electrometer are, its convenient small size, its great sensibility, and its continuing longer in good order than any other. Fig. 14. represents a case to carry the above described electrometer in. This case is like a common toothpick case, except that it hath a piece of amber fixed on one extremity A, which may occasionally serve to electrify the electrometer negatively; and on the other extremity it has a piece of ivory fastened upon a piece of amber BC. This amber BC serves only to insulate the ivory, which, when insulated, and rubbed against woollen cloths, acquires a positive electricity, and is therefore useful to electrify the electrometer positively.”

From this very full explanation of the methods by which the electric fluid can be procured from the atmosphere itself, from rain and vapour, at all times, it is impossible to doubt of the truth of the first position on which Dr Franklin's theory depends, viz. that “all “terrestrial substances, as well as the atmosphere which “surrounds the earth, are filled with electric fluid.”

2. The second position requisite for establishing Dr Franklin's theory is, “That glass and other electric “substances, tho' they contain a great deal of electric “matter, are nevertheless *impermeable* by it.”—This assertion evidently has a contradictory appearance. It is very difficult, if not impossible to conceive, that any substance can be full of a fluid, and yet impermeable by that fluid; especially when we continually talk of putting in an additional quantity into one side and taking out of the other. Nay, what is still more extraordinary, the thinner the glass is, i. e. the *less* quantity of electric matter it can contain, the *more* we are able to put into it; for the thinner a glass is, the greater charge it can receive.

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Arguments for the impermeability of glass refuted.

The chief arguments for the impermeability of glass by the electric fluid are drawn from the phenomena of the Leyden phial. It is indeed very plain, that there is in that case an expulsion of fire from the outside at the same time that it is thrown upon the inside. This appears from numberless experiments, but is most readily observable in the following. Let a coated phial be set upon an insulating stand, and the knob of another phial be brought near the coating of the first. As soon then as the electric sparks are discharged from the prime conductor to the knob of the first bottle, an equal number will be observed to proceed from the coating of the first to the knob of the second. This is very remarkable, and an unphilosophical observer will scarce ever fail to conclude, that the fire runs directly through the substance of the glass. Dr Franklin, however, concludes that it does not, because there is found a very great accumulation of electricity on the inside of the glass, which discovers itself by a violent flash and explosion when a communication is made between the outside and inside coatings. But it must be observed, that there is here no other reason for concluding the glass to be impermeable, except that we *suppose* the electric matter to be *accumulated* on one side of the glass, and *deficient* on the other. If this supposition therefore cannot be proved, the evidence of sense, which indeed is very strong in favour of the permeability, must undoubtedly preponderate. It is said indeed, that if the glass was permeable by the electric matter, a phial would be discharged immediately after being charged, or rather could never be charged at all; because the matter would no sooner be thrown upon one side, than it would fly off from the other. This supposition, however, depends entirely upon the above-mentioned one, namely, that in bodies *positively* electrified there is an *accumulation*, and in such as are *negatively* electrified there is a *deficiency* of fluid; which, never can be proved.

Another argument against the permeability of glass and other electrics is, that coated phials, it is said, standing upon electric substances, cannot be charged.—This, however, seems to be very much exaggerated. A phial, though ever so perfectly insulated, will always receive a charge from a machine that acts very powerfully.—Nay, it is certain, that though a phial is placed in such a manner, that both its knob and outside coating are in contact with the prime conductor, it will still receive a charge; much less indeed in this case than in any other, but still the shock will be perceptible.

In 1759, Mr Wilson read a paper before the Royal Society,

Theory.

Theory.

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Beccaria's
hypothesis
concerning
excitation.

Society, in which the permeability of glass by the electric fluid was asserted. The experiments from which he deduced this conclusion, were the following. He took a very large pane of glass, a little warmed; and holding it upright by one edge, while the opposite edge rested upon wax, he rubbed the middle part of the surface with his finger, and found both sides electrified *plus*. He accounted for this from the electrical fluid passing through the glass from his finger to the opposite side. But here Dr Priestley observes, that on Franklin's principles it ought to be so. If one side be rubbed by the finger, it acquires from it some electrical fluid. This being spread on the glass as far as the rubbing extended, repels an equal quantity of that contained in the other side of the glass, and drives it out on that side, where it stands as an atmosphere, so that both sides are found positively electrified. Mr Wilson also tried another experiment, which seemed more decisive than the former: Having by him a pane of glass, one side of which was rough and the other smooth, he rubbed it slightly on one side; upon doing which, both sides were electrified *minus*.—This also Dr Priestley attempts to reconcile with Franklin's hypothesis. "As the electric fluid, contained in the glass, says he, is kept equal in both sides by the common repulsion; if the quantity in one side is diminished, the fluid in the other side, being less repelled, retires *inward*, and leaves that surface also *minus*."—But here it is impossible to avoid observing, that Dr Priestley's own words, in the strongest manner, militate against the doctrine he means to establish. The quantity of fluid in one side being diminished, that on the other, he says, *retires inward*: but into what does it retire? If into the substance of the glass, then the glass is undoubtedly permeable by it; and this is the very thing which Dr Priestley argues against.

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The electric fluid cannot be proved repulsive of itself.

III. "The electric matter violently repels itself, and attracts all other matter."—The proofs of this position are chiefly derived from the following experiment, and others of a similar kind.—Let a smooth piece of metal be insulated, and bring an excited glass tube near one end of it. A spark of positive electricity will be obtained from the other end; after which, if the tube is suddenly removed, the metal becomes electrified negatively. Here, then, it is said, is a plain repulsion of one part of the electric fluid by another. That contained in the tube repels the fluid contained in the nearest end of the metal; of consequence it is accumulated in the other end, and when the tube is removed, the metal is found to be deprived of part of its natural quantity of electricity, or is electrified negatively.—On such experiments as this, however, it is obvious to remark, that we ought first to prove that positive electricity consists in an accumulation, and negative electricity in a deficiency, of the electric fluid. But while this is only *supposed*, it is impossible that any proofs drawn from the supposition can be conclusive.

IV. "By the excitation of an electric, the equilibrium of the fluid contained in it is broken, and one part is overloaded with electricity, while the other contains too little." This position is entirely hypothetical. No electrician hath yet explained, in a satisfactory manner, how the fluid is procured by the excitation of glass or any other electric substance. Dr Priestley, instead of giving an explanation, proposes several queries con-

cerning it. Mr Cavallo tells us, that the act of excitation pumps as it were the electric fluid from the rubber, and consequently from the earth. He adds, "By what mechanism one body extracts the electric fluid from another, is not yet known. The celebrated Father Beccaria supposes that the action of rubbing increaseth the capacity of the electric, *i. e.* renders that part of the electric which is actually under the rubber, capable of containing a greater quantity of electric fluid: hence it receives from the rubber an additional share of fluid, which is manifested upon the surface of the electric, when that surface is come out from the rubber; in which state it loses, or, as it were, contracts its capacity. Signior Beccaria's experiment to prove this supposition is the following. He caused a glass plate to be rubbed by a rubber applied on one side of the plate, while it was turning vertically; and holding at the same time a linen thread on the other side of the plate just opposite to the rubber, he observed that the thread was not attracted by that part of the glass which corresponded to the rubber, but by that which was opposite to the surface of the glass that had just come out from the rubber; which shews, that the fluid acquired by the glass plate did not manifest its power until the surface of the glass was come out from the rubber."—But from this experiment it seems impossible to draw any conclusion concerning the capacity of glass either one way or other. It is evident, therefore, that whatever parts of Dr Franklin's hypothesis rest on this supposition concerning excitation, are entirely void of evidence.

V. "Conducting bodies are permeable by the electric fluid through the whole of their substance, and do not conduct it merely over their surface."—The proof most commonly adduced in favour of this position, is the following experiment. Take a wire of any kind of metal, and cover part of it with some electric substance, as rosin, sealing-wax, &c. then discharge a jar through it, and it will be found that it conducts as well with as without the electric coating. This, says Mr Cavallo, proves that the electric matter passes through the substance of the metal, and not over its surface. A wire, adds he, continued through a vacuum, is also a convincing proof of the truth of this assertion.—Even here, however, the proof, if impartially considered, will be found very defective. It is a fact agreed upon by all philosophers, that bodies which to us are apparently in contact, do nevertheless require a very considerable degree of force to make them actually touch one another. Dr Priestley found that a weight of six pounds was necessary to press 20 shillings into close contact, when lying upon one another on a table. A much greater weight was necessary to bring the links of a chain into contact with each other. It cannot be at all incredible, therefore, that a wire, though covered with sealing-wax or rosin, should still remain at some little distance from the substance which covers it. The following experiments of Dr Priestley also seem to be much in favour of the supposition that the electric fluid passes chiefly over the surface of conducting substances.

"From the very first use of my battery, (says he,) I had observed a very black smoke or dust to arise on every discharge, even when no wire was melted; and the brass chain I made use of was of a considerable thickness. I observed, that a piece of white paper, on which

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Whether
the electric
fluid per-
vades the
substance of
conductors.

Theory

which lay the chain I was using to make the discharge, was marked with a black stain, as if it had been burnt, wherever it had touched it. I neglected the experiment, till, some time after, observing a very striking appearance of the same kind, I was determined to attend to the circumstances of it a little more particularly. I made my chain very clean, and wrapping it in white paper, I made a discharge of about 40 square feet through it, and found the stain wherever it had touched the paper. Some time after I wrapped the paper, in the same manner, round a piece of brass wire; but, making a discharge through it, saw no stain. To ascertain whether this appearance depended upon the discontinuity of the metallic circuit, I stretched the chain with a considerable weight, and found the paper on which it lay as the shock passed through it, hardly marked at all. Finding that it depended upon the discontinuity, I laid the chain upon white paper, making each extremity fast with pins stuck through the links; and when I had made the discharge, observed that the black stains were directly opposite to the body of the wire that formed the chain, and not to the intervals, as I had sometimes suspected. A chain five feet four inches long, which weighed one ounce, seventeen penny-weights, four grains, lost exactly half a grain after each discharge.

“ In making the mark above-mentioned, I once happened to lay the chain so as to make it return at a sharp angle, in order to impress the form of a letter upon the paper; and observed, that, on the discharge, the part of the chain that had been doubled was displaced, and pulled about two inches towards the rest of the chain. At this I was surprised, as I thought it lay so, that it could not slide by its own weight. Upon this I repeated the experiment with more accuracy. I stretched the whole chain along a table, laying it double all the way, and making it return by a very sharp angle. The consequence always was, that the chain was shortened about two inches, and sometimes more, as if a sudden pull had been given to it by both the ends.---Suspecting that the black smoke which rose at every discharge, might come, not from the chain, but from the paper, or the table on which it lay, and which was probably burnt by the contact of it, I let the chain hang freely in the air; but, upon making the discharge, I observed the same gross black smoke that had before risen from the paper or the table. Fig. 4. Plate CI. represents the spots made upon the paper by a chain laid over it. The breadth of the spots is about the mean thickness of the wire of the chain, and *a b* marks the place to which that part of the chain which returned was thrown back by the discharge.

“ Being willing to try what would be the effect of laying the chain in contact with non-conductors, I dipped it in melted rosin till it had got a coating of considerable thickness. When it was quite stiff, I laid it carefully, without bending, upon white paper, and made the discharge through it. The rosin was instantly dispersed from all the outside of the chain, it being left as clean as if none had ever been put on. That with which the holes in the chain had been filled, having been impelled in almost all directions, was beaten to powder; which, however, hung together, but was perfectly opaque; whereas it had been quite

transparent before this stroke. I next laid the chain upon a piece of glass, which was marked in the most beautiful manner wherever the chain had touched it; every spot the width and colour of the link. The metal might be scraped off the glass at the outside of the marks; but, in the middle part, it was forced within the pores of the glass. On the outside of this metallic tinge was the black dust, which was easily wiped off.

From these experiments it would seem, that the electrical flash had passed over the surface of the chain rather than through its substance; seeing it threw off the rosin with such extreme violence. The same thing appears from the manner in which electricity generally acts, which is not according to the solid contents of any substance, but according to the dimensions of its surface. It is not to be doubted, however, but that, where a great quantity of electric matter is made to pass along a very small wire, it will enter the substance of the metal. This appears from the possibility of melting wires by the force of electric batteries, and even totally dissipating them into small globules. To accomplish this, it is only necessary to connect the hook communicating with the outside coating of a battery, containing at least 30 square feet of coated surface, with a wire that is about one fiftieth part of an inch thick and about two feet long. The other end of it must be fastened to one end of the discharging rod: this done, charge the battery; and then by bringing the discharging rod near its wires, send the explosion through the small wire, which by this means will be made red hot, and melted, so as to fall upon the floor in different glowing pieces. When a wire is melted in this manner, sparks are frequently seen at a considerable distance from it, which are red hot particles of the metal, that, by the violence of the explosion, are scattered in all directions. If the force of the battery is very great, the wire will be entirely dispersed by the explosion, so that none of it can be afterwards found.---If it is required to melt such particles as cannot easily be drawn into wires, ores, for instance, or grain-gold, they may be set in a train upon a piece of wax: they are then to be put into the circuit, and an explosion sent through them, which, if sufficiently strong, will melt them as well as the wires. If a wire is stretched by weights, and a shock is sent through it which renders it just red hot, the wire, after the explosion, is found to be considerably lengthened.

VI. The last position on which Dr Franklin's theory depends, and which indeed may be called the foundation of the whole, is, “ That positive electricity is an accumulation, or too great a quantity, of electric matter contained in a body; and negative electricity is when there is too little.” Of this, however, there is not one solid proof; and all attempts that have hitherto been made to prove it, are only arguing in a circle, or proving the thing by itself. Thus, for instance, a body electrified positively, attracts one that is electrified negatively; because the first has too much, and the other too little, electric matter. But how do we know that one has too much and the other too little electricity? Because they attract each other.---Again, it has been proved, that when a phial is electrified positively, there is as constant a stream of fire from the outside coating, as there is from the conductor to the inside coating. Therefore, it is said, the outside of the glass has too little,

Theory.

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A chain
shortened
by the elec-
tric shock.

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Dr Frank-
lin's hypo-
thesis con-
cerning po-
sitive and
negative e-
lectricity
cannot be
proved.

Theory.

Theory.

little, and the inside too much, electricity. But how is this known to be the case? Because glass is impermeable by the electric fluid. And how is glass known to be impermeable? Because, in the above experiment, one side has too much, and the other too little, electricity.---Thus, in every instance, the arguments for Dr Franklin's hypothesis return into themselves, and no conclusion can be drawn from them. In the subsequent section, the nature of the electric fluid is particularly considered, where the improbability of its ever being accumulated in the substance of solid bodies will more plainly appear.

SECT. VI. *An Inquiry into the Nature of the Electric Fluid; with an Attempt to explain the principal Phenomena of Electricity, from the known laws by which other Fluids are observed to act upon one another.*

IN making this inquiry, or indeed any other, it is proper to take for granted as little as possible. No position should be assumed as the basis of any reasoning whatever, except what has been proved by incontrovertible facts. In the present case, therefore, it is sufficient to assume as a fact what hath been already proved by innumerable experiments, namely, That the air, the earth, and sea, are all filled with electric fluid. The question which most naturally suggests itself when this is once admitted, is, Whence hath the electric fluid come? is it essentially inherent in these bodies, or hath it come from without?---This cannot be resolved, without considering the nature of the fluid itself, and whether it is analogous to any other which is more generally known.

§ 1. *Proofs of the Identity of the Electric Fluid and Elementary Fire or Light of the Sun.*

THE similarity between the electric matter and fire, naturally suggested to the first observers, that it was no other than elementary fire, which pervaded all substances, as we have already mentioned. This, however, was objected to; and the principal objection was, that though the electric matter emitted light, and had the appearance of fire, it nevertheless wanted its most essential quality, namely, *burning*. In particular, the blast which comes from an electrified point, feels cold instead of being hot; and where great quantities of the fluid are forced with violence through certain substances, and thus set them on fire, it was thought that the fire might be occasioned by the internal commotion excited among their small particles. This objection, however, seems now to be totally removed. The dispute concerning the preferable utility of pointed or knobbed conductors for securing buildings from lightning, occasioned the fitting up of a more magnificent apparatus than had ever appeared before. An immense conductor was constructed at the expence of the board of ordnance, and suspended in the *Pantheon*. It consisted of a great number of drums covered with tin-foil, which formed a cylinder of above 155 feet in length, and more than 16 inches in diameter; and to this vast conductor were occasionally added 4800 yards of wire. The electric blast from this machine fired gun-powder in the most unfavourable circumstances that can be imagined, namely, when it was drawn off by a sharp

point, in which case it has generally less force than in any other. The method of doing this was as follows. Upon a staff of baked wood a stem of brass was fixed, which terminated in an iron point at the top. This point was put into the end of a small tube of Indian paper, made somewhat in form of a cartridge, about an inch and a quarter long, and two tenths of an inch in diameter. When the cartridge was filled with common gun-powder, unbruised, a wire communicating with the earth was then fastened to the bottom of the brass stem. The charge in the great cylinder being continually kept up by the motion of the wheel, the top of the cartridge was brought very near the drums, so that it frequently even touched the tin-foil with which they were covered. In this situation a small faint luminous stream was frequently observed between the top of the cartridge and the metal. Sometimes this stream would set fire to the gun-powder the moment it was applied; at others, it would require half a minute or more before it took effect. But this difference in time was supposed to be owing to some small degree of moisture in the powder or the paper, which was always unfavourable to the experiment. Tinder was fired much more readily."

As it therefore appears, that the electric fluid, when it moves through bodies either with great rapidity, or in very great quantity, will set them on fire, it seems scarce disputable, that this fluid is the same with the element of fire. For further proofs of this opinion, which is now adopted by some very eminent philosophers, see the articles FIRE and HEAT.—This being once admitted, the source from whence the electric fluid is derived into the earth and atmosphere, must be exceedingly evident, being no other than the sun himself. The vast quantity of light which continually comes from him to the earth must of necessity be absorbed by that opaque body, at least in great part. It is impossible it can remain there, because there is a perpetual succession of new quantities coming from the sun. It must be observed, however, that as this fluid receives a great number of different directions after once it enters the earth, it cannot appear in its natural form of fire or light, till it receives a new motion similar to what it had when proceeding from the sun. The solar light only burns, or produces heat, when diverging from a centre, or converging towards one. The heat is always greatest at the central point; and even there, no heat is produced except where the light passes through a resisting medium. In those cases likewise the electric fluid burns. When discharged with violence from an electrified bottle, it flies out on all sides, and then will fire gun-powder or other combustible substances. The same thing it will do when converging towards a point, if in sufficient quantity, as was observed in the experiment with the large conductor abovementioned. But when the electric fluid neither meets with any considerable resistance, diverges from a centre, nor converges towards one, it is almost always invisible, and without heat. A most remarkable proof of this we have, even when a vast quantity of electric matter is forced to go through a very small wire. Dr Priestley tells us he had once an opportunity of observing what part of the conductors which form an electric circuit, are most affected by the explosion. Upon discharging a battery of 51 square feet thro' an iron

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Gun-pow-
der fired by
the electric
blast.

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Action of
the electric
matter and
light com-
pared.

Theory.

iron wire nine inches long, the whole of it was glowing hot, and continued so for some seconds. The middle part grew cool first, while both the extremities were sensibly red. When the wire was afterwards examined, both the extremities were found quite melted; an inch or two of the part next to them was extremely brittle, and crumbled into small pieces on being handled; while the middle part remained pretty firm, but had quite lost its polish, so that it looked darker than before. This is precisely what would have happened, had both ends been put into a common fire. We are very sure, that the same quantity of electric matter passed through the middle of the wire, that entered one end of it and went out at the other. Why then did it not produce the same degree of heat in the middle that it did at each end? The reason is plain: At one end it was in a state of *convergence* from the battery to the point of the wire; at the other, it was in a state of *divergence* from the point of the wire to the battery. At the points, therefore, an intense heat was produced; but in the middle, where the fluid neither converged nor diverged, but moved forwards in a parallel direction, the heat was much less. Now we know that this is the case with the solar light itself. At the focus of a burning-glass there is an intense heat both where the convergence ends and the divergence begins. But where this divergence considerably ceases, and the motion of the light becomes more parallel, the heat is vastly diminished. The case is the same with a common fire, and with all burning bodies; for heat never acts but from a centre, and is always greatest at the central point. It is true, that we can never produce electric fire without at the same time producing a violent shock exceedingly different from the *burning* of common fire. But the reason of this is, that we cannot produce a divergence in a stream of electric matter, without at the same time giving it such a motion in some other direction, that its impetus becomes very perceptible. If it was in our power to make the flash produced by an electric bottle keep its place, we cannot suppose that any shock, or other sensation than heat, would be felt. But there is no possibility of hindering it from flying with prodigious celerity from one side of the bottle to the other. Therefore, as it is neither in a state of divergence or convergence, except where it comes out from and enters into the bottle, no sensation is perceived except what arises from its change of place; and hence it is said, that the electric matter hath no heat.

§ 2. *The Identity of Electric Matter and Light farther considered; with some positive Proofs, that electric Substances are actually penetrated by the electric Fluid.*

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Objection concerning the impenetrability of glass answered.

THE only objection of any strength which can arise to the identity of the electric fluid and light is, the surprising case with which the latter penetrates glass, and the seeming stop which is put to the motions of the former when a piece of glass or any other electric substance is presented to it. Here, however, it must be observed, that light, as proceeding from a luminous body, must be regulated by very different laws from light which is absorbed by opaque bodies, and consequently subjected to motions quite different from what it originally had. Water, the only fluid with which

we are very well acquainted, (for all others we know are regulated by the same laws), is capable of two very different motions. The one is a rectilinear one, by which great quantities of it run from one place to another. The other is not so easily explained. It may, however, be very readily observed, by throwing a small stone into a pool of water. A great number of concentric circles will be propagated from the place where the stone fell, as from a centre, which will gradually grow larger and larger. If another stone is thrown in at some distance, similar circles will proceed from the place where it fell. These will meet with the former, and cross them without interfering with each other in the least. It is certain, however, that two streams of water rushing opposite to one another, would shatter and destroy each other. If, therefore, there is a difference in the motion of the electric fluid when it burns, and when it does not, (which there certainly is), we may easily suppose it possible, that glass should obstruct one kind of motion and not another: In which case, the glass would seem to be permeable by the fluid when manifesting itself by the first kind of motion, and not so when it manifests itself by the other.

It hath commonly been thought, that the transparency of bodies depends upon the rectilinear direction of their pores, and opacity upon the situation of them in some other direction. Electrical experiments, however, have shewn that this is not the case. Sealing-wax and pitch are as opaque bodies as we are acquainted with; yet in Mr Hawksbee's experiments mentioned, n^o 4. these substances were both rendered transparent by the action of the electric fluid. These experiments are confirmed by some others still more surprising, mentioned by Dr Priestley. One was made by S. Beccaria. He discharged an electric shock through some brass dust sprinkled between two plates of sealing-wax. The whole was perfectly luminous and transparent. The most extraordinary experiment, however, was made by Dr Priestley himself, of which he gives the following account. "I laid a chain in contact with the outside of a jar lightly on my finger, and sometimes kept at it a small distance by means of a thin piece of glass; and, if I made the discharge at the distance of about three inches, the electric fire was visible on the surface of the finger, giving it a sudden concussion, which seemed to make it vibrate to the very bone; and when it happened to pass on that side of the finger which was opposite to the eye, the whole seemed perfectly transparent in the dark."

Experiments of this kind, though they have not hitherto been pursued by any electrician, seem to be more worthy of notice than almost all others. One consequence which may be derived from this is, that there is in bodies, whether electric or non-electric, a certain subtle medium, on the motion of which, transparency depends. That is, when the medium is at rest, the body is opaque; but when set in motion, it becomes transparent. This motion, we see, may be given in two different ways. One is by simple electrification *in vacuo*, according to Mr Hawksbee's experiments. The other is, by sending the flash of an electrified bottle over their surface. In Dr Priestley's experiment, he could determine the motion to be of the vibratory kind; and hence we may easily conclude, that some bodies may be constructed in such a manner,

Theory.

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Surprising experiments concerning the transparency of bodies.

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Consequences from them.

that

Theory.

that they are capable of transmitting the vibrations of this fluid, but not any other kind of motion. Such kinds of bodies will be naturally transparent: but others, whose particles are disposed in such a manner that the vibrations cannot be propagated through them without considerable violence, are naturally opaque. The question then only is, What is this subtle medium, the vibrations of which occasion transparency? It is scarce possible to answer this question in another manner than by saying, that it is the electric fluid. That it is this fluid which gives the power to electric substances, has never been denied. That the motion of this fluid along the surfaces of bodies throws another fluid within them into vibrations, is also evident from the experiments above-mentioned. All bodies are confessed to be full of electric matter: therefore, if a quantity of the same matter passes over the surface of any body, it must affect what is within its substance with a motion of some kind or other; because it affects that which lies on the outside, and this cannot fail to affect all the rest.—This motion Dr Priestley's experiment determines to be of the vibratory or tremulous kind; and, indeed, it is natural to think it should be so. The vibrations of the electrical fluid, therefore, conduct light through opaque bodies. But whatever fluid is conducted by the vibration of another, must itself also vibrate while it is so conducted. Light, therefore, vibrates when emitted from luminous bodies. In the present case, these vibrations are originally occasioned by the electric flash. They are conducted through opaque bodies by the vibrations of the electric fluid. The air is also full of the same fluid. The air is naturally transparent; but we have seen that transparency consists only in the easy transmission of a vibratory motion of the electric fluid. The light, therefore, is perpetually conducted by means of the vibrations of this fluid: therefore, the vibrations of the electric fluid and light are the same; for no two fluids are always capable of setting one another in motion precisely in the same manner, unless their nature is in all respects exactly the same.

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Light proved to be a vibration of the electric fluid.

These experiments seem in the strongest manner to prove the identity of the electric fluid and light, and that both are transmitted through electric as well as other substances. The reason, therefore, of the seeming stop, which is observed in our electrical operations by the intervention of glass, is, that in all artificial electricity, the fluid has a very considerable progressive motion, which cannot be easily propagated through the solid substance of any body, especially where there is a pretty strong resistance on the other side; which shall afterwards be shewn to be the case with this fluid when passing through electric substances.

§ 3. *Of the Passage of the Electric Fluid over the Surface, and through the Substance, of different Bodies.*

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Dr Priestley's experiments with ice.

DR PRIESTLEY hath made many very curious experiments concerning the discharging of electric shocks over the surface of different bodies; and finds, that by this means a battery may be made to discharge itself at a much greater distance than it would do if sent directly through the air. The experiments were begun with ice; and he first accidentally discovered, that, when the shock of a common jar was discharged on a plate of ice, it would sometimes run over the surface

and strike the chain directly on the other side. With a single jar, however, the distance was not much greater than what it would have passed over in the usual way; but, with a battery, it exceeded the usual distance in a very great degree.—Endeavouring to make a circular spot, such as he had formerly made on metals, upon a piece of raw flesh, he took a leg of mutton, and laying the chain that communicated with the outside of the battery over the flank, he took the explosion on the outward membrane, about seven inches from the chain; but was greatly surprised to observe the electric fire not to enter the flesh, but to pass in a body along the surface of it to come to the chain. Thinking that this might be occasioned by the fatty membrane on which the explosion was made, he again laid the chain in the same manner over the flank, and took the explosion upon the muscular fibres, where they had been cut off from the rest of the body; but still the fire avoided entering the flesh, made a circuit of near an inch round the edge of the joint, and passed along the surface to come to the chain as before, though the distance was near 11 inches. Imagining that this effect was promoted by the chain lying lightly on the surface of the flesh, and therefore not actually in contact with it, he took another explosion upon the hook of the chain, which was thrust into the flesh. On this the fire entered the mutton; and as he held it in his hands, both his arms were violently shocked up to his shoulders.

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With raw flesh.

The Doctor next determined to try the effect of different conducting substances in the same manner; and of these water was the most obvious. "Next day," says he, I laid a brass rod communicating with the outside of the battery, very near the surface of a quantity of water, (to resemble the chain lying upon the surface of the flesh, without being in contact with it), and, by means of another rod furnished with knobs, made a discharge on the surface of the water, at the distance of several inches from any part of the rod; when the electric fire struck down to the water, and, without entering it, passed visibly over its surface till it arrived at that part of the rod which was nearest the water, and the explosion was exceedingly loud. If the distance at which I made the discharge exceeded seven or eight inches, the electric fire entered the water, making a beautiful star upon its surface, and yielding a very dull sound.—When I first made this experiment of the electric flash passing over the surface of water, I thought it necessary, that neither the piece of metal communicating with the outside, nor that communicating with the inside, of the jars, should touch the water immediately before the discharge. But I afterwards found, that the experiment would answer, though either, or even both of them, were dipped in the water: for, in this case, the explosion would still prefer the surface to the water itself, if the distance was not very great; and would even pass at a greater distance along the surface, when there was a nearer passage from one rod to the other in the water."

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With water.

He afterwards tried to pass the electric flash over the surfaces of a great number of different bodies, but found it impossible with a great number of them. He therefore imagined, that this property of conducting a shock over its surface was peculiar to water and raw flesh. It was found, however, that the flash passed over the surface of a touch-stone, and likewise over a piece

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With many other bodies.

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Theory.

piece of the best kind of iron ore, exceedingly smooth on some of its sides. The piece was about an inch thick, and three inches in its other dimensions. The full charge of a jar of three square feet would not enter it. The explosion passed over the surface of oil of vitriol with a dull found and a red colour; but in all other cases, if it passed at all, it was in a bright flame, and with a report peculiarly loud. It passed over the surface of the most highly rectified spirit of wine without firing it; but when too great a distance was taken, the electric fire entered the spirit, and the whole was in a blaze in a moment.

This was the case when such substances were employed as are but indifferent conductors of electricity; raw flesh, for instance, water, &c. When good conductors were used, such as charcoal of different kinds, no remarkable appearances were produced. So far was the shock from passing visibly over the surface of any metal, that, if the distance through the air, in order to a passage through the metal, was ever so little nearer than the distance between the two surfaces, it never failed to enter the metal; so that its entering the surface of the metal, and its coming out again, seemed to be made without obstruction. If as much water was laid on a smooth piece of brass as could lie upon it, it would not go over the surface of the water, but always struck through the water into the metal. But if the metal lay at any considerable depth under the water, it would prefer the surface. It even passed over three or four inches of the surface of water as it was boiling in a brass pot, amidst the steam and bubbles, which seemed to be no hindrance to it.—Animal fluids, however, of all kinds, seemed peculiarly to favour this passage of the electric matter over their surface; and the report of these explosions was manifestly louder than when water was used. In all cases of this kind, the report was considerably louder than when the discharge was made in the common way. The explosions were observed by persons out of the house, and in a neighbouring house, very much to resemble the smart cracking of a whip.

“But, (says Dr Priestley,) the found made by these explosions, though by far the loudest that ever I heard of the kind, fell much short of the report made by a single jar, of no very great size, of Mr Rackhow’s; who says, that it was as loud as that of a pistol.” He also observes, that when the electrical explosion does not pass over the surface of the water, but enters it, a regular star is made upon the surface, consisting of ten or a dozen rays: and what is very remarkable, those rays which stretch towards the brass rod that communicates with the outside of the battery are always longer than the rest; and if the explosion is made at such a distance as to be very near taking the surface, those rays will be four or five times longer than the rest, and a line bounding the whole appearance will be an ellipsis, one of whose foci is perpendicularly under the brass knob with which the discharge is made.

When an electric battery is discharged upon smooth pieces of metal, the effects are very different from any of those we have yet mentioned. Dr Priestley having constructed some large batteries, determined to try what would be the effects of a very great electric power discharged upon metals and other substances; and, in the course of his random experiments, he made the following discoveries. “June 13, 1766, (says he), af-

ter having discharged a battery of about 40 square feet with a smooth brass knob, I accidentally observed upon it a pretty large circular spot, the center of which seemed to be superficially melted, in a great number of dots; larger near the centre, and smaller at a distance from it. Beyond this spot was a circle of black dust which was easily wiped off: but what I was most struck with was, that after an interruption of melted places, there was an entire and exact circle of shining dots, consisting of places superficially melted like those at the centre. The appearance of the whole, exclusive of the black dust, is represented Plate CI. fig. 1. n° 1.

“June 14. I took the spot upon smooth pieces of lead and silver. It was in both cases like that on the brass knob; only the central spot on the silver consisted of dots disposed with the utmost exactness, like radii from the centre of a circle, each of which terminated a little short of the external circle. I took the circular spot upon polished pieces of several metals with the charge of the same battery, and observed that the cavities in some of them were deeper than in others; as I thought in the following order, beginning with the deepest, tin, lead, brass, gold, steel, iron, copper, silver.—I will not be positive as to the order of some of the metals; but silver was evidently not affected a fourth part so much as gold, and much less than any of the others. The circles were marked as plain, but the impression was more superficial.

“I also made the explosion between a piece of lead just solid after melting, and another smooth piece that I had kept a considerable time. The piece of fresh lead was melted more than the other, but there was no other difference between them. The semimetals, as bismuth and zinc, received the same impression as the proper metals; being melted nearly as much as iron. I made three discharges between a piece of highly polished steel and a piece of very smooth iron, and in all cases thought the steel was more deeply melted than the iron.

“Presently after I had observed the single circle, I imagined, that, whatever was the cause of the appearance, it was not improbable but that two or more concentric circles might be procured, if a greater quantity of coated glass was used, or perhaps if the explosion was received upon metals that were more easily fused than brass. Accordingly, June 27, taking the moderate charge of a battery consisting of about 38 square feet, upon a piece of tin, I first observed a second outer circle, at the same distance from the first, as the first was from the central spot. It consisted of very fine points hardly visible, except when held in an advantageous light; but the appearance of the whole was very beautiful, and was such as is represented Plate CI. fig. 1. n° 2.

“Having hitherto found the circles the most distinct on metals that melt with the least degree of heat, I soon after procured a piece of that composition which melts in boiling water; and having charged 60 square feet of coated glass, I received the explosion with it, and found three concentric circles; the outermost of which was not quite so far from the next to it, as that was from the innermost. All the space within the first circle was melted; but the space was very well defined, and by no means like a central spot, which in this case was quite obliterated. The appearance of these three

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concentric circles is represented Plate CI. fig. 1. n° 3. The distance at which the discharge was made occasioned no difference in the diameter of these circular spots. When, by putting a drop of water upon the brass rod communicating with the inside of the battery, I made the discharge at the distance of two inches; the spot was just the same as if it had been received at the distance of half an inch, *i. e.* about a quarter of an inch in diameter. Attempting to send an electric shock over the surface of quicksilver or melted lead, I found that it would not pass; though neither of the rods with which the discharge was made, touched the metals. A dark impression was made on the surfaces of both the quicksilver and the lead of the usual size of the circular spot; and remained very visible notwithstanding the state of fusion in which the metals were."

§ 4. *The Electric Fluid moves thro' the Substance of Electrics, though with difficulty. In most cases, it passes over the Surface of good Conductors.*

Thus will appear from a consideration of the phenomena abovementioned, and some others. The electric most universally present is *air*. That the fluid pervades its substance is evident to our eye-sight; for if a pointed body is placed on the prime conductor, and at the same time the cylinder is briskly turned, a continual stream of blue fire will be observed to issue from the point. This is undoubtedly the fluid itself made visible by the resistance it meets with from the air. That the electric fluid in this case pervades the air to a considerable distance, is also evident from the different methods by which the air of a room may be electrified. One method is that abovementioned: One or more needles are fixed on the prime conductor, which is kept strongly electrified for about 10 minutes. If, afterwards, an electrometer is brought into the room, the air will shew that it has received a considerable quantity of electricity; for the balls will separate, and continue to do so even after the apparatus has been quite removed out of the room. Another method of electrifying the air is to charge a large jar and insulate it; then connect a sharp-pointed wire, or a number of them, with the knob of the jar; and make a communication from the outside coating to the table. If the jar is charged positively, the air of the room will likewise soon become electrified positively; but if the jar is charged negatively, the air will also become negative. To this it may be replied, that the air is always full of conducting substances, and that by means of them the electricity is propagated from one part of the air to another. But whether this is the case or not, it is certain that the air, notwithstanding all the conducting substances it may contain, is in fact an electric, and capable of receiving a charge like glass, or any other electric substance. To this purpose there is a very curious experiment made in the following manner. Take two smooth boards, of a circular form, and each about three or four feet in diameter. Coat one side of each with tin-foil, which should be paled down and burnished, and turned over the edge of the board. These boards must be both insulated, parallel to one another, in a horizontal position. They must be turned with their coated sides towards each other; and should be placed in such a manner as to be easily moved to or

from each other; to do which, it will be proper to fix to one of the boards a strong supporter of glass or baked wood, and to suspend the other by silk strings from the ceiling of the room; from which it may be lowered at pleasure by means of a pulley. When these boards are placed in the manner above described, and about an inch distant from one another, they may be used exactly as the coatings of a pane of glass. If a spark is given from the conductor to the upper board, a spark will instantly be discharged from the lower one, if any conducting substance is presented to it. By continuing to give sparks to the upper board, and to take them from the lower one, the air between them will at last become charged like a piece of glass; and if a communication is made between them, they will explode, give the shock, &c. like glass.

In this experiment it seems impossible to deny that the air is penetrated by electric fluid. The distance of an inch is so small, that it must appear ridiculous to say that this space is penetrated only by a *repulsive power*, when in other cases we plainly see the fluid penetrating it to three or four times that distance. The flat surface of the boards indeed makes the motion of the electric fluid through the plate of air gradual and equal, so that it is not seen to pass in sparks or otherwise; but this is necessary to its receiving a charge, as will be afterwards explained.

If one electric substance is penetrable by the electric fluid, we must be led strongly to suspect at least, that all the rest are so too. That resin, pitch, sealing-wax, &c. are so, hath been already proved; and from thence, if we reason analogically, we must conclude that glass is likewise penetrable by it. A very strong additional proof of this is, that the electric shock cannot be sent over the surface of glass. If this substance was altogether impenetrable to the fluid, it is natural to think, that it would run over the surface of glass very easily. But instead of this, so great is its propensity to enter, that a shock sent through between two glass plates, if they are pressed pretty close together, always breaks them to pieces, and even reduces part of them to a powder like sand. This last effect cannot be attributed to any other cause than the electric fluid entering the pores of the glass; and meeting with resistance, the impetus of its progressive motion violently forces the vitreous particles asunder in all directions.

To this violent impetus of the electric fluid when once it is set in motion, we may also with some probability ascribe the bursting of electric globes, both such as are made of glass, and other materials, in the act of excitation. Dr Priestley hath given several instances of this accident. "The fragments, (says he), have been thrown with great violence in every direction, so as to be very dangerous to the bystanders. This accident happened to Mr Sabbatelli, in Italy; Mr Nollet, in France; Mr Beraud, at Lyons; Mr Boze, at Wittenberg; Mr Le Cat, at Rouen; and Mr Robein, at Rennes. The air in the inside of Mr Sabbatelli's globe had no communication with the external air, but that of the Abbe Nollet had. This last, which was of English flint glass, had been used for more than two years, and was above a line thick. It burst like a bomb in the hands of a servant who was rubbing it, and the fragments, none of which were above an inch in diameter, were thrown to a considerable distance. The

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Methods of
electrifying
the air of a
room.

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To charge a
plate of air

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Accounts
of globes
burst by
electrical
operations.

Theory. Abbe says, that all the globes which were burst in that manner, exploded after five or six turns of the wheel; and he ascribes this effect to the action of the electric matter making the particles of the glass vibrate in a manner he could not conceive.

“When Mr Beraud's globe burst, (and he was the first to whom this accident was ever known to happen), he was making some experiments in the dark on the 8th of February, 1750. A noise was first heard as of something rending to pieces; then followed the explosion; and when the lights were brought in, it was observed that those places of the floor which were opposite to the equatorial diameter of the globe were strewed with smaller pieces, and in greater numbers, than those which were opposite to other parts of it. This globe had been cracked, but it had been in constant use in that state above a year; and the crack had extended itself from the pole quite to the equator. The proprietor ascribed the accident to the vibrations of the glass, and thought the crack had some way impeded these vibrations. When Mr Boze's globe broke, he says that the whole of it appeared, in the act of breaking, like a flaming coal. Mr Boulanger says, that glass globes have sometimes burst like bombs, and have wounded many persons, and that their fragments have even penetrated several inches into a wall. He also says, that if globes burst in whirling by the gun-barrel's touching them, they burst with the same violence, the splinters often entering into the wall. The Abbe Nollet had a globe of sulphur which burst as he was rubbing it with his naked hands; after two or three turns of the wheel, having first cracked inwardly. It broke into very small pieces, which flew to a great distance, and into a fine dust; of which part flew against his naked breast, where it entered the skin so deep, that it could not be got off without the edge of a knife.”

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Proofs of
the electric
fluid's pas-
sing over
the surface
of conduc-
tors.

From these appearances we must necessarily conclude, not only that the electric fluid moves within the substance of electric bodies, but that it sometimes moves with extreme violence; so that its repulsive power separates even the minutest particles from each other; and this could not happen without a thorough penetration of the electric body.—It seems, however, more difficult to shew, that the electric matter does not generally pass directly through the substance of metals, but over their surface. A little consideration, however, will shew, that this must very probably be the case. If we compare Dr Priestley's experiments on metals related in § 3. with the effects of the solar light collected in the focus of a burning-glass upon the same metals, we shall find a considerable degree of resemblance. Under the article BURNING-GLASS, it is observed, that, notwithstanding the prodigious power of that concave mirror with which Mr Macquer melted platina, all bodies did not melt equally soon in the focus. In particular, polished silver, though a very fusible metal, did not melt at all. It is not to be doubted, that this was owing to the complete reflection of the light by the silver; and had polished pieces of all the metals been tried, it is equally certain, that the difficulty of melting them would have been found exactly proportioned to their reflective power. Something like this happened with Dr Priestley; for silver was less touched by the electric explosion than any other metal.

The violent progressive motion of the fluid indeed forced it into the metal, but at the same time the reflective power of the silver hindered it from going so deep as it had done in the others. The case was still more evident when melted lead and quicksilver were used. These have a very great reflective power; and though by reason of the extreme violence wherewith the fluid struck them, part of their substance might naturally have been supposed to be dissipated as in the hard metals, yet we find this was not the case. Only a black spot was made on the surface, and the fluid was immediately dispersed, most probably over the surface of the metal.

It is not indeed easy to bring a decisive proof in favour of this hypothesis. The extreme subtilty, and, in most cases, invisibility, of the electric fluid, render all reasoning about its motions precarious. It is incredible, however, that this fluid should pass through the very substance of metallic bodies, and not be in the least retarded by their solid particles. In those cases, where the solid parts of metals are evidently penetrated, *i. e.* when wires are exploded, there is a very manifest resistance; for the parts of the wire are scattered about with violence in all directions. The like happened in Dr Priestley's circles made on smooth pieces of metal. Part of the metal was also dispersed and thrown off, for the circular spots were composed of little cavities. If therefore the fluid was dispersed throughout the substance; and not over the surface of the metal, it is plain, that a wire whose diameter was equal to one of those circular spots, ought also to have been destroyed by an explosion of equal strength sent through it. But this would not have been the case. A wire whose diameter is equal to one of those circular spots represented in n° 1, 2, 3. fig. 1. Plate CI. would without injury conduct a shock much greater than any battery hitherto constructed could give. It is most probable therefore, that though violent flashes of electricity, which act also as fire, will enter into the substance of metals and consume them; yet it immediately disperses itself over their surface, without entering the substance any more, till being forced to collect itself into a narrow compass it again acts as fire.

In many cases, the electric fluid will be conducted very well by metals reduced to a mere surface, so that we can scarce say they have any thickness at all. A piece of white paper will not conduct a shock without being torn in pieces, as it is an electric substance. But a line drawn upon it with a black-lead pencil will safely convey the charge of several jars. It is impossible we can think that the fire here passes through the substance of the black-lead stroke. It must run over its surface; and if we consider some of the properties of metals, we shall find, that there is every great reason for believing that their conducting power lies at their surface.

The metals are, of all terrestrial substances, those which reflect the light most powerfully. Sir Isaac Newton hath shewn that this reflective power they have not from their substance as metals, but from what he calls a *repulsive power*, spread equally over their surface. The existence of this repulsive power hath already been taken notice of in several instances, particularly in that of a chain, whose links cannot be brought into contact with each other without a considerable

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derable degree of force. It is exceedingly probable, that the repulsive power by which the links of the chain are kept asunder, and that by which the rays of light are reflected, are one and the same. As the electric fluid is known to pervade all substances, and metals as well as others, it seems also probable, that the repulsive and reflective power on the substance of metals is no other than the electric fluid itself in a quiescent state. Perhaps it may be thought absurd to ascribe the reflection of light to a substance of such extreme fluidity and tenuity as the electric fluid is; but we find that the vacuum of an air-pump, a medium of nearly equal tenuity with the electric fluid, (as will elsewhere be proved), is in some cases capable of reflecting light very powerfully. Now it is certain, that nothing can be supposed to give such an easy passage to the electric fluid as itself; because it is the thinnest and most subtle of all the substances we know, and therefore must make the least resistance. Hence the fluid slides over the surface of a piece of metal with surprising ease; and when a large surface of metal is electrified, the effect is proportionable to the extent of it, because all that quantity of electric fluid which is spread over the surface, easily receives the motion communicated by the electrical machine.

The vacuum of an air-pump is found to be a very good conductor, and by means of it the motion of the fluid is rendered visible. Hence this is brought as an argument that the electric fluid *always* passes through the substance of conductors. That it doth so in some cases is indeed very evident, but it then meets with considerable resistance; and, even in the present instance, the passing thro' the vacuum of an air-pump, where it is opposed by a considerable quantity of the same kind of fluid, gives such a considerable resistance, that it will prefer a passage along a metalline rod to one through a vacuum. With regard to charcoal, and other conductors of that kind, as they are very porous, and likewise composed of fine spiculae, it is probable the fluid may run along the surface of the spiculae, and at the same time through the substance of the coal. Even in passing over the best conductors, however, this fluid meets with some resistance, as it will prefer a short passage through the air to a long one through the best conductors.

§ 5. *The exceeding great Velocity and Strength of the Electric Fluid are not owing to a repulsive Power among its Particles, but to the mutual Action of the Air and Electric Fluid upon themselves and one another.*

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Electric fluid shewn to be not repulsive of itself.

THE arguments for a repulsive power existing between the particles of the electric fluid are very inconclusive. Some of them have been already taken notice of. The strongest is that drawn from the appearance of the electric fire issuing from a point, or from any body highly electrified. In the open air this diverges excessively; and very often divides into several distinct rays, which by avoiding each other seem to be violently repulsive. That they are not so in reality, however, is plain from the appearance they have *in vacuo*; when, the resistance of the atmosphere being taken off, the electric light would have room to spread more widely. Fig. 15. Plate C. represents an exhausted receiver with an electrified wire discharging a stream of this fluid from itself, by means of its

communication with a machine. If the electric matter then was really elastic, or endowed with a power repulsive of itself, it is impossible it could pass in an uninterrupted column through an exhausted receiver as in the figure. A column of air, if blown swiftly thro' the orifice of a small pipe, will go forward a considerable way, if it is counterbalanced by air like itself on every side. But if such a column enters a vacuum, what we call its *elasticity*, occasions it to be diffipated in a moment, and equally diffused through the whole exhausted receiver. But this by no means happens to the electric fluid; for even the small divergency represented in the figure, seems entirely owing to some quantity of air left in the air-pump. Dr Watson, by means of a long bent tube of glass filled with mercury, and inverted, made all the bended part which was above the mercury, the most perfect vacuum that can be made. This vacuum he insulated; and one of the basons of mercury being made to communicate with the prime conductor, when some non-electric substance touched the other, the electric matter pervaded the vacuum in a continued arch of lambent flame, and, as far as the eye could follow it, without the least divergency. From these experiments it appears, that there is in the vacuum of an air-pump, as well as in the Torricellian vacuum, a fluid of nearly the same density with the electric one: that the electric fluid is not repulsive of itself, but is resisted by the atmosphere; and therefore all appearances of electrical light are less bright *in vacuo* than in the open air; because, the more resistance the matter meets with, the brighter is the flash.

Thus, as long as a stream of electric fluid is moved through a medium of an equal density with itself, the equable pressure of the fluid all round will keep the luminous stream from diverging; but if the pressure is taken off from any part of the receiver, the pressure of the rest will immediately force the stream to that place, as represented fig. 16. That it is by a pressure of this kind, and not by any obscure *attractive power*, that this is occasioned, will be rendered very probable from the following example. Suppose a pot or kettle is boiling violently over a fire, and in such a situation that there is very little agitation in the surrounding air. The equal pressure of the atmosphere will then force the steam straight upwards in a cylindrical column; but if any object is brought near the edge of the pot, so that the pressure of the atmosphere is taken off on one side, the steam will be directly forced upon that body, or seemingly attracted by it. The electric matter therefore, being capable of having its motions resisted by the air, must immediately fly to that place where the resistance is least; but in the case above-mentioned, this is best done by applying a conducting substance to the side of the receiver, or one along which the fluid can run downward to the earth. This, however, will be more fully explained when we speak of the phenomena of the Leyden phial.

From this simple principle, viz. that fluids impelled by any force will always tend towards that place where there is the least resistance, may most of the phenomena of electricity be explained. The first thing to be considered is, From what source it originally derives the astonishing agility and strength displayed in its motions. If it is granted that the electric fluid is the

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Origin of the prodigious power of electricity.

same

Theory. fame with the solar light, the ultimate cause of its momentum must be the power by which the light of the sun is emitted. As this power extends through regions of space which to our conceptions are truly infinite, so must the power itself be; and it is plain, that by its equable action all round, throughout the whole space through which the sun's light is propagated, the pressure of it upon all bodies must be equal all round, and consequently it can neither move them one way nor another. But if, by the intervention of some other power, the pressure is lessened upon any particular part, a current of electric matter will set towards that part, with a force exactly proportioned to the diminution of the pressure. Thus, in the common experiments of the air-pump, when the air is exhausted from a glass vessel, the pressure of the superincumbent atmosphere is directed towards every part of the glass, so that if it is of a flat square shape, and not very strong, it will certainly be broken. But after the air is exhausted, the vessel is discovered to be full of another subtle fluid of the same nature with the electric one *. If this could also be extracted from the vessel, the pressure on its sides would necessarily be much greater, because not only the atmosphere, but the whole surrounding ether or electric matter, would urge towards the place; and it is not probable, that this pressure could be resisted by any terrestrial power whatever. The momentum of the electric matter therefore, in our experiments, depends on two causes, viz. the pressure of the atmosphere upon the electric matter, and the pressure of one part of this matter upon another. The celerity with which it moves may be explained from its parts lying in contact with each other throughout the wide immensity of space. Hence the great tendency of the fluid to circulate; because, from whatever point a stream of it is sent off, there the pressure is lessened, and the stream, finding no place empty for its reception, must necessarily have a tendency to return to the place from whence it came, as there it meets with the least resistance; and hence, when a passage is opened for it, by which it can return to this point, it is urged thither with great violence, the equable pressure is restored, and the artificial motion ceases.

§ 6. *The manner in which an Electric Substance becomes excited, or diffuses its Electric Virtue.*

This will easily appear, from considering the means taken for the excitation of a common cylinder for electric experiments. The glass is a substance, as we have already seen, into which the electric matter is very apt to enter. To the surface of the glass is applied some amalgam spread on leather. This is a metallic substance which has an exceeding great reflective power, being that which is employed for silvering looking-glasses. The electric fluid therefore runs over its surface with great ease, and there is always a certain quantity of this fluid in a state of stagnation on its surface. At the place where the cylinder touches the amalgam, the air is excluded, and consequently the electric fluid hath there a tendency to rise more than at any other part of the surface where the atmosphere presses with its full force. When the cylinder begins to turn, it necessarily forces before it a small quantity of that electric matter which lay upon the surface of the amalgam. To understand this the more easily,

we must consider that property which glass has of transmitting the electric fluid through it, and refusing it a passage along its surface. Thus we may conceive it to be formed of a vast number of exceedingly small tubes placed close to each other. If we suppose any substance made by art of such a texture, we would find it impossible to pour water along its surface, though it would very easily run through it. If such a substance was made in the shape of a cylinder, and turned briskly round, with its surface just touching a quantity of water contained in a vessel, the consequence would be, that the water would be scattered around in all directions. The case seems to be the same with the more subtle electric fluid. The glass cylinder throws out part of the electric fluid lying on the surface of the amalgam. This quantity is perpetually renewed from the conducting side of the rubber. The quantity which is thrown out cannot be conducted over the surface of the glass, nor can it pass through it; because it is resisted by the air in the inside, and, in some measure, by the glass itself. It is also resisted by the air on the outside; but as that resistance is less than what is made by the air and glass both put together, the fluid naturally forces itself into the open air. Still, however, there neither is, nor can be, any accumulation of the matter itself. It cannot enter the air without displacing the electric matter which was there before. This will displace more of the same kind, and so on, till at last the motion is communicated to the electric matter lodged in some part of the earth. From thence it is propagated to the rubber of the electric machine, and thus a kind of circulatory motion is carried on.—By the excitation of an electric substance, therefore, the fluid is not accumulated, but only set in motion. The reason of that seeming accumulation observable about the excited cylinder is, the resistance which the fluid meets with from the air. This instantly produces a divergency in the stream of electric matter, and a vibratory struggle betwixt it and the air; which, again, produces the appearances of fire and light, for the reasons already given.

That this kind of vibratory motion or struggle between the electric fluid and air always takes place when the latter is set in motion, seems evident from the sensation which is felt when a strongly excited electric is brought near any part of the human body. This is such as would be occasioned by a spider's web drawn lightly along the skin, or rather by a multitude of small insects crawling upon the body. It is, however, more clearly proved by an experiment made by Dr Priestley. He was desirous to know whether the electric fluid was concerned in the freezing of water or not. For this purpose, he exposed two dishes of water to the open air in the time of a severe frost. One of them he kept pretty strongly electrified; but could observe no difference in the time either when it began to freeze, which was in about three minutes, or in the thickness of the ice, when both had been frozen for some time. Happening to look out at the window through which he had put the dishes, he observed on each side of the electrified wire, the same dancing vapour which is seen near the surface of the earth in a hot day, or at any time near a body strongly heated.

If the glass cylinder which we want to excite is exhausted of air, the electric matter, instead of flying off into

Theory.

94 Proofs of the vibratory motion of the electric fluid.

95 Why an exhausted cylinder cannot be excited.

* See Vacuum.

Theory.

Theory.

into the air, runs directly through the glass; and, meeting with some resistance from the *vacuum* as it is called, a weak light is produced in the inside, but no signs of electricity are perceived on the outside of the glass. The same thing happens by giving the cylinder or tube a metallic coating. The fluid collected from the rubber runs directly through the glass, and along the surface of the metallic coating, which keeps off the pressure of the air contained in the glass.—If an electric lining is used, and the glass is exhausted of air, the motion of the fluid becomes visible through both, and the whole is transparent, as already observed.—If the cylinder is lined with an electric substance, and the air is not exhausted, the electricity on the outside is often considerably increased; but the reason of this is not evident. Most probably it is owing to the different kind of electricity acquired by the inside lining; for electricity of any kind always produces its opposite at a small distance, the reason of which shall be afterwards given.

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Nor one
filled with
condensed
air.

If the air within the cylinder is condensed, the electrical appearances on the outside are lessened in proportion. The reason of this seems to be, that though it is necessary that the fluid should not go through the substance of the glass very easily, yet it is requisite that its passage should not be totally obstructed, and therefore the electric experiments succeed best when the air within the glass is a little rarefied. We must also consider, that when an additional quantity of air is forced into the cylinder, an equal bulk of electric matter is forced out. The rest of the matter, therefore, which is contained all round the glass, presses violently into its pores; but this pressure, being directly opposite to what happens when the glass is excited, must of consequence hinder the excitation. If the glass is now made very hot, the pressure of the atmosphere is kept off, and the passage of the electric fluid through the glass and condensed air is rendered easier, and therefore the electric appearances on the outside return.

On the same principles may we explain the excitation of a solid stick of glass, sealing-wax, or sulphur. Though these have no air within them, yet they have a very considerable quantity of electric matter, which resists an expulsion from its place; and therefore, tho' it may yield a little when the rubber is applied to the outside, yet it will instantly throw off into the atmosphere what the rubber has left on the surface; because the resistance is least towards that place, as soon as the electric has come out from under the rubber. Hence also, we see the reason why no signs of electricity are observed on glass to which the rubber is immediately applied; namely, because the pressure being equally great all round, no part of the electric fluid can be thrown off into the atmosphere, in order to set the rest in motion.

The only thing necessary to be added in confirmation of this theory of excitation is, that electric substances of the same kind cannot be excited by rubbing them against one another. Thus glass cannot be excited by rubbing it against glass, &c. Mr Willeke observed, that when two pieces of glass were rubbed upon each other in the dark, a very vivid light appeared upon them; which however threw out no rays, but adhered to the place where it was excited. It was attended with a strong phosphoreal smell, but no attrac-

tion or repulsion. From this experiment he inferred, that friction alone would not excite electricity; but that to produce this effect, the bodies rubbed together must be of different natures with respect to their attracting the electric fluid.

§ 7. Of Positive and Negative Electricity.

From what hath been already advanced, it will pretty plainly appear, that to increase the quantity of electric fluid in any body is a thing impossible, unless we also augment the size of the body. All the fine pores of every terrestrial fluid are exceedingly full, and unless we separate the minutest particles of the body farther from one another than they are naturally, we cannot introduce more of the electric fluid into it than there was before. This fluid, we have already seen, is not, like the air, endued with a repulsive force between its particles; and therefore it must be incompressible. If it is incompressible, all the phenomena attending it must be owing to its various motions, and the seeming accumulations of it must be owing only to its more brisk action in some places than in others. But before a complete solution of the phenomena of positive and negative electricity can be given, it is necessary to shew that these are not so essentially distinct and opposite as they have been thought to be, but may be converted into each other in such cases as we cannot possibly suppose either an addition or subtraction of the electric fluid.

This position, however opposite to the common opinions on the subject, may be proved by the following experiments. 1. Let a coated phial be set upon an insulating stand, and let its knob be touched by the knob of another phial negatively electrified. A small spark will be observed between them, and both sides of the insulated phial will instantly be electrified negatively. Now, though we may suppose the one side of the phial which is touched by the negatively electrified one to lose part of its fire, yet this cannot be the case with the other, because there is nothing to take it away, and therefore it ought to appear in its natural state. 2. Let a phial, having a pith-ball electrometer fastened to its outside coating, be slightly charged positively, and then set upon an insulated stand. The outside is then negatively electrified, or, according to Dr Franklin's theory, has too little electric matter in it. The pith-balls, however, will touch each other, or separate but in a very small degree; but let the knob of another bottle, which hath received a strong charge of positive electricity, be brought near to the knob of the first, and the pith-balls on the outside will diverge with positive electricity. Now, it is impossible that any substance can have both too much and too little electric matter at the same instant: yet we see that negative electricity may thus instantaneously be converted into the positive kind, in circumstances where no addition of fire to the outside can be supposed. 3. Let the same phial, with the pith-balls affixed to its outside coating, be slightly charged negatively, and then insulated. The outside is now electrified positively, or, according to Dr Franklin's hypothesis, has too great a quantity of electric fluid. Nevertheless, upon bringing the knob of a phial strongly electrified negatively to that of the insulated one, the pith-balls will instantly diverge with negative electricity. 4. Let a phial receive as full a charge

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Methods of
changing
positive into
negative
electricity
into one
another.

Theory. charge of positive electricity as it can contain, and then insulate it. Charge another very highly with negative electricity. Bring the knob of the negative bottle near that of the positive one, and a thread will play briskly between them. But when the knobs touch each other, the thread after being attracted will be repelled by both. The negative electricity is somehow or other superinduced upon the positive; and, for a few moments after the bottles are separated, both will seem to be electrified negatively. But, if the finger is brought near the knob of that bottle on which the negative electricity was superinduced, it will instantly be dissipated, a small spark strikes the finger, and the bottle appears positively charged as before.

From these metamorphoses of positive into negative, or negative into positive electricity, it seems proven in the most decisive manner, that positive electricity doth not consist in an accumulation, nor the negative kind in a deficiency, of the electric fluid. We are obliged, therefore, to adopt the only probable supposition, namely, that both of them arise entirely from the different directions into which the fluid is thrown in different circumstances. The only method, therefore, of giving an intelligible explanation of positive and negative electricity is by considering the different direction of the fluid in each.

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Method of determining the direction of the fluid.

A great variety of methods have been contrived to ascertain the direction of the electric fluid, but all of them seem uncertain except that which is drawn from the appearance of electric light. The luminous matter appearing on a point negatively electrified is very small, resembling a globule; it makes little noise, and has a kind of hissing sound. The positive electricity, on the other hand, appears in a diverging luminous stream, which darts a considerable way into the air, with a crackling noise. Now, it is certain, that in whatever case the electric fluid darts from the point into the air, in that case it must be the most resisted by it; and this is evidently in the positive electricity. In this, the rays evidently *diverge* from the points. We may, indeed, suppose them to be *converging* from many points in the surrounding air towards the metallic point. But why should we imagine that a visible ray would break out from one place of the atmosphere more than another? The air, we know, resists the motion of the electric fluid, and it certainly must resist it equally. Of consequence, when this fluid is coming from the air towards a pointed conductor, it must percolate slowly and invisibly through the air on all sides equally, till it comes so near that it is able to break through the intermediate space; and as this will likewise be equal, or nearly so, all round, the negative electricity must appear like a steady luminous globule on the point, not lengthening or shortening by flashes as the positive kind does. Electricians have therefore determined with a great deal of reason, that when a point is electrified positively the matter flows out from it.

It is to be remarked, however, that in most cases, if not in all, a body cannot be electrified negatively till it has first become positively electrified; and it is in the act of discharging its positive electricity that it becomes negative. Thus, suppose a coated phial to be set upon an insulated stand, and its knob is approached by that of another bottle charged positively: a small spark is observed between them, and both sides of the insu-

lated bottle are electrified positively; but as soon as the finger is brought near to the outside, the positive electricity is discharged by a spark, and a negative one appears. But from what hath been already advanced, it is evident, that positive electricity is when the fluid hath a tendency to leave any body, and the negative electricity when it hath the same tendency to enter it. Therefore, as the electric fluid is subject to mechanical laws as well as other fluids, it must follow, that these tendencies are produced and kept up by the motions excited originally in the air, and electric fluid in the air, surrounding these bodies. If this principle is kept in view, it will lead us to an easy explanation of many electrical phenomena, for which no satisfactory reason hath hitherto been given.

§ 8. Of Electric Attraction and Repulsion.

It hath now been shewn, that, in bodies electrified positively, there is a flux of electric matter from their surface all round; that is, the fluid contained in their pores pushes out on every side, and communicates a similar motion to the electric fluid contained in the adjacent atmosphere. This must of necessity very soon exhaust the body of its electric matter altogether, if it was not instantaneously supplied with it after every emission. But this supply is immediately procured from the surrounding atmosphere. The quantity sent off is instantly returned from the air, and the vibratory motion or struggle between the air and electric fluid, which hath been often mentioned, immediately takes place. The positive electricity therefore consists in a vibratory motion in the air and electric fluid; and the force of this vibration is directed outwards from the electrified body. In bodies negatively electrified, the fluid contained in the neighbouring atmosphere is directed towards the body so electrified. But it is certain, that this motion inwards cannot be continued unless there is also a motion of the fluid outwards from the body. In this case also there is a vibratory motion, but the force of it is directed inwards, and as the source of it lies not in the body, but in the surrounding atmosphere, it manifests itself somewhat less vigorously.

The reason why these motions are continued for such a length of time as we see they are, is, the extreme mobility of the electric fluid. It doth not indeed appear from any experiments, that this fluid hath the least friction among its parts. A motion once induced into it must therefore continue for ever, until it is counteracted by some other motion of the same fluid. Hence, when a vibratory motion is once introduced among the particles of the electric fluid contained in any substance, that motion will be kept up by the surrounding fluid, let the body be removed to what place we please. There is no occasion indeed for supposing any thing like an electric atmosphere round the electrified body. The case is exactly the same as with a burning body. Let a candle be carried to what place we will, it will still burn; but it would be absurd to say, that the fire surrounded it like an atmosphere, as we know the fire is kept up by the air only, which is changed every moment. In like manner, the positive and negative electricities, which are two different motions of the electric fluid, are kept up by the air and electric matter contained in it; and, wherever the electrified body is carried, these fluids are equally capable of

of continuing them.

The phenomena of attraction and repulsion are now easily explained. Let us suppose a body positively electrified suspended by a small thread, at a distance from any other. The vibration above-mentioned, in which positive electricity consists, being kept up by the equable pressure on all sides, the body is neither moved to one side nor another. But when a negatively electrified body is brought near, the force of the vibration being directed outwards in the one, and inwards in the other, the pressure of the fluid in the intermediate space between them is greatly lessened; and of consequence the pressure on the other sides drives them together, and they are said to *attract* each other. If another body, electrified also positively, is brought near to the first, the force of the vibrations are directly opposed to one another, and therefore the bodies recede from each other, and are said to *repel* one another.—The case is the same with two bodies negatively electrified: for there the electricity, as far as it extends round the bodies, consists of a vibratory motion of the electric fluid; and the vibrations being directed towards both the bodies, as towards two different centres, must necessarily cause them recede from each other; because, if they remained in contact, the vibratory motions would interfere with and destroy one another.

When a small body is brought within the sphere of another's electricity, the equable pressure of that vibratory or electrical sphere is somewhat lessened upon the side near which the second body is brought; and therefore it is immediately impelled towards the first, by the action of the surrounding fluid, in order to keep up the equilibrium. As soon as it arrives there, the vibrations of the fluid around the first body being communicated to that within the pores of the second, it immediately acquires a sphere of electricity as well as the first, and is consequently repelled. The repulsion continues till the vibration ceases either by the action of the air, or by the body coming in contact with another much larger than itself, in which case the electricity is said to be *discharged*. If, after this discharge of electricity, the second body is still within the electric sphere of the first, it will immediately be attracted, and very soon after repelled, and so on alternately till the electricity of the former totally ceases.

§ 9. *Of the Discharge of Electricity by Sparks upon blunt Conductors, and silently by pointed ones.*

The manner in which this is accomplished will best appear from considering the nature of what is commonly called *electricity*. This cannot appear but in an electric substance, and the substance in which it doth appear is the air. The prime conductor of an electrical machine discovers no other properties in itself when electrified, than it had before. The metal is equally hard, shining, and impenetrable. The electricity, or properties of attracting, repelling, &c. are all lodged in the air; and if the conductor is placed *in vacuo*, they instantly cease. It hath already been shewn, that the electric matter runs over the surface of conducting substances in great quantities, like a stream of water running from one place to another. In this manner it will not pass over the surface of electrics. It enters their substance, and passes through it with a vi-

bratory motion. This vibratory motion always shews a resistance; nor is it in any case possible to induce a vibration without first impressing a motion in one direction, and then resisting it by a contrary motion. Round the surface of an electrified body suspended in the air, therefore, there is always an equable pressure, by which the emission of the electric fluid is every moment checked, and by which its vibrations are occasioned. When a metallic substance is brought near the electrified body, the fluid has an opportunity of making its escape, provided it could get at the metal, because it could run along its surface. The pressure of the air is also lessened on that side which the conducting substance approaches. The whole effort of the electric matter contained in the vibratory sphere is exerted against that single place, because the resistance is least. If the body has a broad surface, however, the disproportion between these resistances is not so great as when its surface is less. Let us suppose, for instance, that the surface of the conducting substance contains an inch square, and that the whole surface of the electrified sphere contains only six square inches. When the conducting substance approaches, all the pressure is directed towards that place; and the effort made by the electric matter to escape there, is five times as great as what it is any where else. Nevertheless, though it has a vibratory motion in the substance of the air, it cannot have a progressive motion through it without violently displacing its parts; and an inch square of air makes a considerable resistance. At last, however, if this resistance is every moment made less by approaching the conducting substance nearer to the electrified body, the electric matter breaks through the thin plate of air, strikes the conductor, and runs along it. The spark is produced by the resistance it meets with from the air.—But if, instead of a body with a broad surface, we present the point of a needle, whose surface is perhaps not above the ten-thousandth part of a square inch, the effort of the electric matter to discharge itself there will be 60,000 times greater than at any other place, because the whole effort of the six square inches, of which we suppose the surface of the electric sphere to consist, is exerted against that single point. The air also resists, as in the former case; but it can resist only in proportion to the extent of its surface which covers the conducting body; and this, being only the ten-thousandth part of a square inch, must be exceedingly little. As soon therefore as a needle, or any other fine pointed body, is presented to an electrified substance, the electric matter is urged thither with great velocity; and as it hath an opportunity of running along the needle, its vibrations quickly cease, and the electricity is said to be *drawn off*.—This drawing off, however, does not extend all round the electrified body, if means are used to keep up the electricity perpetually. Thus, if, on the end of the prime conductor, there are fastened a number of fine threads, hairs, &c. when the cylinder is turned, the threads on the end will diverge, and spread out like as many rays proceeding from a centre. If a point is presented on one side of the conductor, though at a considerable distance, the threads on one side will lose their divergency and hang down, but those on the other side will continue to diverge. The reason of this is, the difficulty with which the electric fluid gets thro' the

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Electricity
only shews
itself in the
air.

Theory. atmosphere, even where the resistance of it is made as little as possible; and hence also we may see why more conductors than one may be necessary for the safety of large buildings. See THUNDER.

§ 9. *Why Positive Electricity hath a tendency to induce the Negative Kind on any Body kept within its sphere of action, and why Negative Electricity produces the Positive Kind in similar circumstances.*

THIS is one of the electrical phenomena most difficult to be solved; and indeed seems totally insoluble, unless we give up the idea of *accumulation* and *deficiency* of the electric fluid in different bodies. On Dr Franklin's principles, no solution hath been attempted. Mr Cavallo places this among the *properties* of electricity for which he doth not pretend to account, but gives as the *causes* of other phenomena. It is indeed certain, that if a body hath already *too much* electricity or any thing else, it cannot be continually taking from those around it; and if it hath *too little*, it cannot be continually giving them. By attending to the principles above laid down, however, this phenomenon admits of an easy solution. As positive electricity consists in a vibratory motion of the electric matter in the pores of any body, and to some distance through the air, while at the same time the force is directed outwards from the body, it is plain, that if any other body is brought within this sphere, the direction of the vibration is changed; for what is *outwards* from the one, is *inwards* to the other. But a vibratory motion, the force of which is directed *inwards*, is what constitutes negative electricity; and, therefore, no sooner is any body placed at some distance from one positively electrified, than it immediately becomes negatively so. The same reason may be given why negative electricity produces the positive kind on a body placed near it. In the negative kind, the force of the vibration is directed *inwards*. If another body is brought near, the vibration which is *inwards* to the first, must be *outwards* from the second, which thus becomes positively electrified. The only difficulty here, is to account for this motion, which is only inward or outward to one side of the body brought near the electrified one, being so suddenly propagated all round. This, however, must easily be seen to arise from the extreme subtilty of the electric fluid, and its effort to keep up an equilibrium in all parts, which it will never suffer to be broken. When this fluid pushes inward to one side of a body, the fluid contained in that body would immediately yield, and allow a free passage to what came after, if its yielding was not obstructed by something on the other side. This obstruction arises from the air, which cannot admit a progressive motion of electric matter through it. No sooner, therefore, is a push made against one side than a contrary one is made against the other; and thus the body instantly becomes electrified all round.

On these principles, also, may we account for the zones of positive and negative electricity which are to be found on the surface of glass tubes*; and especially in electrified air. When the prime conductor of a machine is strongly electrified positively, it is throwing out the fluid from it in all directions. The air cannot receive this fluid without throwing out that which it also contains; and this shews, that simple electrifi-

cation can neither increase nor diminish the density of the air, which is also vouched by numberless experiments. But, if the air throws out its electric fluid in all directions, it must throw part of it back upon the conductor, and consequently obstruct its operations. This likewise is found to be the case; for it is impossible to make an electric machine act long with the same degree of strength, owing to the electricity communicated from it to the air. But if the conductor and air are thus reciprocally throwing the electric matter back upon one another, it is impossible but another zone of air which lies at a greater distance must be continually receiving it, or be electrified negatively. But this cannot receive, without also emitting the fluid it contains; which, therefore, will be thrown upon another zone behind it, and partly back upon the first. The original force of the fluid being now spread over a large space, will consequently be diminished; and the succeeding zone will be electrified weakly, though positively. In like manner, a succeeding zone must yield, and receive the fluid from this; which will consequently be electrified negatively, though weaker than the former; and thus zones of positive and negative electricity will gradually succeed each other in the air, till no traces of either are to be found.—In these zones, it must be remembered, that there is a centre peculiar to each, and from this centre the vibrations proceed either inward or outward. Thus, when the machine is first set in motion, a vibration is propagated from it as from a centre to some distance in the air, and the air is at first negatively electrified. But as this vibratory motion cannot be extended far in one direction, vibrations begin to be propagated in all directions from another centre at some distance. The conductor becomes then less positively electrified than before; however, by means of the machine, its electricity is still kept up, though weaker; but a zone of air beyond the first, where the resistance is much less, becomes negatively electrified. This again cannot continue long till vibrations outwards arise from another centre, and so on. It is scarce needful to add here, that the longer the electrification is continued, and the stronger it is, the broader these zones must be.

§ 10. *Of the Leyden Phial.*

THE phenomena of the Leyden phial are easily explained from what hath been already advanced. Glass and other electric substances are so constituted, that they can transmit the vibratory motions of the electric matter, though they cannot admit of any considerable progressive one. Conducting substances, on the other hand, admit of a progressive motion, but not so easily of a vibratory one. When the electric fluid is procured from the earth by an electric machine, if the conductor had a communication with the earth, all the matter collected by the cylinder would run along the conductor into the earth, and not a spark or other appearance of electricity would be procured in the air. But when the conductor is insulated, the matter is forced to go off into the air, and there produces the vibratory motions already mentioned. If a pane of glass which has no metallic coating touches the conductor, though it is permeable by the vibratory motion of the fluid, yet a considerable resistance is made, and the fluid cannot easily diffuse itself over its surface.

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Why a motion of the electric fluid on one side is suddenly propagated round a body.

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Zones of positive and negative electricity accounted for.
* See n^o 60.

Theory.

surface. Nevertheless, it will soon shew signs of having received electricity, that is, of having the fluid within its pores thrown into a vibratory motion. This motion is directed outwards, from the middle of the substance of the glass, to the surface, and a considerable way beyond it on both sides. Both sides of the glass are then positively electrified. If a conducting substance touches one of the sides of the glass, the vibrations on that side are destroyed; because the fluid which occasioned them yields to the resistance it met with, and runs along the conductor into the earth. But no sooner is this done, than the power which resisted the vibration outward from the glass, having got the better in the manner just now explained, a new vibration is produced by that resisting power; and the force of this vibration is directed towards the side from whence the electricity was drawn off, which therefore becomes electrified negatively. Thus may we understand how a pane of glass, or any other electric, may receive positive electricity on the one side, and negative on the other, to as high a degree as we please. But there is found to be a limit to every charge of electricity we can give; and this limit is the resistance of the air. A phial will contain double the charge in air doubly condensed, that it does in the common atmosphere; and when once the vibration becomes too great to be borne, the positive side of the glass throws out pencils of light, and will receive no more electricity in that state of the atmosphere.

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Why it re-
tains its
charge.

Thus, in every charged phial, there is a violent impulse or vibration of the fluid, outward from the positive, and inward to the negative, side. As long as these continue, the phial continues charged. As the electric fluid seems to be subject to no other natural power, but controuls all its own actions only by moving in opposite directions, it is plain, that if a charged phial is carefully kept from any of those means by which it is known to be discharged, it must keep its charge for a long time; and thus, by keeping phials within glass cases, their charge will be retained for six or eight weeks, or perhaps a great deal longer. The only method of discharging a phial, is by making a communication between its coatings. The fluid pressing out of the positive side, now yields to the pressure of that from the negative side, and runs along the conductor. But no sooner does it come near the negative side of the phial, than, meeting with more of the same kind, the current of which is directed the same way, both together break through the air with a violent flash and crack, and all appearances of electricity cease. — In this, as in all other electrical experiments, it is easy to see, that the force, velocity, &c. of the fluid depends entirely on the pressure of that which surrounds us. Nature hath appointed a certain constitution or modification of the electric fluid in all terrestrial bodies, and likewise all round the earth. In our electrical experiments, we violate this constitution in some degree. When this violation is but small, the powers of nature operate gently in repairing the disorder we have introduced; but when any considerable deviation is occasioned, the natural powers restore the original constitution with extreme violence.

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Reason of
its dis-
charge.

Theory.

§ 11. The Phenomena of the Electrophorus accounted for.

THE electrophorus is a machine represented Plate Cl. fig. 3. It consists of two plates, A and B, usually of a circular form; though they may be made square, or of the figure of a parallelogram, with more ease, and with equal advantage. At first the under plate was of glass, covered over with sealing-wax; but there is little occasion for being particular either with regard to the substance of the lower plate, or the electric which is put upon it. A metallic plate, however, is perhaps preferable to a wooden one, though the latter will answer the purpose very well. This plate is to be covered with some electric substance. Pure sulphur answers very near as well as the dearer electrics, sealing-wax, gum-lac, &c.; but it hath this bad quality, that, by rubbing it, some exceeding subtle steams are produced, which infect the person's clothes, and even his whole body, with a very disagreeable smell, and will change silver in his pocket to a blackish colour. — The upper plate of the electrophorus is a brass plate, or a board or piece of pasteboard covered with tinfoil or gilt paper, nearly of the same size with the electric plate, though it will not be the worse that it is somewhat larger. It is furnished with a glass handle (I), which ought to be screwed into the centre. The manner of using this machine is as follows. — First, the plate B is excited by rubbing its coated side with a piece of new white flannel, or a piece of hare's skin. Even a common hard brush, having the hair a little greased, will excite sulphur extremely well. When this plate is excited as much as possible, it is set upon the table with the electric side uppermost. Secondly, the metal plate is laid upon the excited electric, as represented in the figure. Thirdly, the metal plate is touched with the finger or any other conductor, which, on touching the plate, receives a spark from it. Lastly, the metal plate A, being held by the extremity of its glass handle (I), is separated from the electric plate; and, after it is elevated above that plate, it will be found strongly electrified with an electricity contrary to that of the electric plate; in which case, it will give a very strong spark to any conductor brought near it. By setting the metal upon the electric plate, touching it with the finger, and separating it successively, a great number of sparks may be obtained apparently of the same strength, and that without exciting again the electric plate. If these sparks are repeatedly given to the knob of a coated phial, this will presently become charged.

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Construc-
tion of the
electrophorus.

“As to the continuance of the virtue of this electric plate, (says Mr Cavallo), when once excited, without repeating the excitation, I think there is not the least foundation for believing it perpetual, as some gentlemen have supposed; it being nothing more than an excited electric, it must gradually lose its power by imparting continually some of its electricity to the air, or other substances contiguous to it. Indeed its electricity, although it could never be proved to be perpetual by experiments, lasts a very long time, it having been observed to be pretty strong several days, and even weeks, after excitation. The great duration of the electricity of this plate, I think, depends upon two causes: first, because it does not lose any electricity by the operation of putting the metal plate upon it, &c. and,

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and, secondly, because of its flat figure, which exposes it to a less quantity of air, in comparison with a stick of sealing-wax, or the like, which, being cylindrical, exposes its surface to a greater quantity of air, which is continually robbing the excited electric of their virtue.

"The first experiments that I made, relative to this machine, were with a view to discover which substance would answer best for coating the glass plate, in order to produce the greatest effect. I tried several substances either simple or mixed; and at last I observed, that the strongest in power, as well as the easiest, I could construct, were those made with the second sort of sealing-wax, spread upon a thick plate of glass. A plate that I made after this manner, and no more than six inches in diameter, when once excited, could charge a coated pial several times successively, so strongly as to pierce a hole through a card with the discharge. Sometimes the metal plate, when separated from it, was so strongly electrified, that it darted strong flashes to the table upon which the electric plate was laid, and even into the air, besides causing the sensation of the spider's web upon the face brought near it, like an electric strongly excited. The power of some of my plates is so strong, that sometimes the electric plate adheres to the metal when this is lifted up, nor will they separate even if the metal plate is touched with the finger or other conductor. It is remarkable, that sometimes they will not act well at first, but they may be rendered very good by scraping with the edge of a knife the shining or glossy surface of the wax. This seems analogous to the well-known property of glass, which is, that new cylinders or globes, made for electrical purposes, are often very bad electric at first; but that they improve by being worked, *i. e.* by having their surface a little worn. Paper also has this property.

"If, after having excited the sealing-wax, I lay the plate with the wax upon the table, and the glass uppermost, *i. e.* contrary to the common method; then, on making the usual experiment of putting the metal plate on it, and taking the spark, &c. I observe it to be attended with the contrary electricity: that is, if I lay the metal plate upon the electric one, and, while in that situation, touch it with an insulated body, that body acquires the positive electricity; and the metallic, removed from the electric plate, appears to be negative; whereas it would become positive, if laid upon the excited wax. This experiment, I find, answers in the same manner if an electric plate is used which has the sealing-wax coating on both sides, or one which has no glass plate.

"If the brass plate, after being separated from, be presented with the edge toward the wax, lightly touching it, and thus be drawn over its surface, I find that the electricity of the metal is absorbed by the sealing-wax, and thus the electric plate loses part of its power; and if this operation is repeated five or six times, the electric plate loses its power entirely, so that a new excitation is necessary in order to revive it.

"If, instead of laying the electric plate upon the table, it is placed upon an electric stand, so as to be accurately insulated, then the metal plate set on it, acquires so little electricity, that it can only be discovered with an electrometer; which shows, that the electricity of this plate will not be conspicuous on one side of it, if the opposite side is not at liberty either to part

with, or acquire more of the electric fluid. In consequence of this experiment, and in order to ascertain how the opposite sides of the electric plate would be affected in different circumstances, I made the following experiments.

"Upon an electric stand E, (fig. 3. Plate CI.) I placed a circular tin-plate, nearly six inches in diameter, which by a slender wire H communicated with an electrometer of pith-balls G, which was also insulated upon the electric stand F. I then placed the excited electric plate D of six inches and a quarter in diameter, upon the tin-plate, with the wax uppermost; and on removing my hand from it, the electrometer G, which communicated with the tin-plate, *i. e.* with the under side of the electric plate, immediately opened with negative electricity. If, by touching the electrometer, I took that electricity off, the electrometer did not afterwards diverge. But if now, or when the electrometer diverged, I presented my hand open, or any other un-insulated conductor, at the distance of about one or two inches, over the electric plate, without touching it, then the pith-balls diverged; or, if they diverged before, came together, and immediately diverged again with positive electricity:—I removed the hand, and the balls came together;—approached the hand, and they diverged: and so on.

"If, while the pith-balls diverged with negative electricity, I laid the metal plate, holding it by the extremity K of its glass handle, upon the wax, the balls came, for a little time, towards one another, but soon opened again with the same, *i. e.* negative electricity.

"If, whilst the metallic rested upon the electric plate, I touched the former, the electrometer immediately diverged with positive electricity; which if, by touching the electrometer, I took off, the electrometer continued without divergence.—I touched the metal plate again, and the electrometer opened again; and so on for a considerable number of times, until the metal plate had acquired its full charge. On taking now the metal plate up, the electrometer G instantly diverged with strong negative electricity.

"I repeated the above-described experiments, with this only difference in the disposition of the apparatus, *i. e.* I laid the electric plate D with the excited sealing-wax upon the circular tin-plate, and the glass uppermost; and the difference in their result was, that where the electricity had been positive in the former disposition of the apparatus, it now became negative, and *vice versa*; except that, when I first laid the electric plate upon the tin, the electrometer G diverged with negative electricity, as well in this as in the other disposition of the apparatus.

"I repeated all the above experiments with an electric plate, which besides the sealing-wax coating on one side, had a strong coat of varnish on the other side, and their result was similar to that of those made with the above-described plate."

This is Mr Cavallo's account of the electrophorus; but there is one part of it in which he must certainly be mistaken. He tells us, that "if instead of laying the electric plate upon the table, it is set upon an electric stand, so as to be accurately insulated, then the metal plate set on it acquires so little electricity, that it can only be discovered by an electrometer." In what manner this gentleman came to mistake a plain

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fact so egregiously, is not easy to determine; but it is certain, that an electrophorus, instead of having its virtue impaired by being insulated, has it greatly increased, at least the sphere of its activity is greatly enlarged. When lying on the table, if the upper plate is put upon it without being touched with the finger, it will not shew much sign of electricity. But as soon as it is put on the electric stand, both the upper and under side appear strongly negative. A thread will be attracted at the distance of eight or ten inches. If both the upper and under side are touched at the same time, a strong spark will be obtained from both, but always of the same kind of electricity, namely, the negative kind. If the upper plate is now lifted up, a strong spark of positive electricity will be obtained from it; and on putting it down again, two sparks of negative electricity will be produced.

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Singular
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The singularity of this experiment is, that it produces always double the quantity of negative electricity that it doth of the positive kind; which cannot be done by any other method yet known. Another very surprising circumstance is, that when the electrophorus remains in its insulated situation, you need not always touch the upper and under side of the plates at once, in order to procure positive electricity from the upper plate: It is sufficient to touch both sides only once. On lifting up the upper plate, a spark of positive electricity is obtained as already mentioned. On putting it down again, a spark of the negative kind is obtained from the upper plate, even though you do not touch the lower one. On lifting up the upper plate, a spark of positive electricity is obtained, but weaker than it would have been had both sides been touched at once. Putting down the upper plate again without touching both, a still weaker spark first of negative and then of positive electricity will be obtained from the upper one. Thus, the sparks will go on continually diminishing, to the number perhaps of two or three hundred. But at last, when the electricity of the whole machine seems to be totally lost, if both sides are touched at once, it will instantly be restored to its full strength, and the double spark of negative, with the single one of positive electricity, will be obtained without intermission as before.

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To account for all these phenomena very particularly, is perhaps impossible, without a greater degree of knowledge concerning the internal fabric of bodies than we have access to attain. In general, however, it is evident, that the phenomena of the electrophorus arise from the disposition that the electric matter hath to keep up an equilibrium within itself throughout every part of the universe. In consequence of this, no motion of the electric matter can be produced upon the one side of a body, but it must immediately be balanced by a corresponding one on the opposite side; and in proportion to the strength of the one, so will the strength of the other be. When the under plate of the electrophorus is excited, the negative electricity, or vibratory action of the electric matter towards the excited side, is produced; and the moment that such an action is produced on one side, it is resisted by a similar one on the opposite side, and thus the electrophorus becomes negatively electrified on both sides. As long as the under part of the machine communicates

with the earth, the vibratory motion is impeded by the progressive one towards the earth. This makes the resistance on the under side less, and therefore the vibratory motion on the upper part extends but a small way. When the plate is insulated, the electric matter has not an opportunity of escaping to the earth as before, because it is strongly resisted by the air; a vibration therefore takes place on both sides, and extends to a great distance from the plate. When the upper plate is set upon the electrophorus, the same kind of electricity, viz. the negative kind, is communicated to it. When both sides are touched, with the finger, or with any other conducting substance, both electricities are suddenly taken off, because the electric matter running along the conducting substance on both sides, puts an end to the vibratory motion in the air, which constitutes the very essence of what we call electricity. There is now a quiet and equal balance of the electric matter on both sides, and therefore no signs of electricity are shewn. But as soon as the upper plate is taken off, this balance is destroyed. The fluid in the metal plate had not been able to penetrate the electric substance in such a manner as to put a stop to the vibrations of what was within it. As soon then as the plate is taken off, the electricity, or vibratory motion towards the electric, breaks out at that side. But this motion *inwards* to the electric, which constitutes negative electricity, necessarily becomes *outward* from the plate; and as no motion of the fluid can be produced on one side of a body, but what is immediately communicated to the other, the upper plate becomes electrified positively, and the under one negatively on both sides.

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SECT. VII. Miscellaneous Experiments.

In this section are comprehended some of those effects of the electric matter which may properly be reckoned *anomalous*, and for which it is impossible to assign any reason. Some very remarkable ones of this kind are those on colours, of which Mr Cavallo gives the following account. "Having accidentally observed, that an electric shock sent over the surface of a card, marked a black stroke upon a red spot of the card, I was from this induced to try what would be the effect of sending shocks over cards painted with different water-colours. Accordingly, I painted several cards with almost every colour I had, and sent shocks (A) over them, when they were very dry; making use of the universal discharger, fig. 5. Plate XCIX. The effects were as follow.

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colours.

Vermilion was marked with a strong black track, about one tenth of an inch wide. This stroke is generally single, as represented by A B, fig. 17. of Plate XCIX. Sometimes it is divided in two towards the middle, like EF; and sometimes, particularly when the wires are set very distant from one another, the stroke is not continued, but interrupted in the middle, like G H. It often, although not always, happens, that the impression is marked stronger at the extremity of that wire, from which the electric fluid issues, as it appears at E, supposing that the wire C communicates with the positive side of the jar; whereas the extremity of the stroke, contiguous to the point of the wire

(A) The force generally employed was the full charge of one foot and a half of coated glass.

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wire D, is neither so strongly marked, nor surrounds the wire so much, as the other extremity E.

“ Carmine received a faint and slender impression of a purple colour.

“ Verdigrease was shook off from the surface of the card; except when it had been mixed with strong gum-water, in which case it received a very faint impression.

“ White-lead was marked with a long black track, not so broad as that on vermilion.

“ Red lead was marked with a faint mark much like carmine.

“ The other colours I tried were orpiment, gamboge, sap-green, red ink, ultramarine, Prussian blue, and a few others, which were compounds of the above; but they received no impression.

“ It having been insinuated, that the strong black mark, which vermilion receives from the electric shock, might possibly be owing to the great quantity of sulphur contained in that mineral, I was induced to make the following experiment. I mixed together equal quantities of orpiment and flower of sulphur; and with this mixture, by the help, as usual, of very diluted gum-water, I painted a card; but the electric shock sent over it left not the least impression.

“ Desirous of carrying this investigation on colours a little further, with a particular view to determine something relative to the properties of lamp-black and oil (a), I procured some pieces of paper painted on both sides with oil colours; and sending the charge of two feet of coated glass over each of them, by making the interruption of the circuit upon their surfaces, I observed that the pieces of paper painted with lamp-black, Prussian blue, vermilion, and purple brown, were torn by the explosion; but white lead, Naples yellow, English ochre, and verdigrease, remained un-
hurt.

“ The same shock sent over a piece of paper painted very thickly with lamp-black and oil left not the least impression. I sent the shock also over a piece of paper unequally painted with purple brown, and the paper was torn where the paint lay very thin, but remained unhurt where the paint was evidently thicker. These experiments I repeated several times and with some little variation, which naturally produced different effects; however, they all seem to point out the following propositions.

“ I. A coat of oil-paint over any substance, defends it from the effects of such an electric shock, as would otherwise injure it; but by no means defends it from any electric shock whatever. II. No one colour seems preferable to the others, if they are equal in substance, and equally well mixed with oil; but a thick coating does certainly afford a better defence than a thinner one.

“ By rubbing the abovementioned pieces of paper, I find that the paper painted with lamp-black and oil is more easily excited, and acquires a stronger electricity, than the papers painted with the other colours; and, perhaps, on this account it may be, that lamp-black and oil might resist the shock somewhat better

than the other paints.

“ It is remarkable, that vermilion receives the black impression, when painted with linsed oil, nearly as well as when painted with water. The paper painted with white lead and oil, receives also a black mark; but its nature is very singular. The track, when first made, is almost as dark as that marked on white-lead, painted with water; but it gradually loses its blackness, and in about an hour's time (or longer, if the paint is not fresh), it appears without any darkeness, and when the painted paper is laid in a proper light, appears only marked with a colourless track, as if made by a finger-nail. I sent the shock also over a piece of board, which had been painted with white-lead and oil about four years before, and the explosion marked the black track upon this also: this track, however, was not so strong, nor vanished so soon, as that marked upon the painted paper; but in about two days time, it also vanished entirely.”

Another very remarkable property of the electric fluid is, that it both calcines, vitrifies, and re-vivifies metals. The calcination of them appears from Dr Priestley's experiments with the brass chain, mentioned n^o 75. where the black dust was plainly a calx of the metal. The vitrification is performed by exploding small wires of any kind with the shock of a battery. In this case, the small globules of metal, even though gold, silver, or platinum, are found to be completely vitrified.—The re-vivification is an experiment of Mr Beccaria. This he did by making the explosion between two pieces of the calces; and thus he revived several metallic substances, particularly zinc, and even produced real quicksilver from cinnabar. In this case, he always observed streaks of black beyond the coloured metallic stains; owing, as he supposed, to the phlogiston driven from the parts that were vitrified, when the other part revived the calx.

Mr Beccaria also discovered another very remarkable property of the electric matter; namely, that when it is obliged to pass through air, or any other substance through which it makes its way with difficulty, it throws before it all light conducting substances it can find, in order to facilitate its own passage; and thus it will pass through a greater quantity of resisting medium than it would otherwise be able to do. The experiments from which Mr Beccaria drew this conclusion, were the following. He put a narrow piece of leaf-silver between two plates of wax, laying it across them, but so that it did not quite reach one of the sides. The discharge being made through this strip of metal, by bringing a wire opposite to the silver, at the place where it was discontinued; the silver was found melted, and part of it dispersed all along the track, that the electric matter took between the plates of wax, from the silver to the wire. Happening once to receive, inadvertently, the charge of a small jar through some smoke of spirit of nitre, a hole was made in his thumb, where the fire entered, and which he thought could only have been made by the acid carried along by the electric fluid. Dr Priestley hath made several more experiments, in order to ascertain this remarkable property,

(B) “ It has often been observed, that when lightning has struck the masts of ships, it has passed over such parts of the masts as were covered with lamp-black and tar, or painted with lamp-black and oil, without the least injury, at the same time that it has shivered the uncoated parts in such a manner as to render the masts useless.” For a particular account of such facts, see the article THUNDER.

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Dr Priestley's experiments on this subject.

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perty, and of which he gives the following account.

"I discharged frequent shocks, both of a common jar, and another of three square feet, through trains of brads dust, laid on a stool of baked wood, making interruptions in various parts of the train; and always found the brads dust scattered in the intervals, so as to connect the two disjointed ends of the train; but then it was likewise scattered nearly as much from almost all other parts of the train, and in all directions. The scattering from the train itself was probably occasioned by small electric sparks between the particles of the dust; which, causing a vacuum in the air, drove all that light matter to a considerable distance. But the particles of the dust, which were strowed in the intervals of the train, some of which were at least three inches, could hardly be conveyed in that manner.

"When small trains were laid, the dispersion was the most considerable, and a light was very visible in the dark, illuminating the whole circuit. It made no difference, in any of these experiments, which way the shock was discharged.

"When I laid a considerable quantity of the dust at the ends of two pieces of chain, through which the shock passed, at the distance of about three inches from one another, the dust was always dispersed over the whole interval, but chiefly laterally; so that the greatest quantity of it lay in arches, extending both ways, and leaving very little of it in the middle of the path. It is probable, that the electric power would have spread it equally, but that the vacuum made in the air, by the passage of the fluid from one heap of dust to the other, dispersed it from the middle part.

"I then insulated a jar of three square feet, and upon an adjoining glass stand laid a heap of brads dust; and at the distance of seven or eight inches a brads rod communicating with the outside of the jar. Upon bringing another rod, communicating with the inside, upon the heap of dust, it was dispersed in a beautiful manner, but not one way more than another. However, it presently reached the rod communicating with the outside.

"Making two heaps, about eight inches asunder, I brought one rod communicating with the inside upon one of them, and another rod communicating with the outside upon the other. Both the heaps were dispersed in all directions, and soon met; presently after which the jar was discharged, by means of this dispersed dust, in one full explosion. When the two heaps were too far asunder to promote a full discharge at once, a gradual discharge was made thro' the scattered particles of the dust.

"When one heap of dust was laid in the centre of the stand, and the two rods were made to approach on each side of it, they each attracted the dust from the side of the heap next to them, and repelled it again in all directions. When they came very near the heap, the discharge was made through it, without giving it any particular motion.

"All these experiments show, that light bodies, possessed of a considerable share of electricity, disperse in all directions, carrying the electric matter to places not abounding with it; and that they sometimes promote a sudden discharge of great quantities of that matter from places where it was lodged, to places

where there was a defect of it. But an accident led me to a much more beautiful, and perhaps a more satisfactory manner of demonstrating the last part of this proposition, than any that I hit upon while I was pursuing my experiments with that design.

"Hanging a drop of water upon the knob of a brads rod communicating with the inside of my battery, in order to observe what variety it might occasion in the circular spots abovementioned, I was greatly surprised to find the explosion made all at once, at the distance of two inches.

"I afterwards put some brads dust upon a plate of metal communicating with the inside of the battery; and making the discharge thro' the dust, it exploded at the distance of an inch and a half. The dust rose towards the discharged rod, and from thence was dispersed in all directions.

"These experiments are the more remarkable, as they demonstrate so great a difference between the distance at which the battery may be made to discharge at once, by the help of these light bodies, and without them. When the discharge of a battery by the knobs of brads rods, in the open air, is at the distance of about half an inch; it will, by this means, be made at about two inches."

The motions of the electric fluid, though prodigiously quick, are not instantaneous. The shock of the Leyden phial, indeed, hath been transmitted through wires of several miles in length, without taking up any sensible space of time. That is, supposing two persons to hold the ends of the wire, one communicating with the knob, and the other with the outside coating of the phial, both would feel the shock at the same instant; nor would it make any alteration though a considerable part of the surface of the ground was made part of the conductor.

Dr Priestley relates several very curious experiments made with a view to ascertain this point soon after the Leyden phial was discovered. These experiments were planned and directed by Dr Watson, who was present at every one of them. His chief assistants were Martin Folkes, Esq; president of the royal society, Lord Charles Cavendish, Dr Bevis, Mr Graham, Dr Birch, Mr Peter Daval, Mr Trembley, Mr Ellicott, Mr Robins, and Mr Short. Many other persons, and some of distinction, gave their attendance occasionally.

Dr Watson, who wrote the history of their proceedings, in order to lay them before the royal society, begins with observing (what was verified in all their experiments), that the electric shock is not, strictly speaking, conducted in the shortest manner possible, unless the bodies through which it passes conduct equally well; for that, if they conduct unequally, the circuit is always formed through the best conductors, though the length of it be ever so great.

The first attempt these gentlemen made, was to convey the electric shock across the river Thames, making use of the water of the river for one part of the chain of communication. This they accomplished on the 14th and 18th of July 1747, by fastening a wire all along Westminster bridge, at a considerable height above the water. One end of this wire communicated with the coating of a charged phial, the other being held by an observer, who, in his other hand, held an iron rod, which he dipped into the river. On the opposite

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posite side of the river, flood a gentleman, who likewise dipped an iron rod in the river with one hand; and in the other held a wire, the extremity of which might be brought into contact with the wire of the phial.

Upon making the discharge, the shock was felt by the observers on both sides the river, but more sensibly by those who were stationed on the same side with the machine; part of the electric fire having gone from the wire down the moist stones of the bridge, thereby making several shorter circuits to the phial, but still all passing through the gentlemen who were stationed on the same side with the machine. This was, in a manner, demonstrated by some persons feeling a sensible shock in their arms and feet, who only happened to touch the wire at the time of one of the discharges, when they were standing upon the wet steps which led to the river. In one of the discharges made upon this occasion, spirits were kindled by the fire which had gone through the river.

Upon this, and the subsequent occasions, the gentlemen made use of wires, in preference to chains, for this, among other reasons, that the electricity which was conducted by chains was not so strong as that which was conducted by wires. This, as they well observed, was occasioned by the junctures of the links not being sufficiently close, as appeared by the snapping and flashing at every juncture where there was the least separation. These lesser snappings, being numerous in the whole length of a chain, very sensibly lessened the great discharge at the gun-barrel.

Their next attempt was to force the electrical shock to make a circuit of two miles, at the New River at Stoke Newington. This they performed on the 24th of July 1747, at two places; at one of which the distance by land was 800 feet, and by water 2000: in the other, the distance by land was 2800 feet, and by water 8000. The disposition of the apparatus was similar to what they before used at Westminster bridge, and the effect answered their utmost expectations. But as, in both cases, the observers at both extremities of the chain, which terminated in the water, felt the shock, as well when they stood with their rods fixed into the earth 20 feet from the water, as when they were put into the river; it occasioned a doubt, whether the electric circuit was formed through the windings of the river, or a much shorter way, by the ground of the meadow: for the experiment plainly shewed, that the meadow-ground, with the grass on it, conducted the electricity very well.

By subsequent experiments they were fully convinced, that the electricity had not in this case been conveyed by the water of the river, which was two miles in length; but by land, where the distance was only one mile; in which space, however, the electric matter must necessarily have passed over the New River twice, have gone through several gravel pits, and a large stubble field.

July 28th, they repeated the experiment at the same place, with the following variation of circumstances. The iron wire was, in its whole length, supported by dry sticks, and the observers stood upon original electrics; the effect of which was, that they felt the shock much more sensibly than when the conducting wire had lain upon the ground, and when the observers had like-

wife stood upon the ground, as in the former experiment.

Afterwards, every thing else remaining as before, the observers were directed, instead of dipping their rods into the water, to put them into the ground, each 150 feet from the water. They were both smartly struck, though they were distant from each other above 500 feet.

The same gentlemen, pleased with the success of their former experiments, undertook another, the object of which was, to determine whether the electric virtue could be conveyed through dry ground; and, at the same time, to carry it through water to a greater distance than they had done before. For this purpose, they pitched upon Highbury-barn beyond Islington, where they carried it into execution on the 5th of August 1747. They chose a station for their machine, almost equally distant from two other stations for observers upon the New River; which were somewhat more than a mile asunder by land, and two miles by water. They had found the streets of London, when dry, to conduct very strongly, for about 40 yards; and the dry road at Newington about the same distance. The event of this trial answered their expectations. The electric fire made the circuit of the water, when both the wires and the observers were supported upon original electrics, and the rods dipped into the river. They also both felt the shock, when one of the observers was placed in a dry gravelly pit, about 300 yards nearer the machine than the former station, and 100 yards distant from the river: from which the gentlemen were satisfied, that the dry gravelly ground had conducted the electricity as strongly as water.

From the shocks which the observers received in their bodies, when the electric power was conducted upon dry sticks, they were of opinion, that, from the difference of distance simply considered, the force of the shock, as far as they had yet experienced, was very little if at all impaired. When the observers stood upon electrics, and touched the water, or the ground, with the iron rods, the shock was always felt in their arms or wrists; when they stood upon the ground with their iron rods, they felt the shock in their elbows, wrists, and ankles; and when they stood upon the ground without rods, the shock was always felt in the elbow and wrist of that hand which held the conducting wire, and in both ankles.

The last attempt of this kind which these gentlemen made, and which required all their sagacity and address in the conduct of it, was to try whether the electric shock was perceptible at twice the distance to which they had before carried it, in ground perfectly dry, and where no water was near; and also to distinguish, if possible, the respective velocity of electricity and found.

For this purpose they fixed upon Shooter's-hill, and made their first experiments on the 14th of August 1747; a time when, as it happened, but one shower of rain had fallen during five preceding weeks. The wire communicating with the iron rod, which made the discharge, was 6732 feet in length, and was supported all the way upon baked sticks; as was also the wire which communicated with the coating of the phial, which was 3868 feet long, and the observers were distant from each other two miles. The result of the explosion

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plosion demonstrated, to the satisfaction of the gentlemen present, that the circuit performed by the electric matter was four miles, *viz.* two miles of wire, and two of dry ground, the space between the extremities of the wires; a distance which, without trial, as they justly observed, was too great to be credited. A gun was discharged at the instant of the explosion, and the observers had stop-watches in their hands, to note the moment when they felt the shock: but, as far as they could distinguish, the time in which the electric matter performed that vast circuit might have been instantaneous.

In all the explosions where the circuit was made of considerable length, it was observed, that though the phial was very well charged, yet that the snap at the gun-barrel, made by the explosion, was not near so loud as when the circuit was formed in a room; so that a by-stander, says Dr Watson, though versed in these operations, would not imagine, from seeing the flash, and hearing the report, that the stroke at the extremity of the conducting wire could have been considerable; the contrary whereof, when the wires were properly managed, he says, always happened.

Still the gentlemen, unwearied in these pursuits, were desirous, if possible, to ascertain the absolute velocity of electricity at a certain distance; because, though in the last experiment, the time of its progress was certainly very small if any, they were desirous of knowing, small as that time might be, whether it was measurable; and Dr Watson had contrived an excellent method for that purpose.

Accordingly, on the 5th of August 1648, the gentlemen met once more, and the last time, at Shooter's-hill; when it was agreed to make an electric circuit of two miles, by several turnings of the wire in the same field. The middle of this circuit, they contrived to be in the same room with the machine, where an observer took in each hand one of the extremities of the wires, each of which was a mile in length. In this excellent disposition of the apparatus, in which the time between the explosion and the shock might have been observed to the greatest exactness, the phial was discharged several times; but the observer always felt himself shocked at the very instant of making the explosion. Upon this the gentlemen were fully satisfied, that through the whole length of this wire, which was 12,276 feet, the velocity of the electric matter was instantaneous.

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Sometimes
the fluid
seems to
move more
slowly.

With all this surprising velocity, however, it is certain, that both sides of a charged phial may be touched so quickly, even by the best conductors, that all the electric matter hath not time to make the circuit, and the phial will remain but half discharged. If the upper plate of an electrophorus also is very suddenly touched with the finger, or any other conductor, a very small spark will be obtained on lifting it up; though a very strong one would be got if the finger was kept longer upon it. But how this seeming slowness can be reconciled with the immeasurable velocity above-mentioned, doth not appear. It is certain, indeed, that this fluid is considerably resisted in its passage through, or over, every substance. It will even prefer a short passage in the air where it is violently resisted, to one along a wire of very great length; but here, as in every other case, it seems to divide its force, and to break out through several different passages at once.

Miscellaneous
Experiments.

A method of ascertaining this hath been contrived by Dr Priestley, thus. Bend a wire, about five feet long, in the form represented Plate C. fig. 17. so that the parts A B may come within half an inch of one another; then connect the extremities of the wire with the hook of the battery, and send a shock through it. On making the explosion, a spark will be seen between A and B; which shews that the fluid chooses a short passage through the air, rather than the long one through the wire. The charge, however, does not pass entirely between A and B, but part of it goes also through the wire. This may be proved by putting a slender wire between A and B: for, on making the discharge with only this addition in the apparatus, the small wire will hardly be made red hot; whereas, if the large wire A D B be cut in D, so as to discontinue the circuit A D B, the small wire will be melted, and even exploded, by the same shock that before made it scarcely red hot.—But though we can easily shew that the electric fluid always meets with resistance, it is by no means easy to shew why the same resistance which puts a temporary stop to its motions in some cases, doth not so in all.

Another curious experiment in electricity is the converting of conducting substances into electrics by cold, and of changing electrics into conductors by heat. The first hath yet been done only in the instance of water. This is a discovery of Mr Achard's at Berlin, who, in the month of January 1776, observed, that water frozen to the 20th degree below the freezing point of Reaumur's thermometer, answering to the 13th below 0 of Fahrenheit's, is an electric. He tried his experiments in the open air, where he found, that a rod of ice two feet long, and two inches thick, was a very imperfect conductor when Reaumur's thermometer was at six degrees below 0; and that it would not in the least conduct when the thermometer was sunk to 20°. By whirling a spheroid of ice in a proper machine, he even electrified the prime conductor so as to attract, repel, give sparks, &c. The ice made use of was free from air-bubbles, and quite transparent; to produce which, he used to set a vessel containing distilled water to be frozen, upon the window of a room which was rather warm with respect to the ambient air; so that the water began to freeze on the one side of the vessel, while on the other it was still liquid.

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Electrics
become
conductors
by heat.

To prove that glass and other electrics become conductors when very hot: Take a small glass tube of about one twentieth of an inch in diameter, and above a foot long; close it at one end, and introduce a wire into it, so that it may be extended through its whole length; let two or three inches of this wire project above the open end of the tube, and there fasten it with a bit of cork; tie round the closed end of the tube another wire, which will be separated from the wire within the tube only by the glass interposed between them. In these circumstances, endeavour to send a shock through the two wires, *i. e.* the wire inserted in the glass tube, and that tied on its outside, by connecting one of them with the outside, and touching the other with the knob of a charged jar; and you will find that the discharge cannot be made, unless the tube be broken; because the circuit is interrupted by the glass at the end of the tube, which is interposed between the two wires. But put that end of the tube to which the wire is tied into

Fig. 6.
ECHINUS.



Fig. 8.



Fig. 9.



Fig. 10.



Fig. 11.



Fig. 12.



Fig. 13.



Fig. 14.



Fig. 16.



Fig. 20.



Fig. 18.



Fig. 21.



Fig. 15.



Fig. 19.



Fig. 22.

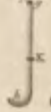


Fig. 23.

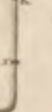


Fig. 24.



Fig. 2.



ELECTRICITY

Fig. 1.

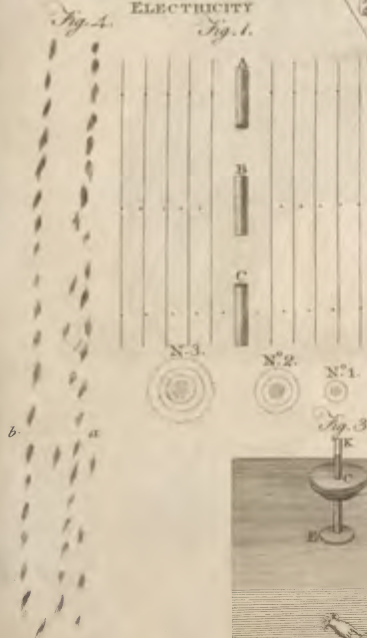
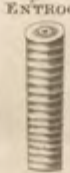


Fig. 5.



ENTROCHUS.

Fig. 3.



Fig. 4.





Fig. 1.
F. Wilson's
ELECTRICAL
MACHINE

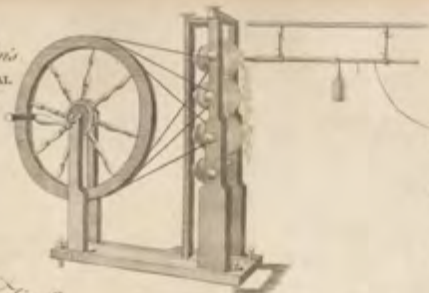


Fig. 2.
CLOUD
MACHINE



Fig. 3.
ELEPHAS or ELEPHANT



Fig. 4. ECHENEIS



Fig. 5.
EXOCETUS VOLANS,
or Flying Fish.



Fig. 6.
ELATER.



Fig. 7. ERINACEUS or HEDGE HOG





Miscellaneous
Experiments

Miscellaneous
Experiments.

into the fire, so that it may become just red-hot, then endeavour to discharge the jar again through the wires, and you will find that the explosion will be easily transmitted from wire to wire through the substance of the glass, which, by being made red-hot, is become a conductor.

In order to ascertain the conducting quality of hot resinous substances, oils, &c. bend a glass tube in the form of an arch C E F D, fig. 16. Plate XCIX; and tie a silk string G C D to it, which serves to hold it by when it is to be set near the fire; fill the middle part of this tube with rosin, sealing-wax, &c. then introduce two wires A E, B F, through its ends, so that they may touch the rosin, or penetrate a little way in it. This done, let a person hold the tube over a clear fire, so as to melt the rosin within it; at the same time, by connecting one of the wires A or B with the outside of a charged jar, and touching the other with the knob of the jar, endeavour to make the discharge through the rosin, and you will observe, that while the rosin is cold, no shocks can be transmitted through it; but it becomes a conductor according as it melts; and when totally melted, then the shocks will pass through it very freely.

To show that hot air is a conductor, electrify one of the cork-ball electrometers suspended upon a stand fig. 7, of Plate XCIX. or electrify the prime conductor with the quadrant electrometer; then bring a red-hot iron within a sufficient distance of the electrometer or prime conductor, and you will find that they soon lose their electricity, which is certainly conducted by the hot air contiguous to the iron; for if the experiment be repeated with the same iron when cold, *i. e.* by bringing it within the same distance of the electrified electrometer or prime conductor, their electricity will not be conducted away as before. It has been observed, that a battery may be discharged by introducing a red-hot iron between two knobs interposed, and standing at

some distance from each other in the circuit: but if, instead of iron, there be introduced a piece of red-hot glass between the knobs, (the distance between them remaining as at first), the battery cannot be discharged: whence we may infer, that either hot air is not so good a conductor as has been imagined; or else, that air heated by iron is stronger with respect to its conducting power, than when heated by the red-hot glass.

Besides these, there are a number of other anomalous appearances exhibited by the electric fluid. Some of the principal of them are the phenomena of the TOURMALIN, the GYMNOTUS *Electricus*, TORPEDO, &c. for a particular account of which, see these articles. See also MAGNETISM, LIGHTNING, THUNDER, &c. The effects of medical electricity are considered under the article MEDICINE. On this last subject we shall just mention the construction of an instrument which, Mr Cavallo says, is very useful for curing the tooth-ach. It is represented Plate XCIX. fig. 15. and consists of two wires A E, B E, fixed in two holes in the piece of baked wood H. These wires, from C to D, and G to F, are bended in a plane inclined to the rest of the wires; their extremities D E, F E, being again bended towards one another, and in the plane C A G B. The extremities A B are bended in a ring. When this instrument is to be used, it must be applied in such a manner that the affected tooth may be pretty closely embraced by the two wires at E; which being flexible, may be adjusted so that they will receive teeth of different sizes: then the end A, or B, of one of the wires, must be connected with the outside of a charged jar, and the end of the other wire with the knob of the jar, so as to make the shock pass through the wires of the instrument, and, of consequence, through the tooth. "A single shock, (says Mr Cavallo), sent through an affected tooth in this manner, will often cure it instantaneously; it is, however, always proper to send two or three shocks through it."

E L E

ELECTROMETER. See ELECTRICITY, n° 45.
ELECTROPHORUS. *Ibid.* n° 106.

ELECTRUM, in natural history. See AMBER.

ELECTUARY, in pharmacy, a form in which both official and extemporaneous medicines are frequently made. See PHARMACY, n° 883; &c.

ELEMOSYNE, and ELEMOSYNARIUS. See ALMS, and ALMONER.

ELEGANCE, or ELEGANCY, an ornament of politeness and agreeableness shewn in any discourse, with such a choice of rich and happy expressions, as to rise politely above the common manners, so as to strike people of a delicate taste.

It is observed, that elegance, though irregular, is preferable to regularity without elegance: that is, by being so scrupulous of grammatical construction, we lose certain licences wherein the elegance of language consists.

ELEGIAC, in ancient poetry, any thing belonging to elegy. See ELEGY.

ELEGIT, in law, a writ of execution, which lies for a person who has recovered debt or damages; or upon a recognizance in any court, against a defendant that is not able to satisfy the same in his goods.

ELEGY, a mournful and plaintive kind of poem *.
VOL. IV.

E L E

ELEMENT, a term used by philosophers to denote the original component parts of bodies, or those into which they are ultimately resolvable †.

Some of the ancients represented the elements as corruptible, and some as incorruptible. Those who maintained the incorruptibility of the elements, supposed them to be *atoms*, *i. e.* bodies which could not be divided, or broke into pieces. Of this opinion were Democritus, Epicurus, &c.

Among those who held the elements to be corruptible, some reckoned there was but one, and some that there were several elements. Heraclitus held fire, Anaximenes air, Thales Milesius water, and Hesiod earth, to be the only element. The Peripatetics contended for four elements, fire, air, earth, and water. Some of these philosophers considered only the sensible properties of bodies, such as pellucidity and opacity, to be elements. Of this number Aristotle himself is said to have been. For, considering the four principal qualities that fall under the sense of touch, he made four elements: the first, cold and dry; the second, cold and moist; the third, hot and moist; and the fourth, hot and dry. To give names to these elements, he inquired in what things these qualities were found chiefly to prevail. Accordingly, taking earth to be the coldest,

† See Chemistry, n° 10.

* See Poetry, n° 62.

Element,
Elemi.

and at the same time the driest, of all things, he called the first element *earth*. Water being the coldest and moistest of all things, he called his second element *water*; and imagining air to be the hottest and moistest of all things, he called his third element *air*. Lastly, fire being the hottest and driest of all things, he called his fourth element *fire*.

The Cartesians admitted only of three elements, which they pretend were all that could arise from the first division of matter, the whole mass of which they supposed to have been from the beginning whirled round several different centres. The first element was composed of the angular parts and prominences broke off from the particles of matter by its continual motion. This was the *materia subtilis*. The second element was made up of the particles from which the *materia subtilis* was broke off, which were now become round; and the third element consisted of the particles which yet remained irregular.

Succeeding philosophers have differed greatly in their opinions; some adopting the Epicurean or atomical hypothesis, and some the Aristotelian. It is, however, easy to see, that the question concerning *elements* can never be solved. If we embrace the atomical system, we must be conscious that we know not what an *atom* is. We can have no idea of a body that doth not consist of parts, and consequently which cannot be made less than it is. If we adopt the notion of infinite divisibility, or, which is much the same, of the Aristotelian *qualities*, we shall find ourselves equally embarrassed. Some have imagined that there are two distinct elements, which they call the *celestial* and *terrestrial matter*. Both these they consider as made up of *atoms*; but they suppose the atoms of the first to be active, and of the second passive. It is difficult, however, to maintain this hypothesis without allowing one kind of atoms to be animated. Certain it is, that we see one part of matter in many cases acting upon, and giving motion to, another; but whether the matter which is *passive* in one case doth not become *active* in another, is a thing not easy to be determined. The utmost that can be said upon the subject seems to be, that as long as matter is subject to our eye-sight and other senses, we can talk intelligibly about it; but when its parts become too small to be observed by them, we are then totally in the dark.

ELEMENT, in a figurative sense, is used for the principles and foundations of any art or science; as Euclid's Elements, &c.

ELEMI, or ELEMV, in the materia medica, a kind of resin, very improperly called *gum elemi*. There are two sorts of it kept in the shops; the one genuine, and brought from Ethiopia; the other spurious, and the produce of America. The true kind is a yellowish resin, with a cast of green and white; its smell is strong and not unpleasant, and its taste acrid and bitter. It is very inflammable, and readily dissolves in oil and other fat substances over the fire; which two characters alone sufficiently distinguish it from the gums; but this genuine elemi is very rare in Europe.

The spurious elemi is a whitish resin produced from a tall tree, with pinnated leaves, not unlike those of the pear-tree. It is in some degree pellucid, and of a fragrant smell. It is only used externally, being greatly recommended for resolving tumours, deterring ul-

cers, wounds, &c. though Dr Lewis is of opinion, its internal use might be advantageous in many cases.

ELEPHANT, in zoology. See ELEPHAS.

American ELEPHANT: An animal only known in a fossil state, and that but partially, from the teeth, some of the jaw-bones, the thigh-bones, and vertebrae, found with many others five or six feet beneath the surface on the banks of the Ohio. But these bones differ in several respects from those of the elephant; for which, see Fossil Bones. As yet the living animal has evaded our search. Mr Pennant thinks it "more than probable, that it still exists in some of those remote parts of the vast new continent unpenetrated yet by Europeans. Providence maintains and continues every created species; and we have as much assurance that no race of animals will any more cease while the earth remaineth, than *seed-time and harvest, cold and heat, summer and winter, day or night.*"

ELEPHANT-Beetle. See SCARABÆUS.

Knights of the ELEPHANT, an order of knighthood in Denmark, conferred upon none but persons of the first quality and merit. It is also called the *order of St Mary*. Its institution is said to have been owing to a gentleman among the Danish croises having killed an elephant, in an expedition against the Saracens, in 1184; in memory of which, king Canutus instituted this order, the badge of which is a towered elephant, with an image of the holy virgin encircled with rays, and hung on a watered sky-coloured ribbon, like the George in England.

ELEPHANTA, a small, but very remarkable island about five miles from the castle of Bombay in the East Indies. Of this we have the following description from Mr Grosse's voyage to the East Indies. "It can at most be about three miles in compass, and consists of almost all hill: at the foot of which, as you land, you see, just above the shore, on your right, an elephant, coarsely cut out in stone, of the natural bigness, and at some little distance not impossible to be taken for a real elephant, from the stone being naturally of the colour of that beast. It stands on a platform of stones of the same colour. On the back of this elephant was placed, standing, another young one, appearing to have been all of the same stone, but has been long broken down. Of the meaning, or history, of this image, there is no tradition old enough to give any account.

"Returning then to the foot of the hill, you ascend an easy flant, which about half way up the hill brings you to the opening or portal of a large cavern hewn out of a solid rock, into a magnificent temple: for such surely it may be termed, considering the immense workmanship of such an excavation; and seems to me a far more bold attempt, than that of the pyramids of Egypt. There is a fair entrance into this subterraneous temple, which is an oblong square, in length about 80 or 90 feet, by 40 broad. The roof is nothing but the rock cut flat at top, and in which I could not discern any thing that did not show it to be all of one piece. It is about 10 feet high, and supported towards the middle, at equi-distance from the sides and from one another, with two regular rows of pillars of a singular order. They are very massive, short in proportion to their thickness, and their capital bears some resemblance to a round cushion pressed by the superincumbent

Elephant,
Ephanta.

mound-

Elephanta
Elephant-
tine.

mountain, with which they are also of one piece. At the further end of this temple are three gigantic figures; the face of one of them is at least five feet in length, and of a proportionable breadth. But these representations have no reference or connection, either to any known history, or the mythology of the Gentoos. They had continued in a tolerable state of preservation and wholeness, considering the remoteness of their antiquity, until the arrival of the Portuguese, who made themselves masters of the place; and in the blind fury of their bigotry, not suffering any idols but their own, they must have even been at some pains to maim and deface them, as they now remain, considering the hardness of the stone. It is said they even brought field-pieces to the demolition of images, which so greatly deserved to be spared for the unequalled curiosity of them. Of this Queen Catherine of Portugal was, it seems, so sensible, that she could not conceive that any traveller would return from that side of India, without visiting the wonders of this cavern; of which too the sight appeared to me to exceed all the descriptions I had heard of them. About two thirds of the way up this temple, on each side, and fronting each other, are two doors or outlets into smaller grottoes or excavations, and freely open to the air. Near and about the doorway, on the right-hand, are several mutilated images, single and in groups. In one of the last, I remarked a kind of resemblance to the story of Solomon dividing the child, there standing a figure with a drawn sword, holding in one hand an infant with the head downwards, which it appears in act to cleave through the middle. The outlet of the other on the left hand, is into an area of about 20 feet in length, and 12 in breadth; at the upper end of which, as you turn to the right, presents itself a colonnade covered at top, of 10 or 12 feet deep, and in length answering to the breadth of the area: this joins to an apartment of the most regular architecture, an oblong square, with a door in perfect symmetry; and the whole executed in quite a contrary taste and manner from any of the oldest or best Gentoos buildings any where extant. I took particular notice of some paintings round the cornices, not for any thing curious in the design, but for the beauty and freshness of the colouring, which must have lasted some thousands of years, on supposing it, as there is all reason to suppose it, cotemporary with the building itself. The floor of the apartment is generally full of water, its pavement or ground-work not permitting it to be drawn off, or to be soaked up. For it is to be observed, that even the cavern itself is not visitable after the rains, until the ground of it has had time to dry into a competent hardness."

ELEPHANTIASIS, called also the *lepra of the Arabians*, in medicine, a chronic disease, one of the two species of leprosy, which affects the whole body, where even the bones as well as the skin are covered with spots and tumours, which being red, at last turn black. See (the *Index* subjoined to) **MEDICINE**.

ELEPHANTINE, in Roman antiquity, an appellation given to the books wherein were registered the transactions of the senate and magistrates of Rome, of the emperors or generals of armies, and even of the provincial magistrates; the births and classes of the people, and other things relating to the census.

They are supposed to have been so called, as being

made of ivory; though some will have them to have been written on the intestines of elephants.

ELEPHANTOMACHI. See **ETHIOPIA**.

ELEPHAS, or the **ELEPHANT**, in zoology, a genus of quadrupeds belonging to the order of bruta. The characters are these: The elephant has no fore-teeth in either jaw, and the dog-teeth are very long; the proboscis, or trunk, is long, and capable of laying hold of any thing; and the body is somewhat naked.

The elephant is the largest of all land-animals. From the front to the origin of the tail he is generally about 16 feet long, from the end of the trunk 25 feet, and about 14 feet high. The circumference of the neck is 17 feet, and the circumference of the body at the greatest part 25 feet 10 inches; the tail is about 6 feet long, and 2½ in circumference. The circumference of the legs is about 6 feet. The eyes are small in proportion to the size of the animal. The muzzle is very different from that of any other quadruped; it is nothing but the origin of a long trunk which hangs between the two large tusks; the mouth appears behind the trunk, which serves in place of an upper lip, and the under lip terminates in a point. The tail is short, and small in comparison of the trunk, which has the appearance of a long thick tail placed before. The feet are short, round, clumsy, and only distinguishable by the toes. The trunk is, properly speaking, the nose extended, and terminated by a couple of nostrils. But, besides serving as an organ of smell, the trunk performs all the functions of a strong and dexterous arm. The trunk of an elephant is about 8 feet long, 5½ feet in circumference near the mouth, and one foot and a half near the extremity: it is a pipe of an irregular conical figure, and widened at the end: the superior side of the trunk is convex, and furrowed transversely; and the inferior side is flat, and has two longitudinal rows of small protuberances resembling the tentacula of the silk-worm and most other caterpillars. The upper part of the trunk corresponds with the extremity of the nose in other quadrupeds, and answers the same intention; the inferior part serves as an upper lip, including the nostrils at the same time. For the trunk is a continued canal, divided into two cavities by a longitudinal partition: these cavities ascend along the forepart of the upper jaw, where they make a turn inward, and descend into the palate, and then terminate in two separate orifices; they have likewise each a separate orifice at the end of the trunk. At the place where these cavities make a turn, and before they enter into the bones of the head, there is a moveable cartilaginous plate situate in such a manner as enables the animal to shut the canal, and to prevent the water, with which it occasionally fills the trunk, from entering into the passage of the nose where the organs serving for the sensation of smell are placed. The elephant can move the trunk in all directions; he can extend or shorten it at pleasure, without altering the diameters of the two canals within. By this means respiration is not interrupted, whatever be the situation of the trunk; and the water is allowed to remain till the animal chuses to throw it out by an expiration. Each canal is lined with a smooth strong membrane, and the surface of the trunk is covered with another strong membrane or skin. The substance contained between the exterior and interior membranes, is a composition of longitudinal and trans-

Elephan-
tomachi,
Elephas.

Elephant. verse muscles, which serve to extend and contract the length of the trunk. At the extremity of the trunk there is a concave protuberance, in the bottom of which are the two passages of the nostrils. The inferior part of the protuberance is thicker than the sides, and the superior part is stretched out like a finger about five inches long; which, together with the edges of the whole extremity of the trunk, takes on different figures according to the necessities of the animal. It is by this organ that the animal lays hold of food, or other substances; which he manages with as much dexterity as a man does his hand, taking up grains of corn, or the smallest piles of grafs, and conveying them to his mouth. When he drinks, he thrusts his trunk into the water, and fills it by drawing in his breath, and exhaling the air: when the trunk is thus filled with water, he can either throw it out to a great distance, or drink it by putting the end of the trunk in his mouth.

The two large tusks, which some call the *horns* of the elephant, are of a yellowish colour, and extremely hard. The bony substance of which they are composed is known by the name of *ivory*, and much used in different branches of manufacture.

The ears are very large, and resemble those of an ape. The skin of the elephant has but few hairs on it, and placed at great distances from each other. It is full of wrinkles, like those on the palm of a man's hand, besides many chaped and greasy ridges. The female has two dugs, one on each side of the breast. The parts of generation are small in proportion to those of other animals. The penis resembles that of a horse. The female organ is situated near the middle of the belly, more than two feet distant from the usual situation in other quadrupeds: when they copulate, the female lies down on her back.

Elephants, even in a savage state, are peaceable and gentle creatures. They never use their weapons but in defence of themselves or companions. Their social dispositions are so strong, that they are seldom found alone, but march always in large troops: the oldest and most experienced lead the van; the younger, or lame ones, keep in the middle; and those of a second rate, as to age, walk in the rear. The females carry their young on their tusks, embracing them at the same time with their trunk. They seldom march in this regular order but when they reckon the journey dangerous, such as an expedition to cultivated lands, where they expect to meet with resistance. On other occasions they are less cautious; some of them falling behind or separating from the rest, but seldom so far as to be without the reach of assistance by alarming and assembling their companions. It is only these wanderers that the hunters dare attack: for it would require a whole army to assail a troop of them; and even an army would be unable to conquer them without losing a number of lives. It is dangerous to offer them the least injury: for they run straight upon the offender; and, although the weight of their body be great, their steps are so large, that they easily outrun the swiftest man, whom they either pierce with their tusks, or seize with their trunk, dart him in the air like a stone, and then trample him under their feet. But they never attack any person, unless when provoked. However, as they are extremely sensible and delicate with regard to injuries, it

is always prudent to keep out of their way. Travelers who frequent these countries kindle large fires, and beat drums during the night, in order to prevent their approach. After being once attacked by men, or falling into any ambush, they are said never to forget the injury, but search for every opportunity of getting revenge. As they are endowed perhaps with a more exquisite sensation of smell than any other animal, owing to the great extent of their nose, they can scent a man at a very great distance, and trace him by his footsteps.

Elephants are peculiarly fond of the banks of rivers, deep valleys, and marshy grounds, especially when well shaded with trees. They delight in drawing up water into their trunks, even when they do not drink it, and amuse themselves in dashing the water around. They cannot endure cold, and are equally averse to an excess of heat: in order to avoid the scorching heat of the sun, they retire to the thickest and most shady parts of the forest. The bulk of their bodies is so enormous, that they do not chuse to go into deep waters so frequently as some other quadrupeds; although the length of their trunk, which they raise straight up, and by which they respire, is a great advantage in swimming.

The ordinary food of elephants is roots, herbs, leaves, the tender branches of trees, fruits, and grains: but they abhor flesh or fish. When any of them discovers a fine pasture, he immediately calls and invites his companions to come and eat with him. As they devour a large quantity of food in a short time, they are always shifting their pasture; when they meet with cultivated grounds, they make a prodigious desolation, and destroy more plants by their feet than they use for nourishment; which last is very considerable, amounting to 150 pounds of herbage every day: by this means, as they constantly graze in large troops, they lay waste whole fields in an hour. The Indians and negroes employ every art to prevent them from visiting their cultivated lands, making great noises, and burning large fires round their fields. However, these precautions are not always sufficient to prevent the elephants from visiting them. They chase away the domestic animals, put the men to flight, and sometimes even throw down their limber huts. Elephants are hardly susceptible of fear; the only things which can surprize them, or stop their course, are artificial fires, such as squibs, crackers, &c. the effects of which are so sudden and so quickly repeated, that the elephants frequently turn back; and when one runs, all the rest instantly follow his example.

Although the social disposition in the elephant be exceeding strong; yet whenever the females come in season, it immediately gives place to the stronger and more interesting passion of love. They observe the greatest delicacy in their amours, abhorring nothing so much as to be seen by their companions. The troop divide themselves into couples, steal off into the most secret places of the forest, and then give way to all the impulses of nature, which are lively and lasting in proportion to the long period of abstinence; for the female goes with young two years, and it is only once in three years that the season of love returns. They bring forth but one at a time; which, as soon as it comes into the world, is as large as a wild boar, and is furnished with teeth; however, the large tusks do not make their

Elephant. their appearance till some time after, and at the age of six months they are several inches long. Elephants of this age are as large as an ox, when in a natural state. But it is incredible how they degenerate when inflamed and under the management of men. Their disgust and chagrin for the loss of liberty seems never to depart from their minds. In this state, though they feel, at the proper seasons, the strongest desires for the sex, no art can allure them to copulate: but the natural passion, restrained by an excess of modesty, bursts out into such violent fits of fury and resentment, that the strongest chains are hardly sufficient to command them. This is a striking difference betwixt the elephant and most other tamed animals. It is only the individual that we can enslave; the species, in spite of all our endeavours, still retain their original freedom and independence.

The manner of taking and taming elephants, therefore, merits our attention. In forests and such places as are frequented by elephants, the Indians choose a spot and inclose it with strong palisades; they use the largest trees as the principal stakes, to which are fixed smaller ones in a transverse direction. These cross-trees are fixed so as to allow a man to pass easily through. There is likewise a large port left for the elephant, over which is suspended a strong barrier, which is let down as soon as he enters. In order to decoy him into the inclosure, the hunters take along with them a tame female in season, and travel about till they come so near as that the cry of the female can reach a male, whom they previously observe in the forest; then the guide of the female makes her give the cry peculiar to the season of love: the male instantly replies, and sets out in quest of her. The guide then makes the female proceed towards the artificial inclosure, repeating her cries from time to time as he goes along. She enters into the inclosure, the male follows her, and the Indians immediately shut the port behind him. He no sooner discovers the hunters, and that he is inclosed, than his passion for the sex is converted into rage and fury. The hunters entangle him with strong ropes; they fetter his legs and trunk; they bring two or three tame elephants in order to pacify and reconcile him to his condition. In a word, they reduce him to obedience in a few days, by a proper application of torture and caresses. There are many other methods of catching elephants. Instead of making large inclosures with palisades, like the kings of Siam, and other monarchs, the poor Indians content themselves with a very simple apparatus: they dig deep pits in the roads frequented by elephants, covering them over with branches of trees, turf, &c. When an elephant falls into one of these pits, he is unable to get out again.

The elephant, when tamed, is the most friendly and obedient of all animals: he is entirely attached to the person who feeds and takes care of him. In a short time he understands signs, and the sound of his master's voice. He distinguishes the language of passion, of command, of satisfaction; and acts accordingly. He receives his orders with attention, and executes them with prudence and alacrity, but without precipitation. He easily learns to bow his knees and lower his body, for the convenience of those who mount him. He caresses his friends with his trunk. He lifts burdens with his trunk, and assists those who are loading him in laying them on his back. He delights in shining harness

and trappings. When yoked in a cart or waggon, he pulls equally and cheerfully, unless he be abused by injudicious chastisements. His guide is generally mounted on his neck, with a small rod of iron sharp at the point in his hand; he directs his motion by pricking him on the ears and head; but, for the most part, a word is sufficient.

A tame elephant will do more labour than six horses: but then he requires a proportional quantity of food. They are the principal beasts of burden in many parts of Africa and the East Indies. They carry sacks and bundles of all kinds on their neck, back, and tusks. They never lose or damage any thing committed to their care: they will stand on the edge of a river, take bundles off their necks and tusks, lay them carefully in a boat wherever they are desired, and try with their trunk whether they are properly situated; if they be loaded with casks, they go in quest of stones to prop them and prevent them from rolling.

The elephant is not only the most tractable, but the most intelligent, of animals; sensible of benefits, resentful of injuries, and endowed even with a sense of glory.—In India, they were once employed in the launching of ships: one was directed to force a very large vessel into the water; the work proved superior to his strength: his master, with a sarcastic tone, bid the keeper take away this lazy beast and bring another: the poor animal instantly repeated his efforts, fractured his skull, and died on the spot. In Delhi, an elephant passing along the streets, put his trunk into a taylor's shop, where several people were at work: one of them pricked the end with his needle: the beast passed on; but in the next dirty puddle filled his trunk with water, returned to the shop, and spouting every drop among the people who had offended him, spoiled their work.

An elephant in Adameer, which often passed thro' the bazar or market, as he went by a certain herb-woman, always received from her a mouthful of greens: at length he was seized with one of his periodical fits of rage, broke his fetters, and, running through the market, put the crowd to flight; among others, this woman, who in haste forgot a little child she had brought with her. The animal recollecting the spot where his benefactress was wont to sit, took up the infant gently in his trunk, and placed it in safety on a stall before a neighbouring house. Another, in his madness, killed his *cornac* or governor: the wife fleeing the misfortune, took her two children and flung them before the elephant, saying, "Now you have destroyed their father, you may as well put an end to their lives and mine." It instantly stopped, relented, took the greatest of the children, placed him on its neck, adopted him for its *cornac*, and never afterwards would permit any body else to mount it.

At the Cape of Good-Hope, it is customary to kill those animals, for the sake of their teeth, by the chase. Three horsemen, well-mounted and armed with lances, attack the elephant alternately, each relieving the other as they see their companion pressed, till the beast is subdued. Three Dutchmen (brothers), who had made large fortunes by this business, determined to retire to Europe, and enjoy the fruits of their labours; but resolved, before they went, to have a last chase by way of amusement: they met with their game, and began the

Elephant.

Ludolph.
Com. in hist.
Æthiop.
p. 147.

Ibid.

Yoyage de la
Caille,
p. 166.

the attack in the usual manner; but unfortunately one of their horses fell down and flung its rider: the enraged animal instantly seized the unhappy man with its trunk, flung him up to a vast height in the air, and received him on one of its tusks; then turning towards the two other brethren, as if it were with an aspect of revenge and insult, held out to them the impaled wretch wreathing on the bloody tooth.

From the earliest accounts in history, the eastern nations have employed elephants in war; Alexander the Great was the first European who ever mounted an elephant. He carried a number of them into Greece, which Pyrrhus employed some years after against the Romans at the battle of Tarentum. Both the Greeks and Romans soon learnt to get the better of these monstrous animals: they opened their ranks and allowed them to pass through; neither did they attempt to hurt them, but threw darts, &c. at their guides. Now that fire-arms are the principal instruments of war, elephants, who are terrified at the noise and flame, instead of being useful, would only tend to embarrass and confuse an army. However, in Cochín and other parts of Malabar, as also in Tonguin, Siam, and Pegu, where fire-arms are little understood, they are still used in battle. The guide sits astride upon the neck, and the combatants sit or stand upon the other parts of the body.

When the elephant is properly managed, he lives very long even in a state of slavery and labour. That some have lived in this state 130 years, is pretty well authenticated. In a natural state, they often exceed 200 years, and propagate their species till they are 120: It is 30 years before they come to their full growth.

The elephant inhabits India, and some of its greater islands, Cochín China, and some of the provinces of China. It abounds in the southern parts of Africa, from the river Senegal to the Cape; and from thence as high as Ethiopia on the other side. They are found in the greatest numbers in the interior parts, where there are vast forests, near the sides of rivers. They are not at present domesticated in Africa, but only in the more civilized parts of Asia. They are much more numerous in Africa. In some parts they swarm so, that the Negroes are obliged to make their habitations under ground for fear of them. They are killed and eaten by the natives, and the trunk is said to be a delicious morsel. All the teeth are brought from Africa: they are frequently picked up in the woods; so that it is uncertain whether they are shed teeth, or those of dead animals. The African teeth which come from Mosambique, are 10 feet long; those of Malabar only three or four; the largest in Asia are those of Cochín China, which even exceed the size of the elephants of Mosambique. The skin is thick, and, when dressed, proof against a musket ball. The flesh, the gall, the skin, and the bones, are said to be used medicinally by the Chinese.

ELEVATION, the same with **ALTITUDE** or **height**.

ELEVATION of the Host, in the church of Rome, that part of the mass where the priest raises the host above his head for the people to adore.

ELEVATOR, in anatomy, the name of several muscles, so called from their serving to raise the parts of the body to which they belong.

ELEVATORY, in surgery, an instrument for raising depressed or fractured parts of the skull, to be applied after the integuments and periosteum are removed. See **SURGERY**.

ELEVENTH, or chord of the eleventh. See **INTERVAL**.

ELEUSINIA, in Grecian antiquity, a festival kept in honour of Ceres, every fourth year by some states, but by others every fifth. The Athenians celebrated it at Eleusis, a town of Attica; whence the name.

It was celebrated with a world of ceremony, and persons of both sexes were initiated in it; it being deemed impious to neglect doing so. The mysteries were of two sorts; the lesser, and the greater: whereof the former were sacred to Proserpine, Ceres's daughter; and the latter to Ceres herself. According to Lactantius, they consisted in a mystical representation of what mythologists teach of Ceres; tho' some of the Christian fathers will have the great mystery, or secret, which they were forbidden by law, upon pain of death, to divulge, to have been the representation or figures of both male and female privities, which were handed about and exposed to the company.

ELEUTHERIA, another festival celebrated at Platæa, by delegates from almost all the cities of Greece, in honour of Jupiter Eleutherius, or the asserter of liberty.

It was instituted in memory of the victory obtained by the Grecians, in the territories of Platæa, over Mardonius, the Persian general left by Xerxes with a mighty army to subdue Greece.

ELF, a term now almost obsolete, formerly used to denote a fairy, or hobgoblin; an imaginary being, the creature of ignorance, superstition, and craft *.

* See **Fairy**.

ELF-ARROWS, in natural history, a name given to the flints, anciently fashioned into arrow-heads, and still found fossil in Scotland, America, and several other parts of the world: they are believed by the vulgar to be shot by fairies, and that cattle are sometimes killed by them.

ELGIN, the capital of the county of Murray in Scotland, situated on the river Lofey about six miles north from the Spey, in W. Long. 2. 25. N. Lat. 57. 40. Mr Pennant says, it is a good town, and hath many of the houses built over piazzas; but, excepting its great cattle-fairs, has little trade. It is principally remarkable for its ecclesiastical antiquities. The cathedral, now in ruins, has been formerly a very magnificent pile. The west door is very elegant and richly ornamented. The choir is very beautiful, and has a fine and light gallery running round it; and at the east end are two rows of narrow windows in an excellent Gothic taste. The chapter-house is an octagon; the roof supported by a fine single column with neat carvings of coats of arms round the capital. There is still a great tower on each side of this cathedral; but that in the centre, with the spire and whole roof, are fallen in; and form most awful fragments, mixed with the battered monuments of knights and prelates. Boethius says, that Duncan, who was killed by Macbeth at Inverness, lies buried here. The place is also crowded with a number of modern tomb-stones.—The cathedral was founded by Andrew de Moray, in 1224, on a piece of land granted by Alexander II.; and his remains were deposited in the choir, under a tomb

Eliaz
Elizabeth.

tomb of blue marble, in 1244. The great tower was built principally by John Innes bishop of this see, as appears by the inscription cut on one of the great pillars: "Hic Jacet in Xto, pater et dominus, Dominus Johannes de Innes, hujus ecclesie Episcopus;—qui hoc notabile opus incepit et per septennium edificavit."

ELIAS, the prophet, memorable for having escaped the common catastrophe of mankind; being taken up alive into heaven, in a fiery chariot, about 895 B. C. See *the Bible*.

ELICHMAN (John), a native of Silesia in the 17th century, who practised physic at Leyden, and was remarkable for understanding 16 languages. He supported an opinion, that the German and Persian languages were derived from the same origin. His Latin translation of the *Tablet of Cebes*, with the Arabic version and the Greek, was printed at Leyden in 1640, under the care of Salmasius, who prefixed thereto a very ample preface.

ELIQUATION, in chemistry, an operation by which a more fusible substance is separated from one that is less so, by means of a heat sufficiently intense to melt the former, but not the latter. Thus an alloy of copper and lead may be separated by a heat capable of melting the latter, but not the former.

ELISHA the prophet, famous for the miracles he performed, died about 830 B. C. See *the Bible*.

ELISION, in grammar, the cutting off or suppressing a vowel at the end of a word, for the sake of found, or measure, the next word beginning with a vowel.

Elisions are pretty frequently met with in English poetry, but more frequently in the Latin, French, &c. They chiefly consist in suppressions of the *a*, *e*, and *i*, though an elision suppresses any of the other vowels.

ELIXATION, in pharmacy, the extracting the virtues of ingredients by boiling or stewing.

ELIXIR, in medicine, a compound tincture extracted from many efficacious ingredients. Hence the difference between a tincture and an elixir seems to be this, that a tincture is drawn from one ingredient, sometimes with an addition of another to open it and to dispose it to yield to the menstruum; whereas an elixir is a tincture extracted from several ingredients at the same time. See *PHARMACY*, n° 388, &c.

ELIZABETH, queen of England, daughter of Henry VIII. and Anna Boleyn, was born at Greenwich, September 7th, 1533. According to the humour of the times, she was early instructed in the learned languages, first by Grindal, who died when she was about 17, and afterwards by the celebrated Roger Ascham. She acquired likewise considerable knowledge of the Italian, Spanish, and French languages. Dr Grindal was also her preceptor in divinity, which she is said to have studied with uncommon application and industry. That Elizabeth became a Protestant, and her sister Mary a Papist, was the effect of that cause which determines the religion of all mankind; namely, the opinion of those by whom they were educated: and this difference of opinion, in their tutors, is not at all surprising, when we recollect, that their father Harry was of both religions, or of neither.

But the studies of our illustrious princeess were not confined merely to languages and theology: she was

also instructed in the political history of the ancients; and was so well skilled in music, as to sing and play "artfully and sweetly."

After the short reign of her brother Edward, our heroine being then about 20 years of age, her sister *five-brand* according to the crown, Elizabeth experienced a considerable degree of persecution, so as to be not a little apprehensive of a violent death. She was accused of nobody knows what; imprisoned; and, we are told, inhumanly treated. At last, by the intercession of king Philip of Spain, she was set at liberty; which she continued to enjoy, till, on the death of her *pious* sister, she, on the 17th of November 1558, ascended the throne of England. Her political history, as a queen, is universally known, and admired*: but her

* See (History of) England.

attention to the government of her kingdom did not totally suspend her pursuit of learning. Ascham, in his *School-master*, tells us, that, about the year 1563, five years after her accession, she being then at Windsor; besides her perfect readiness in Latin, Italian, French, and Spanish, she read more Greek in one day, than some prebendaries of that church did read Latin in a whole week, (p. 21).—She employed Sir John Fortescue to read to her, Thucydides, Xenophon, Polybius, Euripides, Æschines, and Sophocles. (*Ballard*, p. 219.)—That the Latin language was familiar to her, is evident from her speech to the university of Oxford, when she was near sixty; also from her spirited answer to the Polish ambassador in the year 1598. And that she was also skilled in the art of poetry appears, not only from the several scraps which have been preserved, but likewise from the testimony of a cotemporary writer, Puttenham, in his *Art of Engl. Poetry* (a very scarce book). These are his words:—"But, last in recital, and first in degree, is the queen, whose learned, delicate, noble muse, easily surmounteth all the rest, for sense, sweetness, or subtilty, be it in ode, elegy, epigram, or any other kind of poem." &c. In this author are to be found only a specimen of 16 verses of her English poetry. "But," says Mr Walpole, "a greater influence of her genius, and that too in Latin, was her extempore reply to an insolent prohibition delivered to her from Philip II. by his ambassador, in this tetraffic.

Te veto ne pergas bello defendere Belgas:
Quæ Dracus eripuit, nunc restituantur oportet:
Quas pariter evexit, jubeo te condere cellis:
Religio patre hæc restituitur ad unguem.

"She instantly answered him, with as much spirit as she used to return his invasions."

Ad Grægas, bone rex, sient mandata calendar.

Being earnestly pressed by a Romish priest, during his persecution, to declare her opinion concerning the real presence of Christ's body in the wafer, she answered,

Christ was the word that spake it;
He took the bread, and brake it;
And what that word did make it,
That I believe, and take it.

Fuller's Holy State.

She gave the characters of four knights of Nottinghamshire in the following distich:

Gervase the gentle, Stanhope the stout,
Markham the lion, and Sutton the lout,

Wals. Cat.
Coming

Coming into a grammar-school, she characterised three classic authors in this hexameter :

Perſius a crab-ftaff; bawdy Martial; And a fine wag.
Full. *Worth. of Warw.* 126.

Sir Walter Raleigh having wrote on a window,
Fain would I climb, yet fear I to fall;
She immediately wrote under it,
If thy heart fail thee, climb not at all.

Worth. of Devonſh. 261.

Doubtleſs, ſhe was a woman of ſingular capacity, and extraordinary acquirements; and, if we could forget the ſtory of the Scottiſh Mary, and of her favourite Effex, together with the burning a few Anabaptiſts, we might pronounce her the moſt illuſtrious of illuſtrious women. She died in her palace at Richmond, the 24th of March, 1602, aged 70, having reigned 44 years; and was interred in the chapel of Henry VII. in Weſtmiſter abbey. Her ſucceſſor James erected a magnificent monument to her memory. — She wrote, 1. *The mirror, or glaſs of the ſinful ſoul*. This was tranſlated out of French verſe into Engliſh proſe, when ſhe was eleven years old. It was dedicated to queen Catharine Parr. Probably it was never printed; but the dedication and preface are preſerved in the *Sylogæ epistolæ*, in Hearne's edition of *Livii Forſ-Julienſis*, p. 161. 2. *Prayers and meditations*, &c. Dedicated to her father, dated at Hatfield, 1545. Manuſcript, in the royal library. 3. *A dialogue out of Xenophon, in Greek, between Hiero a king, yet ſome time a private perſon, and Simonides a poet, as touching the life of the prince and private man*. Firſt printed, from a manuſcript in her majeſty's own hand-writing, in the Gentleman's Magazine for 1743. 4. Two orations of Iſocrates, tranſlated into Latin. 5. Latin oration at Cambridge. Preſerved in the king's library: alſo in Hollinſhed's Chron. p. 1206; and in Fuller's Hiſt. of Cambr. p. 138. 6. Latin oration at Oxford. See Wood's Hiſt. and Antiq. of Oxf. lib. i. p. 289. alſo in Dr Jebb's Append. to his Life of Mary, Queen of Scots. 7. A comment on Plato. 8. *Boethius de conſolatione philoſophiæ*, tranſlated into Engliſh anno 1593. 9. *Salluſti de bello Jugurthino*, tranſlated into Engliſh anno 1590. 10. A play of Euripides tranſlated into Latin, *Cat. of Royal Auth.* 11. A prayer for the uſe of her fleet in the great expedition in 1596. 12. Part of Horace's art of poetry, tranſlated into Engliſh, anno 1598. 13. *Plutarch de curioſitate*, tranſlated into Engliſh. 15. Letters on various occaſions to different perſons; ſeveral ſpeeches to her parliament; and a number of other pieces.

ELIZABETH PETROWNA, (daughter of Peter the Great), the laſt empreſs of Ruſſia, diſtinguiſhed herſelf by her ſignal clemency. She made a vow, that no perſon ſhould be put to death in her reign, and ſhe ſtrictly obſerved it. The example has been followed, and confirmed by law, under the preſent auguſt ſovereign of Ruſſia, Catharine II. Elizabeth died in 1762, in the 21ſt year of her reign and 52d of her age.

ELK, in zoology. See CERVUS.

ELL, a meaſure of length, different in different countries: but thoſe moſtly uſed, are the Engliſh and Flemiſh ells; whereof the former is three feet nine inches,

or one yard and a quarter; and the latter only 27 inches, or three quarters of a yard. In Scotland, the ells contains 37 $\frac{2}{3}$ Engliſh inches.

ELLIPSIS, in geometry, a curve line returning into itſelf, and produced from the ſection of a cone by a plane cutting both its ſides, but not parallel to the baſe. See CONIC SECTIONS.

ELLIPSIS, in grammar, a figure of ſyntax, where-in one or more words are not expreſſed; and from this deficiency, it has got the name *ellipsis*.

ELLIPTIC, or ELLIPTICAL, ſomething belonging to an ellipſis.

ELLIPOMACHROSTYLA, in natural hiſtory, a genus of imperfect cryſtals, with ſingle pyramids; one end of their column being affixed to ſome ſolid body. They are dodecahedral, with thinner hexangular columns and hexangular pyramids.

Of theſe cryſtals, authors enumerate a great many ſpecies; among which are the whitith pellucid ſprig cryſtal, a bright brown kind, a dull brown kind, and a bright yellow kind, all which are farther diſtinguiſhed according to the different lengths of their pyramids.

ELLIPOPACHYSTYLA, in natural hiſtory, a genus of imperfect cryſtals, compoſed of 12 planes, in an hexangular column, terminated by an hexangular pyramid at one end, and irregularly affixed to ſome other body at the other, with ſhorter columns.

There are two ſpecies of theſe cryſtals; one ſhort, bright, and colourleſs, found in great plenty in New Spain and other parts of America; the other, a ſhort, dull, and duſky brown one, found in Germany, and ſometimes in England.

ELM, in botany. See ULMUS.

ELMACINUS (George), author of a *Hiſtory of the Saracens*, was born in Egypt towards the middle of the 13th century. His hiſtory comes down from Mahomet to the year of the Hegira 512, anſwering to the year of our Lord 1134; in which he ſets down year by year, in a very concise manner, whatever regards the Saracen empire, intermixed with ſome paſſages relating to the eaſtern Chriſtians. His abilities muſt have been conſiderable; ſince, though he profeſſed Chriſtianity, he held an office of truſt near the perſons of the Mahometan princes. He was ſon to Yaſer Al Amid, ſecretary to the council of war under the ſultans of Egypt for 45 years; and in 1238, when his father died, ſucceeded him in his place. His hiſtory of the Saracens was tranſlated from Arabic into Latin by Erpinus; and printed in theſe two languages in folio, at Leyden, in 1625. Erpinus died before the publication; but Golius took care of it, and added a preface. It was dedicated by Erpinus's widow to Dr Andrews, biſhop of Wincheſter.

ELOCUTION. See ORATORY, Part III.

ELOGY, a praiſe or panegyric beſtowed on any perſon or thing, in conſideration of its merit. The beauty of elogy conſiſts in an expreſſive brevity. Eulogiums ſhould not have ſo much as one epithet, properly fo called, nor two words ſynonymous: they ſhould ſtrictly adhere to truth; for extravagant and improbable elogies rather leſſen the character of the perſon or thing they would extol.

ELOHI, ELOI, or Elohim, in ſcripture, one of the names of God. But it is to be obſerved, that angels, prin-

Elohim
||
Elfinore.

princes, great men, judges, and even false gods, are sometimes called by this name. The sequel of the discourse is what affits us in judging rightly concerning the true meaning of this word. It is the same as *Eloha*. One is the singular, the other the plural. Nevertheless *Elohim* is often constructed in the singular number, particularly when the true God is spoken of; but when false gods are spoke of, it is construed rather in the plural.

ELOINED, in law, signifies restrained or hindered from doing something: thus it is said, that if those within age be eloined, so that they cannot sue personally, their next friend shall sue for them.

ELONGATION, in astronomy, the digression or recess of a planet from the sun, with respect to an eye placed on our earth. The term is chiefly used in speaking of Venus and Mercury, the arch of a great circle intercepted between either of these planets and the sun being called the *elongation* of that planet from the sun.

ELONGATION, in surgery, is an imperfect luxation, occasioned by the stretching or lengthening of the ligaments of any part.

ELOPEMENT, in law, is where a married woman departs from her husband, and cohabits with an adulterer; in which case the husband is not obliged to allow her any alimony out of his estate, nor is he chargeable for necessaries for her of any kind. However, the bare advertising a wife in the gazette, or other public papers, is not a legal notice to persons in general not to trust her; though a personal notice given by the husband to particular persons is said to be good.—An action lies, and large damages may be recovered, against a person for carrying away and detaining another man's wife.

ELOQUENCE, the art of speaking well, so as to affect and persuade. See ORATORY.

ELSHEIMER (Adam), a celebrated painter, born at Francfort on the Maine, in 1574. He was first a disciple of Philip Uffenbach a German; but his desire of improvement carrying him to Rome, he soon became a most excellent artist in landscapes, history, and night-pieces, with small figures. His works are but few; and the great pains he bestowed in finishing them, raised their prices so high, that they are hardly any where to be found but in the cabinets of princes. He was of a melancholy turn, and sunk under the embarrassments of his circumstances in 1610. James Ernest Thomas of Landau was his disciple; and imitated his style so nicely, that their performances are not easily distinguished.

ELSIMBURG, a port-town of Sweden, in the province of Gothland, and territory of Schonen, seated on the side of the Sound; over against Elfinore. It was formerly a fortress belonging to the Danes; but all the fortifications were demolished in 1679, and there is only one tower of a castle which remains undemolished. It now belongs to Sweden. E. Long. 13. 20. N. Lat. 56. 2.

ELSNORE, a port-town of Denmark, seated on the Sound, in the isle of Zealand. The Sound is a strait of the Baltic Sea, of which this is one of the quays, for here the Danes take toll of all the merchant ships which go to the Baltic. Sometimes two or three hundred vessels pass through it in a day. E. Long. 13. 23. N. Lat. 56. 0.

Vol. IV.

Elvas
||
Elzevir.

ELVAS, a large town, and one of the best and most important in Portugal, seated in the province of Alentejo, a few miles from the frontiers of Estramadura, in Spain. It is built on a mountain, and is strongly fortified with works of free-stone. The streets of the town are handsome, and the houses neat; and there is a cistern so large, that it will hold water enough to supply the whole town six months. The water is conveyed to it by a magnificent aqueduct, three miles in length, sustained in some places by four or five high arches, one upon another. It was bombarded by the French and Spaniards in 1706, but without effect. It has generally a garrison of one thousand men. The king founded an academy here, in 1733, for young gentlemen. W. Long. 7. 28. N. Lat. 38. 39.

ELUL, in ancient chronology, the 12th month of the Jewish civil year, and the sixth of the ecclesiastical: it consisted of only 29 days, and answered pretty nearly to our August.

ELUTRIATION, in chemistry, an operation performed by washing solid substances with water, stirring them well together, and hastily pouring off the liquid, while the lighter part remains suspended in it, that it may thereby be separated from the heavier part. By this operation metallic ores are separated from earth, stones, and other unmetallic particles adhering to them.

ELY, a city and bishop's see of Cambridgeshire, situated about 12 miles north of Cambridge. E. Long. 15. N. Lat. 52. 24.

It is a county of itself, including the territory around; and has a judge who determines all causes civil and criminal within its limits.

ELYOT (Sir Thomas), a gentleman of eminent learning in the 16th century, was educated at Oxford, travelled into foreign countries, and upon his return was introduced to court. His learning recommended him to Henry VIII. who conferred the honour of knighthood on him, and employed him in several embassies; particularly, in 1532, to Rome, about the divorce of queen Catharine, and afterward to Charles V. about 1536. He wrote, *The castle of health*, *The governor*, *Banquet of Sapience*, *Of the education of children*, *De rebus memorabilibus Angliæ*, and other books; and was highly esteemed by all his learned contemporaries.

ELYSIUM, or ELYSIAN FIELDS, in heathen mythology, certain plains, abounding with woods, fountains, verdure, and every delightful object; supposed to be the habitation of heroes and good men after death.

According to some, the fable of Elysium is of Phœnician extraction, or rather founded upon the account of paradise delivered in the Scriptures.

ELZEVR, (Lewis, Bonaventure, Abraham, Lewis, and Daniel), five celebrated printers at Amsterdam and Leyden; who greatly adorned the republic of letters by beautiful editions of the best authors of antiquity. Lewis began to be famous at Leyden about the year 1595; and was the first who distinguished the *v* consonant from the *u* vowel. Daniel died about the year 1680, and was the last of the family who excelled in the printing art. The Elzevirs printed several catalogues of their editions; but the last, published by

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Embalming

Daniel, is considerably enlarged: it was printed at Amsterdam in 1674. The types of these printers were so elegant, that their name has been given to all beautiful types, particularly of the small kind, ever since.

EMANATION, the act of flowing or proceeding from some source or origin; or the thing that proceeds from that action.

EMANCIPATION, in the Roman law, the setting free a son from the subjection of his father; so that whatever moveables he acquires belong in property to him, and not to his father, as before emancipation.

Emancipation puts the son in a capacity of managing his own affairs, and of marrying without his father's consent, tho' a minor. Emancipation differs from manumission, as the latter was the act of a master in favour of a slave, whereas the former was that of a father in favour of his son.

There were two kinds of emancipation: the one tacit, which was by the son's being promoted to some dignity, by his coming of age, or by his marrying, in all which cases he became his own master of course. The other, express; where the father declared before a judge, that he emancipated his son. In performing this, the father was first to sell his son imaginarily to another, whom they called *pater fiduciarius*, father in trust; of whom being brought back again by the natural father, he manumitted him before the judge by a verbal declaration.

Emancipation still obtains in France with regard to minors or pupils, who are hereby set at liberty to manage their own effects, without the advice or direction of their parents or tutors.

EMARGINATED, among botanists. See **BOTANY**, p. 1276.

EMASCULATION, the act of castrating or depriving a male of those parts which characterize his sex. See **CASTRATION**, and **EUNUCH**.

EMBALMING, is the opening a dead body, taking out the intestines, and filling the place with odoriferous and desiccative drugs and spices, to prevent its putrifying. The Egyptians excelled all other nations in the art of preserving bodies from corruption; for some that they have embalmed upwards of 2000 years ago, remain whole to this day, and are often brought into other countries as great curiosities. Their manner of embalming was thus; they scooped the brains with an iron scoop, out at the nostrils, and threw in medicaments to fill up the vacuum: they also took out the entrails, and, having filled the body with myrrh, cassia, and other spices, except frankincense, proper to dry up the humours, they pickled it in nitre, where it lay soaking for 70 days. The body was then wrapped up in bandages of fine linen, and gums, to make it stick like glue; and so was delivered to the kindred of the deceased, entire in all its features, the very hairs of the eye-lids being preserved. They used to keep the bodies of their ancestors, thus embalmed, in little houses magnificently adorned, and took great pleasure in beholding them, alive as it were, without any change in their size, features, or complexion. The Egyptians also embalmed birds, &c. The prices for embalming were different; the highest was a talent, the next 20 minæ, and so decreasing to a very small matter: but they who had not

wherewithal to answer this expence, contented themselves with infusing, by means of a syringe, thro' the fundament, a certain liquor extracted from the cedar; and, leaving it there, wrapped up the body in salt of nitre: the oil thus preyed upon the intestines, so that when they took it out, the intestines came away with it, dried, and not in the least putrified: the body being enclosed in nitre, grew dry, and nothing remained besides the skull girded upon the bones.

The method of embalming used by the modern Egyptians, according to Maillet, is to wash the body several times with rose-water, which, he elsewhere observes, is more fragrant in that country than with us; they afterwards perfume it with incense, aloes, and a quantity of other odours, of which they are by no means sparing; and then they bury the body in a winding sheet, made partly of silk and partly of cotton, and moistened, as is supposed, with some sweet-scented water or liquid perfume, though Maillet uses only the term *moistened*; this they cover with another cloth of unmixt cotton, to which they add one of the richest suits of clothes of the deceased. The expence, he says, on these occasions, is very great, though nothing like what the genuine embalming cost in former times.

EMBARGO, in commerce, an arrest on ships or merchandise, by public authority; or a prohibition of state, commonly on foreign ships, in time of war, to prevent their going out port, sometimes to prevent their coming in, and sometimes both, for a limited time.

The king may lay embargoes on ships, or employ those of his subjects, in time of danger, for the service and defence of the nation: but they must not be for the private advantage of a particular trader, or company; and therefore a warrant to stay a single ship is no legal embargo. No inference can be made from embargoes which are only in war-time; and are a prohibition by advice of council, and not at prosecution of parties. If goods be laden on board, and after an embargo or restraint from the prince or state comes forth, and then the master of the ship breaks ground, or endeavours to sail, if any damage accrues, he must be responsible for the same; the reason is, because his freight is due, and must be paid, even tho' the goods be seized as contraband.

EMBASSADOR, See **AMBASSADOR**.

EMBASSY, the office or function of an **AMBASSADOR**.

EMBDEN, a port-town and city of Germany, capital of a county of the same name, now in possession of the king of Prussia; it is situated at the mouth of the river Ens. E. Long. 6.45. N. Lat. 53. 50.

EMBER-WEEKS, are those wherein the *ember* or *embring* days fall.

In the laws of king Alfred, and those of Canute, those days are called *yubren*, that is, circular days, from whence the word was probably corrupted into *ember-days*: by the canonists they are called *quatuor anni tempora*, the four cardinal seasons, on which the circle of the year turns: and hence Henshaw takes the word to have been formed, viz. by corruption from *tempus* of *tempora*.

The *ember-days* are the Wednesday, Friday, and Saturday, after Quadragesima Sunday, after Whitsunday,

Emberge
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Ember-
weeks.

Emberiza

Monday, after Holy-rod day in September, and after St Lucia's day in December: which four times answer well enough to the four quarters of the year, Spring, Summer, Autumn, and Winter.

Mr Somner thinks they were originally falks, instituted to beg God's blessing on the fruits of the earth. Agreeably to which, Skinner supposes the word *ember* taken from the ashes, *embers*, then strewn on the head.

These ember weeks are now chiefly taken notice of, on account of the ordination of priests and deacons; because the canon appoints the Sundays next succeeding the ember weeks, for the solemn times of ordination: Tho' the bishops, if they please, may ordain on any Sunday, or holiday.

EMBERIZA, in ornithology, a genus of birds, belonging to the order of passers. The bill is conical, and the mandibles recede from each other towards the base; the inferior mandible has the sides narrowed inwards, but the upper one is still narrower. There are 24 species; of which the most remarkable are,

1. The *nisalis*, or great pyed mountain-finch of Ray, and the snow-bird of Edwards, has white-wings, but the outer edge of the prime-feathers are black; the tail is black, with three white feathers on each side.

These birds are called in Scotland *snow-flakes*, from their appearance in hard weather, and in deep snows. They arrive in that season among the Cheviot-hills, and in the Highlands, in amazing flocks. A few breed in the Highlands, on the summit of the highest hills, in the same places with the *ptarmigans*; but the greatest numbers migrate from the extreme north. They appear in the Shetland islands; then in the Orkneys; and multitudes of them often fall, wearied with their flight, on vessels in the Pentland Frith. Their appearance is a certain fore-runner of hard weather, and storms of snow, being driven by the cold from their common retreats. Their progress southward is probably thus; Spitzbergen and Greenland, Hudson's Bay, the Lapland Alps, Scandinavia, Iceland, the Ferroe Isles, Shetland, Orkneys, Scotland, and the Cheviot-hills. They visit at that season all parts of the northern hemisphere, Prussia, Austria, and Siberia. They arrive lean, and return fat. In Austria, they are caught and fed with millet, and, like the ortolan, grow excessively fat. In their flights, they keep very close to each other, mingle most confusedly together, and fling themselves collectively into the form of a ball; at which instant the fowler makes great havoc among them.

2. The *miliaris*, or grey emberiza, is of a greyish colour, spotted with black in the belly, and the orbits are reddish. It is the bunting of English authors, and a bird of Europe.

3. The *hortulana*, or ortolan, has black wings; the first three feathers on the tail are white on the edges, only the two lateral are black outwardly. The orbits of the eyes are naked and yellow; the head is greenish, and yellow towards the inferior mandible. It feeds principally upon the panick-grass; grows very fat; and is reckoned a delicate morsel by certain epicures. It is a bird of Europe.

4. The *citrinella*, or ye-low-hammer, has a blackish tail, only the two outward side-feathers are marked on

the inner edge with a sharp white spot. It is a bird of Europe, and comes about houses in winter: it builds its nest on the ground in meadows.

5. The *schœniclas*, or reed-sparrow, has a black head, a blackish-grey body, and a white spot on the quill-feathers. It inhabits marshy places, most commonly among reeds, from which it takes its name. Its nest is worthy of notice for the artful contrivance of it, being fastened to four reeds, and suspended by them like a hammock, about three feet above the water; the cavity of the nest is deep, but narrow; and the materials are bushes, fine bents, and hairs. It lays four or five eggs of a bluish white, marked with irregular purplish veins, especially on the larger end. It is a bird much admired for its song; and, like the nightingale, it sings in the night.

EMBLEM, ΕΜΒΛΗΜΑ, a kind of painted ænigma, which, representing some obvious history, with reflections underneath, instructs us in some moral truth or other matter of knowledge. See DEVISE, ÆNIGMA, &c.

Such is that very significant image of Scævola holding his hand in the fire; with the words, *Agere et pati fortiter Romanum est*, "To do and suffer courageously is Roman."

The word is pure Greek, formed of the verb *ἐμβαλεῖν* to cast in, to insert. Suetonius relates, that Tiberius made the word be erased out of the decree of the Roman senate, because borrowed from another language.

The emblem is somewhat plainer and more obvious than the ænigma.—Gale defines emblem an ingenious picture, representing one thing to the eye, and another to the understanding.

The Greeks also gave the name ΕΜΒΛΗΜΑ, *εμβλημα*, to insaid or Mosaic works, and even to all kinds of ornaments of vases, moveables, garments, &c. And the Latins used *emblemata* in the same sense. Accordingly, Cicero reproaching Verres with the statues and fine wrought works he had plundered from the Sicilians, calls the ornaments fixed thereto (and which on occasion might be separated from them) *emblemata*. Add, that Latin authors frequently compare the figures and ornaments of discourse to these *emblemata*. Thus, an ancient Latin poet praising an orator, says, that all his words were ranged like the pieces in Mosaic:

*Quam lepide lævæ compæctæ, ut tessellæ ornæ,
Arte pavimentum, aliq̃ emblemata vermiculata.*

With us, emblem ordinarily signifies no more than a painting, basso relievo, or other representation, intended to hold forth some moral or political instruction.

What distinguishes an emblem from a devise, is, that the words of an emblem have a full, complete sense of themselves; nay, all the sense and signification which they have together with the figure. But there is a yet further difference between emblem and devise: for a *devise* is a symbol appropriated to some person, or that expresses something which concerns him particularly; whereas an *emblem* is a symbol that regards all the world alike.

These differences will be more apparent, from comparing the emblem above quoted, with the devise of a candle lighted, and the words, *Juvenando consumor*, "I waste myself in doing good." See DEVISE.

EMBOSSING, or IMBOSSING, in architecture and sculpture, the forming or fashioning works in relievo,

Emblem,
Embossing

Embrasure

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Embrio.

whether cut with a chisel or otherwise.

Embossing is a kind of sculpture, wherein the figures stick out from the plane whereon it is cut: and according as the figures are more or less prominent, they are said to be in alto, mezzo, or basso, rilievo; or high, mean, or low, relief. See ENCHASING.

EMBRASURE, in architecture, the enlargement made of the aperture of a door or window, on the inside of the wall; its use being to give the greater play for the opening of the door or casement, or to admit the more light.

EMBRICATION, in surgery and pharmacy, an external kind of remedy, which consists in an irrigation of the part affected, with some proper liquor, as oils, spirits, &c. by means of a woollen or linen cloth, or a sponge, dipped in the same.

EMBROIDERY, a work in gold, or silver, or silk thread, wrought by the needle upon cloth, stuffs, or muslin, into various figures. In embroidering stuffs, the work is performed in a kind of loom; because the more the piece is stretched, the easier it is worked. As to muslin, they spread it upon a pattern ready designed; and sometimes, before it is stretched upon the pattern, it is stretched, to make it more easy to handle. Embroidery on the loom is less tedious than the other, in which, while they work flowers, all the threads of the muslin, both lengthwise and breadthwise, must be continually counted; but, on the other hand, this last is much richer in points, and susceptible of greater variety. Cloths too much milled are scarce susceptible of this ornament, and in effect we seldom see them embroidered. The thinnest muslins are left for this purpose; and they are embroidered to the greatest perfection in Saxony: in other parts of Europe, however, they embroider very prettily, and especially in France.

There are several kinds of embroidery: as, 1. Embroidery on the stamp; where the figures are raised and rounded, having cotton or parchment put under them to support them. 2. Low embroidery; where the gold and silver lie low upon the sketch, and are stitched with silk of the same colour. 3. Gimped embroidery: this is performed either in gold or silver; they first make a sketch upon the cloth, then put on cut vellum, and afterwards sew on the gold and silver with silk thread: in this kind of embroidery they often put gold and silver cord, tinsel, and spangles. 4. Embroidery on both sides; that which appears on both sides of the stuff. 5. Plain embroidery; where the figures are flat and even, without cords, spangles, or other ornaments.

By stat. 22. Geo. II. c. 36. no foreign embroidery, or gold and silver brocade, shall be imported, upon pain of being forfeited and burnt, and penalty of 100l. for each piece. No person shall sell, or expose to sale, any foreign embroidery, gold or silver thread, lace, fringe, brocade, or make up the same into any garment, on pain of having it forfeited and burnt, and penalty of 100l. All such embroidery, &c. may be seized and burnt; and the mercer, &c. in whose custody it was found, shall forfeit 100l.

EMBRUN, or AMBRUN, a city of Dauphiny, in France, near the confines of Piedmont. E. Long. 6. 6. and N. Lat. 44. 35.

EMBRIO, in physiology, the first rudiments of an animal in the womb, before the several members are

distinctly formed; after which period it is denominated a fetus. See GENERATION, and FETUS.

EMERALD, a genus of precious stone, very green and transparent; and, as to hardness, the next after the ruby. The word is formed from the French *esmeraude*, and that from the Latin *smaragdus*, which signifies the same. Others derive it from the Italian *smaraldo*, or the Arabic *zomarrad*.

Our jewellers distinguish emeralds into two kinds; the oriental, and occidental. The emeralds of the East-Indies are evidently finer than those of any other part of the world: but our jewellers, seldom meeting with these, call the American emeralds the oriental; and usually sell crystal, accidentally tinged with green, under the name of the occidental emerald: these being also the most common, there has grown an opinion among the lapidaries, that the emerald is no harder than the crystal; because what they take to be emeralds, are in general only crystals.

The genuine emerald, in its most perfect state, is perhaps the most beautiful of all the gems; it is found of various sizes, but usually small; a great number of them are met with of about the sixteenth part of an inch in diameter, and they are found from this to the size of a walnut.

The emerald is of different figures like the diamond and many of the other gems; being sometimes found in a roundish or pebble-like form, but much more frequently in a columnar one, resembling common crystal: the pebble-emeralds are always the hardest and brightest, but are seldom found exceeding the size of a pea: the crystalliform ones grow several together, and are often larger: the pebble-kind are found loose in the earths of mountains, and sands of rivers; the columnar are found usually bedded in, or adhering to, a white, opaque, and coarse crystalline mass, and sometimes to the jasper or the porphyry.

The oriental emerald is of the hardness of the sapphire and ruby, and is second only to the diamond in lustre and brightness; the American is of the hardness of the garnet; and the European somewhat softer than that, yet considerably harder than crystal: It loses its colour in the fire, and becomes undistinguishable from the white sapphire.

The oriental emeralds are very scarce, and at present found only in the kingdom of Cambay. Very few of them have of late been imported into Europe, inasmuch that it has been supposed there were no oriental emeralds; but, lately, some few have been brought from Cambay into Italy, that greatly excel the American ones. The American, being what our jewellers call *oriental emeralds*, are found principally about Peru; and the European are principally from Silesia.

Rough EMERALDS.—Those of the first and coarsest sort, called *plafuses*, for grinding, are worth 27 shillings sterling the marc, or 8 ounces. The demi-morillons, 81. sterl. per marc. Good morillons, which are only little pieces, but of fine colour, from 131. to 151. per marc. Emeralds, larger than morillons, and called of the *third colour* or *sort*, are valued at from 501. to 601. the marc. Emeralds, called of the *second sort*, which are in larger and finer pieces than the preceding, are worth from 651. to 751. per marc. Lastly, those of the first colour, otherwise called *negres cartes*, are worth from 1101. to 1151.

Emerald.

Emerald.

EMERALDS ready cut, or polished and not cut, being of good stone, and a fine colour, are worth,

Those weighing one caract, or four grains	L.	s.
Those of two caracts	—	1 7
Those of three caracts	—	2 5
Those of four caracts	—	3 10
Those of five caracts	—	4 10
Those of six caracts	—	7 10
Those of seven caracts	—	15 0
Those of eight caracts	—	19 0
Those of nine caracts	—	23 0
Those of ten caracts	—	33 0

To counterfeit EMERALDS: Take of natural crystal, four ounces; of red-lead, four ounces; verdigrease, forty-eight grains; crocus martis, prepared with vinegar, eight grains: let the whole be finely pulverized and sifted; put this into a crucible, leaving one inch empty: lute it well, and put it into a potter's furnace, and let it stand there as long as they do their pots. When cold, break the crucible; and you will find a matter of a fine emerald colour, which, after it is cut and set in gold, will surpass in beauty an oriental emerald.

EMERY, in natural history, a rich iron-ore found in large masses of no determinate shape or size, extremely hard, and very heavy. It is usually of a dusky brownish red on the surface; but when broken, is of a fine bright iron-grey, but not without some tinge of redness; and is spangled all over with shining specks, which are small flakes of a foliaceous tale, highly impregnated with iron. It is also sometimes very red, and then usually contains veins of gold. It makes no effervescence with any of the acid menstrua; and is found in the island of Guernsey, in Tuscany, and many parts of Germany.

Dr Lewis is of opinion, that some kinds of emery may contain the metal called *platina*, and on this subject has the following curious observations. "Alonso Barba mentions a substance called *chumpi*; which is a hard stone of the emery kind, participating of iron, of a grey colour shining a little, very hard to work, because it resists the fire much, found in Potosi, Chocaya, and other places, along with blackish and reddish ores that yield gold. If *platina* is really found in large masses, either generally or only now and then, one might reasonably expect those masses to be such as are here described.

"Of the same kind perhaps also is the mineral mentioned by several authors under the name of Spanish emery, *smiris Hispanica*, which should seem, from the accounts given of it, to be no other than *platina* or its matrix. The *smiris* is said to be found in the gold mines, and its exportation prohibited; to contain films or veins of native gold; to be in great request among the alchemists; to have been sometimes used for the adulteration of gold; to stand, equally with the noble metal, cupellation, quartation, antimony, and the regal cement; and to be separable from it by amalgamation with mercury, which throws out the *smiris* and retains the gold; properties strongly characteristic of *platina*, and which do not belong to any known substance besides. This debasement of gold per extractum *smiris Hispanici* is mentioned by Becher in his *Minera arenaria*, and several times hinted at in his *Physica subter-*

anea. Both Becher and Stahl indeed call the substance, which the gold receives from the emery, an earth, whereas *platina* is undoubtedly a metal; but this does not at all invalidate our supposition, for they give the name of earth also to the substance which copper receives from calamine in being made into brass, which is now known to be metallic.

"From these observations I have been led to suspect, that the European emeries likewise might possibly participate of *platina*. If this was certain, it would account satisfactorily for the use which some of the alchemists are said to have made of emeries and other ferruginous ores; and we should no longer doubt, or wonder, that by treating gold with these kinds of minerals, they obtained a permanent augmentation; that this augmentation, though it refuted lead, antimony, aquafortis, and the regal cement, was separable, as Becher owns it was, by quicksilver; and that, when it exceeded certain limits, it rendered the gold pale and brittle.

"If emery contains *platina*, I imagined it might be discoverable by boiling the powdered mineral in melted lead, and afterwards working off the lead upon a test or cupel. The experiment was made with eight ounces of the finest powder of common emery, and the same quantity of lead; which were covered with black flux to prevent the scorification of the lead, and urged with a strong fire for two or three hours. The lead became hard, rigid, of a dark colour, and a granulated texture, as if it had really imbibed some *platina* from the emery; but in cupellation it worked almost entirely off, leaving only a bead about the size of a small pin's head, which was probably no other than silver contained in the lead.

"I repeated the experiment, with some variation, thinking to obtain a more perfect resolution of the emery by vitrifying it with the lead. Two ounces of fine emery, and six ounces of minium, were well mixed together, and urged with a strong fire, in a close crucible, for an hour: they melted into an uniform dark brownish glass. The glass was powdered, mixed with four ounces of fixt alkaline salt and some powdered charcoal, and put into a fresh crucible, with some common salt on the surface: The fire was pretty strongly excited; but the fusion was not so perfect as could be wished, and only about two ounces of lead were found revived. This lead had suffered nearly the same change as that in the foregoing experiment; and, like it, gave no appearance of *platina* on being cupelled.

"It seems to follow from these experiments, that the emery employed in them contained no *platina*; but as it is not to be supposed that all emeries are of one composition, other sorts may deserve to be submitted to the same trials. As gold is contained in some parcels of common minerals, and by no means in all the individuals of any one species; *platina* may possibly in like manner be found in some European ores, though there is not the least footstep of it in other parcels of the same kind of ore."

EMETICS, medicines that induce vomiting.

EMINENCE, a title of honour peculiar to cardinals. See CARDINAL.

EMIR, a title of dignity among the Turks, signifying a prince.

This title was first given to the caliphs; but when they

Emerald.
Emir.

Emiffary
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Emolument

they assumed the title of fultans, that of emir remained to their children; as that of Cæfar among the Romans. At length the title came to be attributed to all who were judged to defend from Mahomet by his daughter Fatimah, and who wear the green turban inftead of the white. The Turks make an obfervation, that the emirs, before their fortieth year, are men of the greateft gravity, learning, and wifdom; but after this, if they are not great fools, they difcover fome figns of levity and ftupidity. This is interpreted by the Turks as a fort of divine impulle in token of their birth and fanctity. The Turks alfo call the vizirs, bafhaws, or governors of provinces, by this name.

EMISSARY, in a political fenfe, a perfon employed by another to found the opinions of people, fpread certain reports, or act as a fpy over other people's actions.

EMISSARY *Veffels*, in anatomy, the fame with thofe more commonly called EXCRETORY.

EMISSION, in medicine, a term ufed chiefly to denote the ejaculation of the femen, or feed, in the act of coition. See COITION, and GENERATION.

EMMERICK, a rich fortified town of Germany, in the circle of Weftphalia, and duchy of Cleves. It carries on a good trade with the Dutch, and both Proteftants and Catholics have the free exercife of their religion. The ftreets are neat and regular, and the houfes tolerably built. It was taken by the French in 1672, and delivered to the elector of Brandenburg in 1673, under whose jurifdiction it now is. It is feated near the Rhine. E. Long. 5. 29. N. Lat. 52. 5.

EMMIUS (Ubbo), born at Gretha in Eaft Friesland in 1547, was a very learned profeflor, and chofen rector of the college of Norden in 1579. This feminary flourifhed exceedingly under his care; and declined as vifibly after he was ejected, in 1587, for refufing to fubfcribe the Confeflion of Augfburg. The year after, he was made rector of the college of Leer; and when the city of Groningen confederated with the United Provinces, the magiftrates appointed him rector of that college: which employment he filled with the higheft repute near 20 years; until, the college being erected into an univerfity, he was the firft rector, and one of the chief ornaments of it by his lectures, till his infirmities prevented his public appearance. His wifdom was equal to his learning; fo that the governor of Friesland and Groningen often confulted him, and feldom failed to follow his advice. He wrote *Vetus Græcia illuftrata*, 3 vols; *Decades Rerum Freficarum*; and many other valuable works. He died in 1625.

EMOLLIENTS, in medicine and pharmacy, are fuch remedies as fheath and foften the afperity of the humours, and relax and fupple the folids at the fame time.

EMOLUMENT, is properly applied to the profits arifing daily from an office, or employ. The word is formed of the Latin *emolumentum*, which, according to fome, primarily fignifies the profits redounding to the miller from his mill; of *mola*, *molerere*, to grind.—The patent, or other inftrument, whereby a perfon is preferred to an office, gives him a right to enjoy all the dues, honours, profits, and emoluments belonging thereto.—Emolument is alfo ufed, in a fomewhat greater latitude, for profit or advantage in the general.

EMOTION and PASSION, in the human mind, are thus diftinguifhed by a celebrated writer *. An internal motion or agitation of the mind, when it paffeth away without defire, is denominated an *emotion*: when defire follows, the motion or agitation is denominated a *paflion*. A fine face, for example, raifeth in me a pleafant feeling: if that feeling vanifh without producing any effect, it is in proper language an *emotion*; but if the feeling, by reiterated views of the object, becomes fufficiently ftrong to occafion defire, it lofes its name of emotion, and acquires that of *paflion*. The fame holds in all the other paflions. The painful feeling raifed in a fpectator by a flight injury done to a ftranger, being accompanied with no defire of revenge, is termed an emotion; but that injury raifeth in the ftranger a ftronger emotion, which being accompanied with defire of revenge, is a paflion. External expreffions of diftreff produce in the fpectator a painful feeling, which being fometimes fo flight as to pafs away without any effect, is an emotion; but if the feeling be fo ftrong as to prompt defire of affording relief, it is a paflion, and is termed *pity*. Envy is emulation in excefs: if the exaltation of a competitor be barely difagreeable, the painful feeling is an emotion; if it produce defire to deprefs him, it is a paflion. See PASSION.

EMPALEMENT, an ancient kind of punifhment, which confifted in thrufting a flake up the fundament. EMPALEMENT of a *Flower*, the fame with CALIX. EMPEDOCLES, a celebrated philofopher and poet, was born at Agrigentum, a city in Sicily, about 444 years before the Chriftian æra. He followed the Pythagorean philofophy, and admitted the metemphychofis. He constantly appeared with a crown of gold on his head; to maintain, by this outward pomp, the reputation he had acquired of being a very extraordinary man. Yet Aristotle fays, that he was a great lover of liberty, extremely averfe to ftate and command, and that he even refufed a kingdom that was offered him. His principal work was a Treatife in verfe on the Nature and Principles of Things. Aristotle, Lucetius, and all the ancients, make the moft magnificent elogiums on his poetry and eloquence. His death is variously reported: but the common opinion is, that he leaped into mount Ætna, that he might leave behind him an opinion that he was a god.

EMPEROR, a title of honour among the ancient Romans, conferred on a general that had been victorious; and now made to fignify a fovereign prince, or fupreme ruler of an empire. The title of emperor adds nothing to the rights of fovereignty; it only gives pre-eminence above other fovereigns. The emperors, however, pretend, that the imperial dignity is more eminent than the regal. It is difputed whether emperors have the power of difpofing of the regal title. However this may be, they have fometimes taken upon them to erect kingdoms: thus it is that Bohemia, Pruffia, and Poland, are faid to have been raifed to that dignity. In the eaft, the title of emperor is more frequent than with us; thus the fovereign princes of China, Mogul, &c. are called emperors. In the weft, the title has been a long time reftrained to the emperors of Germany. The firft who bore it was Charlemagne, who was crowned by Pope Leo III. in 800. And it is to be obferved, that

Emotion
||
Emperor.
* Elem. of Criticifm, l. 41.

Empetrum there was not a foot of land or territory annexed to the emperor's title.

Empire.

In the year 1723, the Czar of Muscovy assumed the title of emperor of all the Russias. The kings of France were also called emperors, when they reigned with their sons, whom they associated in the crown: thus Hugh Capet was called emperor, and his son Robert king. The kings of England were anciently styled emperors, as appears from a charter of king Edgar.

The emperor of Germany is a limited monarch in regard to the empire, though he is an absolute sovereign in most of his hereditary dominions. The late emperors of the Austrian family, having hereditary dominions, enumerated all of them in their title. Charles VI. was styled emperor of the Romans, always august, king of Bohemia and Hungary, arch-duke of Austria, &c.; but the present emperors inheriting those countries, her consort enjoys only the title of emperor of the Romans, duke of Lorraine and Tuscany. The emperor creates dukes, marquises, and other noblemen; and he appoints most of the officers, civil and military, in the empire: he is elected by the nine electors; and he summons the general diet of the empire.

EMPETRUM, BERRY-BEARING HEATH, a genus of the triandria order, belonging to the diœcia class of plants. There are two species; one of which, viz. the nigrum, which bears the crow-crake berries, is a native of Britain. It grows wild on boggy heaths and mountains. Children sometimes eat the berries; but, when taken in too great quantity, they are apt to occasion a head-ach. Grouse feed upon them. When boiled with alum, they afford a dark purple dye. Goats are not fond of it. Cows, sheep, and horses refuse it.

EMPHASIS, in rhetoric, a particular stress of the voice and action, laid on such parts or words of the oration as the orator wants to enforce upon his audience. See DECLAMATION; ORATORY, Part IV.; and READING, n° iv. v.

EMPHYSEMA, in surgery, a windy tumour, generally occasioned by a fracture of the ribs, and formed by the air insinuating itself, by a small wound, between the skin and muscles, into the substance of the cellular or adipose membrane, spreading itself afterwards up to the neck, head, belly, and other parts, much after the manner in which butchers blow up their veal.

EMPIRE, IMPERIUM, in political geography, a large extent of land, under the jurisdiction or government of an emperor. See EMPEROR.

The most ancient empire we read of, is that of the Assyrians, which was subverted through the effeminacy of Sardanapalus; the Persian empire was destroyed through the bad conduct of Darius Codomannus; the Grecian empire, by its being dismembered among the captains of Alexander the Great; and the Roman empire, through the ill management of the last emperors of Rome.

Antiquaries distinguish between the medals of the upper, and lower or bas, empire.—The curious only value those of the upper empire, which commences with Cæsar, or Augustus, and ends in the year of Christ 260.

The lower empire comprehends near 1200 years, reckoning as low as the destruction of Constantinople in 1453. They usually distinguish two ages, or periods, of the lower empire: the first beginning where the upper ends, viz. with Aurelian, and ending with Anastasius, including 200 years; the second beginning with Anastasius, and ending with the Paleologus, which includes 1000 years.

EMPIRE, or *The empire*, used absolutely, and without any addition, signifies the empire of Germany; called also, in juridical acts and laws, The holy Roman empire. Authors are at a loss under what form of government to range the empire: some will have it a monarchical state, by reason all the members thereof are forced to ask the investiture of their states of the emperor, and to take an oath of fidelity to him. Others will have it an aristocratic state, by reason the emperor cannot determine any thing without the concurrence of the princes: and, lastly, others will have the empire to be a monarcho-aristocratic state.

EMPIRIC, an appellation given to those physicians who conduct themselves wholly by their own experience, without studying physic in a regular way. Some even use the term, in a still worse sense, for a quack who prescribes at random, without being at all acquainted with the principles of the art.

EMPRESS, the spouse of an emperor, or a woman who governs an empire. See EMPEROR.

EMPROSTHOTHONOS, a species of convulsion, wherein the head bends forward.

EMPHYÆMA, in medicine, a disorder wherein purulent matter is contained in the thorax or breast, after an inflammation and suppuration of the lungs and pleura. See (*Index* subjoined to) MEDICINE.

EMPYREUM, a term used by divines for the highest heaven, where the blessed enjoy the beatific vision.

EMPYREUMA, in chemistry, signifies a very disagreeable smell produced from burnt oils. It is often perceived in distillations of animal as well as vegetable substances when they are exposed to a quick fire.

EMPYREUMATIC OILS. See CHEMISTRY, n° 492.

EMRODS. See HEMORRHOIDS.

EMULATION, a noble jealousy, between persons of virtue, or learning, contending for the superiority therein.—The word comes originally from the Greek, *ἐμιμύω*, dispute, contest; whence the Latin *emulus*, and thence our *emulation*.

Plato observes of *emulation*, that it is the daughter of envy. If so, there is a deal of difference between the mother and the offspring: the one is a virtue, and the other a vice. Emulation admires great actions, and strives to imitate them; envy refuses them the praises that are their due: emulation is generous, and only thinks of surpassing a rival; envy is low, and only seeks to lessen him.

EMULGENT, OF RENAL, ARTERIES, those which supply the kidneys with blood; being sometimes single, sometimes double, on each side.

EMULSION, a soft liquid remedy, of a colour and consistence resembling milk *.

EMUNCTORY, in anatomy, a general term for all those parts which serve to carry off the excrementitious parts of the blood and other humours of the body.

Empire
Emunc-
tory.

* See
Pharmacy,
n° 210.

Enallage
↑
Enamel-
ling.

dy. Such more especially are the kidneys, bladder, and most of the glands.

ENALLAGE, in grammar, is when one word is substituted for another of the same part of speech: A substantive for an adjective, as *exercitus victor*, for *victoriosus*; *scelus*, for *sceleratus*: A primitive for a derivative, as *Dardana arma* for *Dardania*: An active for a passive, as *nox humida celo precipitat*, for *precipitatur*, &c.

ENAMEL, in general, is a vitrified matter betwixt the parts of which is dispersed some unvitrified matter: hence enamel ought to have all the properties of glass except transparency.

Enamels have for their basis a pure crystal glass or frit, ground up with a fine calx of lead and tin prepared for the purpose, with the addition usually of white salt of tartar. These ingredients baked together are the matter of all enamels, which are made by adding colours of this or that kind in powder to this matter, and melting or incorporating them together in a furnace.

For white enamel, Neri (*De Arte Vitriar.*) directs only manganese to be added to the matter which constitutes the basis. For azure, zaffer mixed with calx of brass. For green, calx of brass with scales of iron, or with crocus martis. For black, zaffer with manganese or with crocus martis; or manganese with tartar. For red, manganese, or calx of copper and red tartar. For purple, manganese with calx of brass. For yellow, tartar and manganese. And for violet-coloured enamel, manganese with thrice-calci- nated brass.

In making these enamels, the following general cautions are necessary to be observed. 1. That the pots must be glazed with white glass, and must be such as will bear the fire. 2. That the matter of enamels must be very nicely mixed with the colours. 3. When the enamel is good, and the colour well incorporated, it must be taken from the fire with a pair of tongs. 4. The general way of making the coloured enamel is this: Powder, sift, and grind, all the colours very nicely, and first mix them with one another, and then with the common matter of enamels: then set them in pots in a furnace; and when they are well mixed and incorporated, cast them into water; and when dry, set them in a furnace again to melt; and when melted, take a proof of it. If too deep-coloured, add more of the common matter of enamels; and if too pale, add more of the colours.

Enamels are used either in counterfeiting or imitating precious stones, in painting in enamel; or by enamellers, jewellers, and goldsmiths, in gold, silver, and other metals. The two first kinds are usually prepared by the workmen themselves, who are employed in these arts. That used by jewellers, &c. is brought to us chiefly from Venice or Holland, in little cakes of different sizes, commonly about four inches diameter, having the mark of the maker struck upon it with a punchon. It pays the pound 1 s. 7½⁴/₁₆ d. on importation, and draws back 1 s. 5½⁴/₁₆ d. at the rate of 4 s. per pound.

ENAMELLING, the art of laying enamel upon metals, as gold, silver, copper, &c. and of melting it at the fire, or of making divers curious works in it at a lamp. It signifies also to paint in enamel.

Enamel-
ling.

The method of painting in ENAMEL. This is performed on plates of gold or silver, and most commonly of copper, enamelled with the white enamel; whereon they paint with colours which are melted in the fire, where they take a brightness and lustre like that of glass. This painting is the most prized of all for its peculiar brightness and vivacity, which is very permanent, the force of its colours not being effaced or sullied with time as in other painting, and continuing always as fresh as when it came out of the workmen's hands. It is usual in miniature; it being the more difficult the larger it is, by reason of certain accidents it is liable to in the operation. Enamelling should only be practised on plates of gold, the other metals being less pure: copper, for instance, scales with the application, and yields fumes; and silver turns the yellow white. Nor must the plate be made flat; for in such case, the enamel cracks; to avoid which, they usually forge them a little round or oval, and not too thick. The plate being well and evenly forged, they usually begin the operation by laying on a couch of white enamel (as we observed above) on both sides, which prevents the metal from swelling and blistering; and this first layer serves for the ground of all the other colours. The plate being thus prepared, they begin at first by drawing out exactly the subject to be painted with red vitriol, mixed with oil of spike, marking all parts of the design very lightly with a small pencil. After this, the colours (which are to be before ground with water in a mortar of agate extremely fine, and mixed with oil of spike somewhat thick) are to be laid on, observing the mixtures and colours that agree to the different parts of the subject; for which it is necessary to understand painting in miniature. But here the workman must be very cautious of the good or bad qualities of the oil of spike he employs to mix his colours with, for it is very subject to adulterations. See OIL.

Great care must likewise be taken, that the least dust imaginable come not to your colours while you are either painting or grinding them; for the least speck, when it is worked up with it, and when the work comes to be put into the reverberatory to be red hot, will leave a hole, and so deface the work.

When the colours are all laid, the painting must be gently dried over a slow fire to evaporate the oil, and the colours afterwards melted to incorporate them with the enamel, making the plate red-hot in a fire like what the enamellers use. Afterwards that part of the painting must be passed over again which the fire hath any thing effaced, strengthening the shades and colours, and committing it again to the fire, observing the same method as before, which is to be repeated till the work be finished.

Method of ENAMELLING by the Lamp. Most enamelled works are wrought at the fire of a lamp, in which, instead of oil, they put melted horse-grease, which they call *caballine oil*. The lamp, which is of copper, or white iron, consists of two pieces; in one of which is a kind of oval plate, six inches long, and two high, in which they put the oil and the cotton. The other part, called the *box*, in which the lamp is inclosed, serves only to receive the oil which boils over by the force of the fire. This lamp, or, where several artists work together, two or three more lamps are placed on a table of proper height. Under the table, about the middle

Enamel
Encaenia.

middle of its height, is a double pair of organ-bellows, which one of the workmen moves up and down with his foot to quicken the flame of the lamps, which are by this means excited to an incredible degree of vehemence. Grooves made with a gauge in the upper part of the table, and covered with parchment, convey the wind of the bellows to a pipe of glass before each lamp; and that the enamellers may not be incommoded with the heat of the lamp, every pipe is covered at six inches distance with a little tin plate, fixed into the table by a wooden handle. When the works do not require a long blast, they only use a glass pipe, into which they blow with their mouth.

It is incredible to what a degree of fineness and delicacy the threads of enamel may be drawn at the lamp. Those which are used in making false tufts of feathers are so fine, that they may be wound on the reel like silk or thread. The fictitious jets of all colours, used in embroideries, are also made of enamel; and that with so much art, that every small piece hath its hole to pass the thread through wherewith it is sewed. These holes are made by blowing them into long pipes; which they afterwards cut with a proper tool.

It is seldom that the Venetian or Dutch enamels are used alone: they commonly melt them in an iron-ladle, with an equal part glass or crystal; and when the two matters are in perfect fusion, they draw it out into threads of different sizes, according to the nature of the work. They take it out of the ladle while liquid, with two pieces of broken tobacco-pipes, which they extend from each other at arm's-length. If the thread is required still longer, then another workman holds one end, and continues to draw it out, while the first holds the enamel to the flame. Those threads, when cold, are cut into what lengths the workman thinks fit, but commonly from 10 to 12 inches; and as they are all round, if they are required to be flat, they must be drawn through a pair of pincers while yet hot. They have also another iron instrument in form of pincers, to draw out the enamel by the lamp when it is to be worked and disposed in figures. Lastly, they have glass-tubes of various sizes, serving to blow the enamel into various figures, and preserve the necessary vacancies therein; as also to spare the stuff, and form the contours. When the enameller is at work, he sits before his lamp with his foot on the step that moves on the bellows; and holding in his left hand the work to be enamelled, or the brass or iron-wires the figures are to be formed on, he directs with his right the enamel thread, which he holds to the flame with a management and patience equally surprising. There are few things they cannot make or represent with enamel; and some figures are as well finished, as if done by the most skillful carvers.

ENARTHROSIS, in anatomy, a species of DIARTHROSIS.

ENCENIA, the name of three several feasts celebrated by the Jews in memory of the dedication, or rather purification, of the temple, by Judas Maccabæus.

VOL. IV.

(A) Spanish chalk is called by Dr Parfons, in a note, *Spanish white*. This is a better kind of whitening than the common, and was the only white that had the name of *Spanish* annexed to it, that I could procure, tho' I inquired for it at most if not all the colour-shops in town.

My friend Mr da Costa shewed me a piece of Spanish chalk in his collection, which seemed more like a CIMOLIA (tobacco pipe clay), and was the reason of my using that in one of the experiments.

us, Solomon, and Zorobabel.—This term is likewise used in church-history for the dedication of Christian churches.

ENCAMPMENT, the pitching of a CAMP.

ENCANTHIS, in surgery, a tubercle arising either from the caruncula lachrymalis, or from the adjacent red skin; sometimes so large, as to obstruct not only the puncta lachrymalia, but also part of the sight or pupil itself. See SURGERY.

ENCAUSTIC and ENCAUSTUM, the same with enamelling and enamel. See ENAMELLING and ENAMEL.

ENCAUSTIC Painting, a method of painting made use of by the ancients, in which wax was employed to give a gloss to their colours, and to preserve them from the injuries of the air, and which seems greatly superior to the method of painting with oil, because the wax never changes its colour, but the oil always does, and thus oil paintings never fail to become discoloured, and lose their beauty through age.

The art of encaustic painting was long lost. It is but lately revived; and the only authentic account we have of the method of performing it is given in a letter from Mr Josiah Colebrooke to the earl of Macclesfield president of the Royal Society in 1759.

"The art of painting with burnt wax, (says he), has long been lost to the world. The use of it to painters, in the infancy of the art of painting, was of the utmost consequence. Drying oil being unknown, they had nothing to preserve their colours entire from the injury of damps, and the heat of the sun: a varnish of some sort was therefore necessary; but they being unacquainted with distilled spirits, could not, as we now do, dissolve gums to make a transparent coat for their pictures: this invention therefore of burnt wax supplied that defect to them; and with this manner of painting, the chambers and other rooms in their houses were furnished: this Pliny calls *encaustum*, and we *encaustic painting*.

"The following experiments which I have the honour to lay before your Lordship and the Society, were occasioned by the extract of a letter from the abbe Mazeas, translated by Dr Parfons, and published in the second part of the XLIXth volume of the Philosophical Transactions, n^o 100. concerning the ancient method of painting with burnt wax, revived by count Caylus.

"The count's method was,

"*First*, To rub the cloth or board designed for the picture simply over with bees-wax.

"*Secondly*, To lay on the colours mixed with common water; but as the colours will not adhere to the wax, the whole picture was first rubbed over with (A) Spanish chalk, and then the colours are used.

"*Thirdly*, When the picture is dry, it is put near the fire, whereby the wax melts, and absorbs all the colours.

"Exp. I. A piece of oak board was rubbed over with bees wax, first against the grain of the wood, and then with the grain, to fill up all the pores that remained

15 U

remained

Encampment
Encaustic.

maintained after it had been planed, and afterwards was rubbed over with as much dry Spanish white as could be made to stick on it. This, on being painted (the colours mixed with water only), clogged the pencil, and mixed so unequally with the ground, that it was impossible to make even an outline, but what was so much thicker in one part than another, that it would not bear so much as the name of painting; neither had it any appearance of a picture. However, to pursue the experiment, this was put at a distance from the fire, on the hearth, and the wax melted by slow degrees: but the Spanish white, (though laid as smooth as so soft a body would admit, before the colour was laid on), yet on melting the wax into it, was not sufficient to hide the grain of the wood, nor shew the colours by a proper whiteness of the ground; the wax, in rubbing on the board, was unavoidably thicker in some parts than in others, and the Spanish white the same: on this I suspected there must be some mistake in the Spanish white, and made the inquiry mentioned in the note.

"To obviate the inequality of the ground in the first experiment;

"Exp. 2. A piece of old wainscot (oak board) $\frac{1}{2}$ of an inch thick, which, having been part of an old drawer, was not likely to shrink on being brought near the fire: this was smoothed with a fish-skin, made quite warm before the fire; and then, with a brush dipped in white wax, melted in an earthen pipkin, smeared all over, and applied to the fire again, that the wax might be equally thick on all parts of the board, a ground was laid (on the waxed board), with levigated chalk mixed with gum water, (*viz.* gum Arabic dissolved in water): when it was dry, I painted it with a kind of landscape; and pursuing the method laid down by count Caylus, brought it gradually to the fire. I fixed the picture on a fire-screen, which would preserve the heat, and communicate it to the back part of the board. This was placed first at the distance of three feet from the fire, and brought forwards by slow degrees, till it came within one foot of the fire, which made the wax swell and bloat up the picture; but as the chalk did not absorb the wax, the picture fell from the board and left it quite bare.

"Exp. 3. I mixed three parts white wax, and one part white resin, hoping the tenacity of the resin might preserve the picture. This was laid on a board heated, with a brush, as in the former; and the ground was chalk, prepared as before. This was placed horizontally on an iron box, charged with an hot heater, shifting it from time to time, that the wax and resin might penetrate the chalk; and hoping from this position, that the ground, bloated by melting the wax, would subside into its proper place; but this, like the other, came from the board, and would not at all adhere.

"Exp. 4. Prepared chalk four drams, white wax, white resin, of each a dram, burnt alabaster half a dram, were all powdered together and sifted, mixed with spirit of molasses instead of water, and put for a ground on a board smeared with wax and resin, as in Exp. 3. This was also placed horizontally on a box-iron, as the former: the picture blistered, and was cracked all over; and though removed from the box-iron to an oven moderately heated (in the same hori-

zontal position), it would not blister, nor become smooth. When it was cold, I took an iron spatula made warm, and moved it gently over the surface of the picture, as if I were to spread a platter. (This thought occurred, from the board being prepared with wax and resin, and the ground having the same materials in its composition, the force of the spatula might make them unite.) This succeeded so well, as to reduce the surface to a tolerable degree of smoothness; but as the ground was broke off in many places, I repaired it with flake white, mixed up with the yolk of an egg and milk, and repainted it with molasses spirit (instead of water), and then put it into an oven with a moderate degree of heat. In this I found the colours fixed, but darker than when it was at first painted; and it would bear being washed with water, not rubbed with a wet cloth.

"Exp. 5. A board (that had been used in a former experiment) was smeared with wax and resin, of each equal parts; was wetted with molasses spirit, to make whitening (or Spanish white) mixed with gum-water adhere. This, when dry, was scraped with a knife, to make it equally thick in all places. It was put into a warm oven, to make the varnish incorporate partly with the whitening before it was painted; and it had only a small degree of heat: water only was used to mix the colours. This was again put into an oven with a greater degree of heat; but it flaked off from the board: whether it might be owing to the board's having had a second coat of varnish (the first having been scraped and melted off), and that the unctuous parts of the wax had so entered its pores, that it would not retain a second varnish, I cannot tell.

"Exp. 6. Having miscarried in these trials, I took a new board, planed smooth, but not polished either with a fish-skin or rushes: I warmed it, and smeared it with wax only; then took *cinolia* (tobacco-pipe clay) divested of its sand, by being dissolved in water and poured off, leaving the coarse heavy parts behind. After this was dried and powdered, I mixed it with a small quantity of the yolk of an egg and cow's milk, and made a ground with this on the waxed board: this I was induced to try, by knowing that the yolk of an egg will dissolve almost all unctuous substances, and make them incorporate with water; and I apprehended, that a ground, thus prepared, would adhere so much the more firmly to the board than the former had done, as to prevent its flaking off. The milk, I thought, might answer two purposes; first, by uniting the ground with the wax; and secondly, by answering the end of size, or gum-water, and prevent the colours from sinking too deep into the ground, or running one into another. When the ground was near dry, I smoothed it with a pallet-knife, and washed with milk and egg where I had occasion to make it smooth and even: when dry I painted it, mixing the colours with common water; this, on being placed horizontally in an oven, only warm enough to melt the wax, flaked from the board; but held so much better together than any of the former, that I pasted part of it on paper.

"Exp. 7. (a) Flake white mixed with egg and milk, crumbled to pieces in the oven, put on the waxed board, as in the last experiment.

The bad success which had attended all the former experiments

(a) Flake white is the purest sort of white-lead.

experiments, led to consider of what use the wax was in this kind of painting: and it occurred to me, that it was only as a varnish to preserve the colours from fading.

"In order to try this:

"Exp. 8. I took what the brick-layers call *fine stuff*, or *putty* (c): to this I added a small quantity of burnt alabaster, to make it dry: this it soon did in the open air; but before I put on any colours, I dried it gently by the fire, left the colours should run. When it was painted, I warmed it gradually by the fire (to prevent the ground from cracking), till it was very hot. I then took white wax three parts, white resin one part, melted them in an earthen pipkin, and with a brush spread them all over the painted board, and kept it close to the fire in a perpendicular situation, that what wax and resin the plaster would not absorb might drop off. When it was cold, I found the colours were not altered, either from the heat of the fire, or passing the brush over them. I then rubbed it with a soft linen cloth, and thereby procured a kind of gloss, which I afterwards increased by rubbing it with an hard brush; which was so far from scratching or leaving any marks on the picture, that it became more smooth and polished by it.

"After I had made all the foregoing experiments, in conversation with my honoured and learned friend Dr Kiddy, a fellow of this society, I said I had been trying to find out what the encaustic painting of the ancients was. Upon which he told me, that there was a passage in Vitruvius *de Architectura*, relative to that kind of painting; and was so good as to transcribe it for me from the 7th book, chap. 9. *De minii temperatura*. Vitruvius's words are: *At si quis subtilior fuerit, & voluerit expolitionem miniæque suam colorem retinere, cum paries expolitus & aridus fuerit, tunc ceram Punicam liquefactam igni, paulo oleo temperatam, seta inducat, deinde postea carbonibus in ferreo vase compressis, eam ceram apprimere cum pariete, calefaciendo sudore cogat, fiatque ut peræquetor, deinde cum candela linteisque puris subigat, uti signa marmorea nuda curantur. Hæc autem xavvic Græce dicitur. Ita obstant ceræ Punice loricæ non patitur, nec lunc splendorem, nec solis radios lambendo eripere ex his politionibus colorem.*

Which I thus translate: "But if any one is more wary, and would have the polishing [painting] with vermilion hold its colour, when the wall is painted and dry, let him take Carthaginian [Barbary] wax, melted with a little oil, and rub it on the wall with an hair-pencil; and afterwards let him put live coals into an iron vessel [chaffing-dish], and hold it close to the wax, when the wall, by being heated, begins to sweat; then let it be made smooth: afterwards let him rub it with a (b) candle and (e) clean linen rags, in the same manner as they do the naked marble statues. This the Greeks call *xavvic*. The coat of Carthaginian wax (thus put on) is so strong, that it neither suffers the

moon by night, nor the sun-beams by day, to destroy the colour."

Being satisfied, from this passage in Vitruvius, that the manner of using wax in Exp. 8. was right, I was now to find if the wax-varnish, thus burnt into the picture, would bear washing. But here I was a little disappointed: for, rubbing one corner with a wet linen cloth, some of the colour came off; but washing it with a soft hair-pencil dipped in water, and letting it dry without wiping, the colour stood very well.

A board painted, as in Exp. 8. was hung in the most smoky part of a chimney for a day, and exposed to the open air in a very foggy night. In the morning the board was seemingly wet through, and the water ran off the picture. This was suffered to dry without wiping; and the picture had not suffered at all from the smoke or the dew, either in the ground or the colours: but when dry, by rubbing it, first with a soft cloth, and afterwards with a brush, it recovered its former gloss.

Supposing that some tallow might have been mixed with the white wax I had used, which might cause the colours to come off on being rubbed with a wet cloth, I took yellow wax which had been melted from the honeycomb in a private family, and consequently not at all adulterated: to three parts of this I added one part resin, and melted them together.

Exp. 9. Spanish white, mixed with fish-glue, was put for a ground on a board, and painted with water-colours only. The board was made warm; and then the wax and resin were put on with a brush, and kept close to the fire till the picture had imbibed all the varnish, and looked dry. When it was cold, I rubbed it first with a linen cloth, and then polished it with an hard brush.

In these experiments I found great difficulties with regard to colours. Many water-colours being made from the juices of plants, have some degree of an acid in them; and these, when painted on an alkaline ground, as chalk, whitening, *cinolia*, and plaster, are totally changed in their colours, and from green become brown; which contributes much to make the experiments tedious. I would therefore advise the use of mineral or metallic colours for this sort of painting, as most likely to preserve their colour: for although I neutralized Spanish white, by fermenting it with vinegar, and afterwards washed it very well with water, it did not succeed to my wish.

"These experiments, and this passage from Vitruvius, will in some measure explain the obscurity of part of that passage in Pliny which Dr Parsons, in his learned comment on the encaustic painting with wax, seems to despair of.

"*Ceris pingere*, was one species of encaustic painting. *Encaustor, inquam*, may be translated, "forced in by the means of fire, burnt in:" for whatever is forced in by the help of fire can be rendered into Latin by no

15 U 2

other

(c) Putty is lime slaked, and, while warm, dissolved in water, and strained through a sieve.

(d) The account of the method of polishing [painting] walls coloured with vermilion, gave me great satisfaction, as it proved the method I had taken in experiment 8. (which I had tried before I saw or knew of this passage in Vitruvius) was right. The use of the candle, as I apprehend, was to melt the wax on the walls where by accident the brush had put on too much, or afford wax where the brush had not put on enough, or had left any part bare.

(e) The rubbing the wall with a linen cloth, while warm, will do very well, where there is only one colour to be preserved; but where there are many, as in a landscape, it will be apt to take off some, or render the colouring rather faint; which I found by wiping the wax off from a painting while it was hot.

Encaustic,
Encephali.

other significant word, that I know of, but *inustum*. If this is allowed me, and I think I have the authority of Vitruvius (a writer in the Augustan age) for it, who seems to have wrote from his own knowledge, and not like Pliny, who copied from others much more than he knew himself, the difficulty with regard to this kind of painting is solved, and the encaustic with burnt wax recovered to the public.

"What he means by the next kind he mentions, *in ebore cestro id est viriculo*, I will not attempt to explain at present.

"The ship-painting is more easily accounted for: the practice being, in part, continued to this time; and is what is corruptly called *breaining*, for brenning or burning.

"This is done by reeds set on fire, and held under the side of a ship till it is quite hot; then resin, tallow, tar, and brimstone, melted together, and put on with an hair brush while the planks remain hot, make such a kind of paint as Pliny describes: which, he says, *nec sole, nec sale, ventisque corrumpitur*. As they were ignorant of the use of oil painting, they mixed that colour with the wax, &c. which they intended for each particular part of the ship, and put it on in the manner above described.

"In the pictures painted for these experiments, and now laid before your Lordship and the Society, I hope neither the design of the landscape, nor the execution of it, will be so much taken into consideration as the varnish (which was the thing wanted in this inquiry): and I think that will evince, that the encaustic painting with burnt wax is fully restored by these experiments; and tho' not a new invention, yet having been lost for so many ages, and now applied further, and for other purposes, than it was by Vitruvius (who confined it to vermilion only), may also amount to a new discovery, the use of which may be a means of preserving many curious drawings to (F) posterity: for this kind of painting may be on paper, cloth, or any other substance that will admit a ground to be laid on it. The process is very simple, and is not attended with the disagreeable smell unavoidable in oil-painting, nor with some inconveniences inseparable from that art; and as there is no substance we know, more durable than wax, it hath the greatest probability of being lasting."

ENCEINTE, in fortification, is the wall or rampart which surrounds a place, sometimes composed of bastions or curtains, either faced or lined with brick or stone, or only made of earth. The enceinte is sometimes only flanked by round or square towers, which is called a *Roman wall*.

ENCEPHALI, in medicine, worms generated in the head, where they cause so great a pain as sometimes to occasion distraction.

The encephali are very rare; but there are some diseases wherein they swarm, from whence we are told pestilential fevers have wholly arisen. Upon the dissection of one who died of this fever, a little, short, red worm was found in the head, which malmsey wine, wherein horse-radish had been boiled, could only destroy. This medicine was afterwards tried on the sick, most of whom it cured.

The like worms have also been taken out by trepanning, and the patient cured. Those worms that generate in the nose, ears, and teeth, are also called *encephali*.

ENCHANTER, a person supposed to practise enchantment or fascination. See FASCINATION, WITCHCRAFT, &c.

ENCHANTER'S *Nightshade*, in botany. See CIRCÆA.

ENCHASING, INCHASING, or *Chasing*, the art of enriching and beautifying gold, silver, and other metal-work, by some design or figures represented thereon in low relieve.

Enchasing is practised only on hollow thin works, as watch-cases, cane-heads, tweezer-cases, or the like. It is performed by punching or driving out the metal, to form a figure, from withinside, so as to stand out prominent from the plane or surface of the metal. In order to this, they provide a number of fine steel blocks or punchcons of divers sizes; and the design being drawn on the surface of the metal, they apply the inside upon the heads or tops of these blocks, directly under the lines or parts of the figures; then, with a fine hammer, striking on the metal, sustained by the block, the metal yields, and the block makes an indentation or cavity on the inside, corresponding to which there is a prominence on the outside, which is to stand for that part of the figure.

Thus the workman proceeds to chase and finish all the parts by the successive application of the block and hammer to the several parts of the design. And it is wonderful to consider with what beauty and justice, by this simple piece of mechanism, the artists in this kind will represent foliages, grotesques, animals, histories, &c.

ENCLITICA, in grammar, particles which are so closely united with other words, as to seem part of them, as in *virumque*, &c.—There are three enclitic particles in Latin, viz. *que, ne, ve*.

ENCRATITES, in church-history, heretics who appeared towards the end of the second century: they were called *Encratites*, or *Continentes*, because they gloried in abstaining from marriage and the use of wine and animal-food.

ENCURECK, in natural history, a venomous insect found in Persia, and said to be a kind of tarantula. According to Olearius as quoted by Mr Boyle, it neither stings nor bites; but lets fall its venom like a drop of water, which causes insufferable pain in the part for a time, and afterwards so profound a sleep, that nothing can awake the patient except crushing one of the creatures on the part affected. It is nevertheless said, that the sheep eat these insects without damage.

ENCYCLOPÆDIA, the same with CYCLOPÆDIA.

ENDEMIC, or ENDEMICAL, DISEASES, those to which the inhabitants of particular countries are subject more than others, on account of the air, water, situation, and manner of living.

ENDIVE, in botany. See CICHORIUM.

END-

Enchanter
Endive.

(F) A bird drawn by Mr Edwards upon paper, prepared with a ground of whitening and fish-glue, first painted, and then the wax burnt in, has been since shewn to the Royal Society. This picture rolls up as easily as common paper without cracking the varnish. At also two landscapes painted in the same manner on wood.

Endless
||
Engine.

ENDLESS, something without an end : thus authors mention endless rolls, the endless screw, &c.

ENDORSE, in heraldry, an ordinary, containing the eighth part of a pale, which Leigh says is only used when a pale is between two of them.

ENDORSED, in heraldry, is said of things borne back to back, more usually called *ADORSÉ*.

ENDOWMENT, in law, denotes the settling a dower on a woman : though sometimes it is used, figuratively, for settling a provision upon a parson, on the building of a church ; or the severing a sufficient portion of tithes for a vicar, when the benefice is appropriated.

ENDYMION, the 12th king of Elis. Being expelled his kingdom, he retired into Caria to mount Latmos, where he studied the heavenly bodies, but chiefly the moon ; which gave rise to the fable of the poets, that he was beloved by the moon, who visited him every night as he lay asleep upon the top of that hill.

ENEMY, in law, an alien or foreigner, who publicly invades the kingdom.

ENERGUMENS, in church-history, persons supposed to be possessed by the devil, concerning whom there were many regulations among the primitive Christians. They were denied baptism, and the eucharist ; at least, this was the practice of some churches : and though they were under the care of exorcists, yet it was thought a becoming act of charity, to let them have the public prayers of the church, at which they were permitted to be present. See *EXORCISM*.

ENERGY, a term of Greek origin, signifying the power, virtue, or efficacy of a thing. It is also used, figuratively, to denote emphasis of speech.

ENFANS PERDUS, the same with *forlorn-hope*.

ENFILADE, in the art of war, is used in speaking of trenches, or other places, which may be scoured by the enemy's shot along their whole length. In conducting the approaches at a siege, care must be taken that the trenches be not enfiladed from any work of the place. See *TRENCHES*.

ENFRANCHISEMENT, in law, the incorporating a person into any society or body politic.

ENGASTRIMYTHI, in Pagan theology, the Pythians, or priestesses of Apollo, who delivered oracles from within, without any action of the mouth or lips.

The ancient philosophers, &c. are divided upon the subject of the engastrimythi. Hippocrates mentions it as a disease. Others will have it a kind of divination. Others attribute it to the operation or possession of an evil spirit. And others to art and mechanism. M. Scottus maintains that the engastrimythi of the ancients were poets, who, when the priests could not speak, supplied the defect by explaining in verse what Apollo dictated in the cavity of the balon on the sacred tripod.

ENGENDERING, a term sometimes used for the act of producing or forming any thing : thus meteors are said to be engendered in the middle region of the atmosphere, and worms in the belly.

ENGINE, *sc.* mechanics, is a compound machine, made of one or more mechanical powers, as levers, pulleys, screws, &c. in order to raise, cast, or sustain any weight, or produce any effect which could not be easily effected otherwise. The word is formed of the

French *engin*, from the Latin *ingenium* "wit;" by reason of the ingenuity required in the contrivance of engines to augment the effect of moving powers.

ENGINE for *extinguishing Fires*. See *HYDROSTATICS*, n° 33.

Pile-ENGINE, one contrived for driving piles. See *Pile-Engine*.

Steam-ENGINE, a machine to raise water by fire, or rather by the force of water turned into steam. See *STEAM Engine*.

ENGINE for *dividing Mathematical Instruments*. See *RAMSDEN'S Engine*.

ENGINEER, in the military art, an able expert man, who, by a perfect knowledge in mathematics, delineates upon paper, or marks upon the ground, all forts of forts, and other works proper for offence and defence. He should understand the art of fortification, so as to be able, not only to discover the defects of a place, but to find a remedy proper for them ; as also how to make an attack upon, as well as to defend, the place. Engineers are extremely necessary for these purposes : wherefore it is requisite, that, besides being ingenious, they should be brave in proportion. When at a siege the engineers have narrowly surveyed the place, they are to make their report to the general, by acquainting him which part they judge the weakest, and where approaches may be made with most success. Their business is also to delineate the lines of circumvallation and contravallation, taking all the advantages of the ground ; to mark out the trenches, places of arms, batteries, and lodgments, taking care that none of their works be flanked or discovered from the place. After making a faithful report to the general of what is a-doing, the engineers are to demand a sufficient number of workmen and utensils, and whatever else is necessary.

ENGLAND, the southern division of the island of Great Britain. Including Wales, it is of a triangular form, and lies between the 50th and 55th degrees of north latitude, extending about 400 miles in length from south to north, and in some places it is 300 miles in breadth. It is bounded by Scotland on the north ; by the English Channel on the south, dividing it from France ; by the German Sea on the east ; and on the west by St George's, or the Irish, Channel.

At what time the island of Britain was peopled is uncertain ; nor do we know whether the southern or northern parts were first inhabited. We have no accounts that can be depended upon before the arrival of Julius Cæsar, and it is certain he found the southern parts full of people of a very warlike disposition. These people, according to Cæsar, were a colony of the Gauls ; and this opinion is embraced by most of the ancient as well as modern writers. It is chiefly founded on the agreement observed by the Romans between the two nations in their customs, manners, language, religion, government, way of fighting, &c. The more northern inhabitants, according to Tacitus, came from Germany. This he infers from the make of their limbs ; but Cæsar simply calls them *Aborigines*.

England, including the principality of Wales, when first invaded by the Romans, was divided into 17 petty states. 1. The *Danmonii*, called also *Dunmonii* and *Donmonii*, inhabiting the counties of Cornwall and Devonshire. 2. The *Durotriges*, who inhabited the track now called *Dorsetshire*. 3. The Belgæ possessed

Engine
||
England.

Inhabited
by 17 different
nations.

Somerset

England.

Somersetshire, Wiltshire, and Hampshire. 4. The Attrebatii, or inhabitants of Berkshire. 5. The Regni, whose country bordered on that of the Attrebatii, and comprehended Surry, Suffex, and part of the sea-coast of Hampshire. 6. The Cantii, inhabiting the county now called Kent. 7. The Dobuni are placed by Ptolemy on the north side of the Thames, near its head, in the counties of Gloucestershire and Oxfordshire. 8. The Cattieuchani, *Calyceuchani*, *Cattidudani*, or *Cathicudani*, inhabited Buckinghamshire, Bedfordshire, and Hertfordshire. 9. The Trinobantes, who possessed the countries of Essex and Middlesex. 10. The Icenii, whose country comprehended Suffol, Norfolk, Cambridge, and Huntingdonshire. These are by Ptolemy called *Simeni*, and by others *Tigeni*. Camden is of opinion, that they were the same whom Cæsar calls *Cenomagni*. 11. The Corianni, whose country comprehended Northamptonshire, Leicestershire, Rutlandshire, Lincolnshire, Nottinghamshire, and Derbyshire. 12. The Cornavii possessed Warwickshire, Worcestershire, Staffordshire, Shropshire, and Cheshire. 13. The Silures inhabited the Counties of Radnorshire, Brecknockshire, Glamorganshire, with Herefordshire and Monmouthshire. 14. The Demetæ inhabited part of Carmarthenshire, Pembrokehire, and Cardiganshire. 15. The country of the Ordovices comprehended Montgomeryshire, Merionethshire, Caernarvonshire, Denbighshire, and Flintshire. 16. The Brigantes possessed the countries of Yorkshshire, the bishopric of Durham, Lancashire, Westmoreland, and Cumberland. 17. The country of Northumberland was held by the Otadini, Otadenni, or Otallini. Their country, according to some, reached from the Tine to the river Forth; though the most common opinion is, that it reached only to the Tweed.

The above-mentioned names of these nations are plainly Roman, but the etymology of them is not easily ascertained. Some attempt to derive them from words in the Old British language; but as this subject at best must be very obscure and uncertain, we shall not enter into it.

Before the time of Julius Cæsar, the Romans had scarcely any knowledge of Britain; but that conqueror having subdued most of the Gallic nations on the opposite side of the channel, began to think of extending his conquests by the reduction of Britain. The motive for this expedition, ascribed to him by Suetonius, was a desire of enriching himself by the British pearls, which were then very much esteemed. The pretence, however, which he made use of in order to justify his invasion, was, that the Britons had sent assistance to the Gauls during his wars with them.

Cæsar undertook his first expedition against Britain when the summer was already far spent, and therefore he did not expect to finish the conquest of the country that campaign. He thought, however, that it would be a considerable advantage to view the island, and learn something of the manners and customs of the natives; after which he could more easily take such measures as should ensure a permanent conquest on his return. Having marched all his forces into the country of the Morini, now the province of Picardy, from whence was the shortest passage into Britain; he ordered at the same time all the vessels that lay in the neighbouring ports, and a fleet which he had built the

year before for an expedition against the Morini, to attend him. The Britons, alarmed at his preparations, sent ambassadors with offers of submission; but Cæsar, though he received them with great kindness, did not abandon his intended scheme of an invasion. He waited till the arrival of C. Volusenus, whom he had sent out with a single galley to make discoveries on the coast of Britain. Volusenus did not think proper to land; but, having made what observations he could on the coast, returned after five days absence, and Cæsar immediately set sail for Britain. His force consisted of two legions embarked on board 80 transports; and he appointed 18 more which lay wind-bound about eight miles off, to convey over the cavalry; but these last orders were too slowly executed, which occasioned some difficulty in his landing.

The Britons at this time, according to Cæsar and other Roman historians, were very numerous, and had their country well stocked with cattle. Their houses resembled those of the Gauls; and they used copper or iron plates weighed by a certain standard instead of money. Their towns were a confused parcel of huts placed at a small distance from one another, generally in the middle of a wood, to which all the avenues were slightly guarded with ramparts of earth or with trees. All the nations were in a state of the most wretched barbarism, even when compared with the barbarous Gauls on the continent. The use of clothes was scarce known in the island. Only the inhabitants of the southern coast covered their nakedness with the skins of wild beasts; and this rather to avoid giving offence to the strangers who came to trade with them, than out of any principle of decency. It was a general custom among the Britons to paint their bodies with the juice of woad; but whether this was designed as ornament, or for any other purpose, is not known. They shaved their beards, all except their upper lip, and wore long hair. They also had their wives in common, a custom which made them detestable to all other nations.

The arms of the Britons were a sword, a short lance, and a shield. Breast-plates and helmets they looked upon rather to be incumbrances, and therefore made no use of them. They usually fought in chariots, some of which were armed with scythes at the wheels; they were fierce and cruel, and exceedingly blood-thirsty. When driven to distress, they could subvert themselves even on the bark and roots of trees; and Dio Cassius tells us, that they had ready, on all occasions, a certain kind of food, of which, if they took but the quantity of a bean, they were not troubled with hunger or thirst for a considerable time after.—The northern nations, however, were somewhat more civilized; and the Cantii, or inhabitants of Kent, more so than any of the rest.

All the British nations at this time were very brave and resolute, owing to the continual dissensions among themselves. They proved therefore very formidable enemies to the Romans; but the same dissensions which had taught them the art of war, also prevented them from uniting in the defence of their country. As soon as they perceived Cæsar's fleet approaching, a number of cavalry and chariots were dispatched to oppose his landing, while a considerable body of infantry halted after. What chiefly embarrassed the Romans in their attempt to land, was the largeness of their ships,

England.

4
Manners,
customs,
&c. of the
Britons.

3
Julius Cæsar undertakes an expedition into Britain.

5
They oppose Cæsar's landing.

England. which required a considerable depth of water. The soldiers therefore were obliged to leap into the sea while loaded with their armour; and at the same time to encounter the enemy, who were quite disengaged, as they either flooded on dry ground, or waded but a little way into the water. Cæsar perceiving this disadvantage, ordered his galleys to advance, with their broad sides towards the shore, in order to drive the Britons from the water-side with their slings and arrows. On this the Britons, surpris'd at the galleys, a sort of shipping they had never before seen, began to give ground. The fight, however, continued for some time, greatly to the disadvantage of the Romans; till at last Cæsar, observing the distress of his men, caus'd several boats to be manned, and sent them to the assistance of those who were most expos'd to the enemy's assault. The Romans then soon got the better of the undisciplin'd barbarians, however brave, and made good their landing; but they were unable to pursue the enemy for want of cavalry, which had not yet arriv'd.

6
They are
defeated
and sue for
peace.

7
Their
treachery.

The Britons were so dishearten'd with this bad success, that they immediately sent ambassadors to sue for peace; which was granted, on condition of their delivering a certain number of hostages for their fidelity. Part of these they brought immediately; and promis'd to return in a few days with the rest, who, they said, liv'd at some distance. But, in the mean time, the 18 transports which carried Cæsar's cavalry, being driven back by a violent storm, and the fleet which lay in the road being greatly damaged by the same, the Britons thought proper to break their engagements. Having therefore privately assembled their forces, they fell unexpectedly on the seventh legion while at a distance from the rest and busied in foraging. Cæsar being apprised of their danger, hasten'd to their assistance with two cohorts, and at last repuls'd the enemy.—This, however, prov'd only a temporary deliverance; for the Britons, thinking it would be possible for them to cut off all the Romans at once, dispatch'd messengers to inform several of the neighbouring nations of the weakness of the enemy's forces, and the happy opportunity that offer'd itself of destroying all these invaders at one blow.—On this, they drew together a great body of horse and foot, which boldly advanced to the Roman intrenchments. But Cæsar came out to meet them; and the undisciplin'd Britons being by no means able to cope with the Romans, were put to flight with great slaughter. Having burnt several towns and villages, the victors return'd to their camp, where they were soon followed by new deputies from the Britons. Cæsar being in want of horse, and afraid lest another storm should destroy the remainder of his fleet, granted the Britons a peace, on condition of their sending him double the number of hostages into Gaul which they had before promis'd. The same night he set sail, and soon arriv'd safe in Gaul.

8
Cæsar re-
turns.

The Britons no sooner perceiv'd the Romans gone, than, as before, they broke through their engagements. Of all the states who had promis'd to send hostages, only two perform'd their promises; and this neglect so provok'd Cæsar, that he determin'd to return the year following with a far greater force. Having, therefore, caus'd his old vessels to be re-
 10

ted, and a great many new ones built, he arriv'd off the coast of Britain with a fleet of 600 ships and 28 galleys. The Britons made no opposition to his landing; but Cæsar, getting intelligence that an army was assembled at no great distance, march'd in quest of them. He found them encamp'd on the banks of a river, suppos'd to be the *Stour*, about 12 miles distant from the place where he had land'd. They attempt'd to oppose his passage; but being briskly attack'd by the Roman cavalry, they were oblig'd to retire into a wood, all the avenues of which were block'd up by trees cut down for that purpose. This fortification, however, prov'd insufficient to protect them. The seventh legion, having cast themselves into a tessel'd, and thrown up a mound against their works, drov'd them from their asylum; but as the day was far spent, a pursuit was not thought advis'able.

England.

9
Defeats the
Britons.

Next morning Cæsar, with the greatest part of his army, which he divid'd into three bodies, march'd out in quest of the enemy. But when he was already come in sight of their rear, he was overtaken by messengers, who inform'd him, that his fleet was greatly damaged by a violent storm which had happen'd the preceding night. This put an end to the pursuit for that time; but Cæsar having employ'd all the carpenters he had with him, and sent for others from Gaul, in order to repair the damage, resolv'd to prevent misfortunes of this kind for the future. He therefore drew all his ships ashore, and inclos'd them within the fortifications of his camp. This arduous undertaking employ'd his whole army for 10 days, after which he again set out in quest of the enemy.

The Britons had made the best use they could of the respite afford'd them by the storm. They were head'd by Cassibelanus king of the Trinobantes. He had formerly made war upon his neighbours; and having render'd himself terrible to them, was look'd upon to be the most proper person for leading them on against the common enemy; and as several states had now join'd their forces, the British army was very numerous. Their cavalry and chariots attack'd the Roman army while on their march; but were repuls'd with loss, and driven into the woods. The Romans pursu'd them too eagerly, and thus lost some of their own men; which encourag'd the Britons to make another fierce attack: but in this also they were finally unsuccessful, and were oblig'd to retire, though their loss seems not to have been great.

Next day the Britons suddenly attack'd the Roman legions as they were foraging; but meeting with a vigorous resistance, they soon betook themselves to flight. The Romans pursu'd them so closely, that having neither time to rally nor get down from their chariots, according to custom, great numbers of them were cut in pieces: and this overthrow had such an effect upon the auxiliaries of Cassibelanus, that all of them abandon'd him; nor did the Britons ever afterwards engage Cæsar with united forces. Cæsar, pursuing his victory, march'd towards the Thames, with a design to cross that river, and enter the territories of the Trinobantes. The river was fordable only at one place, and that not without great difficulty; but when he came to it, he found the enemy's forces drawn up in a considerable body on the opposite bank, which was fortify'd with sharp stakes. They had likewise driven many stakes
 10
Cæsar cross
the
Thames.

England.

of the same kind into the bottom of the river, the tops of which were covered with water. These stakes are visible to this day at a place called *Walton* in Surrey. They are made of oak; and though they have been so long in the water, are as hard as Brazil, and as black as jet; and have sometimes been pulled out in order to make knife-handles of them.

11
Gives the
Britons fre-
quent over-
throws.

Cæsar was not at all dismayed at these difficulties, which he had intelligence of by prisoners and deserters. He ordered the cavalry to enter first, and the foot to follow. His orders were obeyed, and the soldiers advanced with such resolution; that though the infantry were up to the chin in water, the enemy, unable to sustain their assault, abandoned the bank and fled. After this defeat Cassibelannus himself despaired of success, and therefore dismissed all his forces except about 4000 chariots, with which he observed the motions of the Romans, harassing them by cutting off straggling parties, &c. This, however, was not sufficient to keep up the spirits of his countrymen. On the contrary, they deposited him from the kingdom, and chose Mandubratius, whose father had been murdered by Cassibelannus, who thereupon usurped the kingdom. The young prince had fled to Cæsar, who gave him protection; and the Trinobantes now offered to submit to the conqueror, provided he would give them Mandubratius for their king.

Cæsar readily complied with the request of the Trinobantes upon their sending him 40 hostages: and the submission of the Trinobantes was soon followed by that of other states and tribes; for each of the 17 nations already mentioned were composed of several different tribes, of which no particular account can be given.—Cæsar next marched to Verulamium, or Canterbury, which was Cassibelannus's capital, and which he still kept possession of; but, tho' the place was strongly fortified both by nature and art, the Britons were unable to bear the assault of the Romans, and therefore soon fled out at one of the avenues. Many were taken as they attempted to make their escape, and many more cut in pieces.

After this loss, Cassibelannus, as his last resource, found means to draw into confederacy with him four kings of the Cantii. But, though Cæsar gives them the title of kings, it is probable that they were only petty princes, tributary to the king of that nation. Their names were Cingetorix, Corvilius, Taximagulus, and Segonax. These, having raised what forces they could, attacked the camp where the ships were laid up: but the Romans having made a sally, repulsed them with great slaughter, and then returned to their trenches without any loss; after which, Cassibelannus thought proper to submit to the conqueror. As the summer was already far spent, Cæsar hearkened to his proposals. A peace was concluded on the following terms, *viz.* that the Britons should pay an annual tribute to the Romans, that Cassibelannus should leave Mandubratius in peaceable possession of his dominions, that he should not molest the Trinobantes, and that he should deliver a certain number of hostages. These terms being agreed to, Cæsar set sail with his whole fleet from Britain, to which he never returned.

12
He leaves
the island
altogether.

Such is the account given by Cæsar himself of his two expeditions into Britain; but other authors have spoken very doubtfully of his victories in this island.

England.

Dio Cassius tells us, that the Britons utterly defeated the Roman infantry, but were at last put in disorder by their cavalry. Horace and Tibullus, in many parts of their works, speak of the Britons as a people not yet conquered. Tacitus says, that Cæsar rather shewed the Romans the way to Britain, than put them in possession of it; and Lucan tells us plainly, that Cæsar turned his back to the Britons and fled. This last, however, considering the consummate military genius of Cæsar, is by no means probable. That he left Britain during the winter, was, in all probability, to prevent insurrections among the Gauls, which might very readily have happened; and that he did not return to finish his conquest can be no wonder, seeing his ambition would certainly be more gratified by being called emperor of Rome, than conqueror of Britain.

The departure of Julius Cæsar, which happened about 53 years before Christ, left the Britons without any fear of a foreign enemy. We are not, therefore, to imagine, that they would regard their promises of paying tribute; nor was it probably demanded for a good number of years afterwards. Augustus, however, when he had got himself fully established on the throne, had twice a design of invading Britain and forcing the inhabitants to pay the tribute promised to Julius Cæsar. Both times, however, he was prevented by revolts in different provinces in the empire, so that the Britons still continued to enjoy their liberty. They thought proper, however, to court the favour of the Romans as much as they could by pretended submissions; but, in the reign of Claudius, the Romans set about reducing the Britons to subjection in good earnest. The occasion of this war is related by Dio Cassius as follows.

13
Why the
war with
Romans
was renewed.

"Canobelinus, the third in succession from Cassibelannus, being dead, his two sons, Togodumnus and Caractacus, succeeded to the throne; but whether they reigned jointly or separately, is not known. In their reign one Bericus, of whom we also know very little, being driven out of the island for attempting to raise a sedition, fled with some of his partisans to Rome, and persuaded Claudius to make war on his countrymen. The Britons, on the other hand, resented the behaviour of Claudius in receiving these vagabonds, and therefore prohibited all intercourse with the Romans. A much smaller offence than this would have been sufficient at any time to provoke that haughty nation to declare war. An army was therefore immediately ordered into Britain, under the command of Plautius prætor in Gaul. The soldiers at first refused to embark, from a superstitious notion, that they were going to be sent without the compass of the world; and this mutiny being related to the Britons, they did not make the necessary preparations for their own defence. The Roman soldiers were soon brought to a sense of their duty; and set out from three different ports, in order to land in three different places of Britain at once. Being driven back by contrary winds, their fears began to return; but they resumed their courage on the appearance of a meteor shooting from the east, which they imagined was sent from heaven to direct their course. They landed without opposition; and the Britons, not having drawn together a sufficient army, kept in small bodies behind their marshes, and in woods, in order to spin out the war till winter; which they imagined Plautius would, like Cæsar, spend in Gaul.

The

England.

74
The Britons
defeated.

The Roman general marched first in quest of the two kings Togodumnus and Caratacus; both of whom he found out, and defeated one after another. He then reduced part of the Dobuni, at that time subject to the Cattiuchiani; and, leaving a garrison to keep them in awe, he advanced to a river where the Britons lay carelessly encamped, supposing that the Romans could not pass it without a bridge. But the Germans in the Roman army had been accustomed to swim across the strongest currents in their heavy armour. They therefore passed the river first; and having, according to their orders, fallen only upon the enemy's horses which drew their chariots, these formidable machines were rendered entirely useless; and the Britons were put to flight as soon as another part of the forces could pass the river.

The Britons were not disheartened with this defeat, but engaged the Romans next day with great bravery. Victory continued long doubtful; but at length the Romans prevailed, and the Britons were forced to betake themselves to flight. This battle is thought to have been fought on the banks of the Severn. From thence the Britons fled to the mouth of the Thames. They were closely pursued by the Romans; but the latter being unacquainted with the flats and shallows of the river, were often in great danger. The Germans, however, crossed the river by swimming as before, and the rest on a bridge somewhat higher; so that the Britons were in a short time surrounded on all sides, and great numbers of them cut in pieces. Many of the Romans, also, pursuing the fugitives with too great eagerness, were lost in the marshes.—In one of these battles Togodumnus was killed; but the Britons were so far from being disheartened by his death, that they shewed more eagerness than ever to oppose the Romans, in order to revenge it. Plautius, therefore, did not think proper to penetrate farther into the country, but contented himself with putting garrisons in the places he had already conquered. He then wrote to the emperor himself; who no sooner received an account of his success, than he set out for Britain; where, having landed after a short voyage, he joined Plautius on the banks of the Thames.

15
Claudius
arrives in
Britain.

Soon after the arrival of Claudius, the Roman army passed the Thames, attacked the British army, and totally defeated it. The consequence of this was the taking of Cunobelinus's capital, and the submission of several of the neighbouring states. The emperor, however, did not make a long stay in the island, but left Plautius to pursue his conquests. This he did with such success, that, on his return to Rome, he was met without the gates by the emperor himself, who, at his solemn entry, gave him the right hand.—The Britons seem to have made a very obstinate resistance to the Roman arms about this time. Vespasian, who was afterwards emperor, is said to have fought 30 battles with them. The exploits of Titus his son are also much celebrated by the Roman historians.

In the ninth year of Claudius, P. Ostorius Scapula was sent into Britain. By far the greater part of the 17 nations formerly mentioned were at this time unconquered. Some of these had broken into the Roman territories; but Ostorius falling unexpectedly upon them, put great numbers to the sword, and dispersed the rest. To prevent them for the future from making

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inroads into the territories of the Romans or their allies, he built several forts on the Severn, the Avon, and the Nen, reducing the country south of these rivers to a Roman province. This so highly offended the Iceni, that, being joined by the neighbouring nations, they raised a considerable army, and encamped in an advantageous situation, in order to prevent the Romans from penetrating farther into the island. Ostorius, however, soon advanced against them. The Romans, as usual, got the victory, and the enemy were pursued with great slaughter. The Roman general then, having quelled an insurrection among the Brigantes, led his army against the Silures. They were headed by their king Caratacus, a most renowned warrior. He shewed his military talents by choosing a very advantageous place for engaging the enemy. Tacitus tells us, "it was on the ridge of an exceeding steep mountain; and, where the sides of it were inclining and accessible, he reared walls of stone for a rampart. At the foot of the mountain flowed a river dangerous to be forced, and an army of men guarded his entrenchments." This hill is thought to be one called *Cæsar-Caradoc* in Shropshire, situated near the conflux of the rivers Colun and Teme, and where the remains of ancient entrenchments are still visible.—On the approach of the enemy, Caratacus drew up his troops in order of battle, animating them with the following speech, according to Tacitus. "That from this day, and this battle, they must date their liberty rescued, or their slavery for ever established. He then invoked the shades of those heroes who had expelled Cæsar the dictator; those brave men by whose valour they still enjoyed freedom from Roman tribute and taxes, and by which their wives and children were yet preserved from prostitution." The whole army then took a solemn oath either to conquer or die, and prepared for the charge with the most terrible shouts. Ostorius was somewhat dismayed when he considered the uncommon fierceness of the enemy, and the other difficulties which he had to encounter. He led on his men, however, to the charge; and the Romans were attended with their usual good fortune. The Britons were put to flight. Vast numbers fell on the field of battle and in the pursuit, and many more were taken prisoners. Among the latter were the wife, the daughter, and the brothers, of Caratacus. The unfortunate prince himself fled to Cartimundua queen of the Brigantes, by whom he was delivered up to the Roman general, who sent him in chains to Rome. Caratacus bore his misfortunes with magnanimity; and when he came before the emperor, addressed him in the following terms. "If my moderation in prosperity, O Claudius! had been as conspicuous as my birth and fortune, I should now have entered this city as a friend, and not as a prisoner; nor would you have disdained the friendship of a prince descended from such illustrious ancestors, and governing so many nations. My present condition, I own, is to you honourable, to me humiliating. I was lately possessed of subjects, horses, arms, and riches. Can you be surprised that I endeavoured to preserve them? If you Romans have a desire to arrive at universal monarchy, must all nations, to gratify you, tamely submit to servitude? If I had submitted without a struggle, how much would it have diminished the lustre of my fall, and of your victory?"

England.

16
Caratacus
defeated and
taken prisoner.

17
His speech
to the Ro-
man emper-
or.

15 X

And

England. And now, if you resolve to put me to death, my story will soon be buried in oblivion; but if you think proper to preserve my life, I shall remain a lasting monument of your clemency."—This speech had such an effect upon Claudius, that he immediately pardoned Caractacus and his whole family, and commanded them to be set at liberty.

18
General re-
volt of the
Britons.

The Silures, notwithstanding this terrible blow, continued the war with great vigour, and gained considerable advantages over the Romans; which so much affected Ostorius, that he died of grief. He was succeeded by A. Didius, who restrained the incursions of the Silures, but was not able to restore Cartimundua queen of the Brigantes, who had been deposed by her subjects. Didius was succeeded by Veranius, and he by Suetonius Paulinus, who reduced the island of **ANGLESEY**, as related under that article. But while Paulinus was employed in the conquest of this island, he was alarmed by the news of an almost universal revolt among those nations which had submitted to the Romans. The Britons, tho' conquered, had still a desire of returning to their former state of independence; and the Roman yoke became every day more unsupportable to them through the insolence and oppressions of the Roman soldiers. The Britons had been long discontented, and were already in a very proper disposition for a revolt, when an event happened which kindled these discontents into an open flame. Prasutagus, king of the Iceni, a prince renowned for opulence and grandeur, had, by his last will, left the Roman emperor joint-heir with his two daughters, in hopes of obtaining his favour and protection by so great an obligation. But the event turned out very different. No sooner was he dead, than his houses and possessions were all plundered by the Roman soldiers. The queen Boadicea remonstrated against this injustice; but, instead of obtaining any redress, she herself was publicly whipped, her daughters ravished, and all the relations of the late king reduced to slavery. The whole country also was plundered, and all the chiefs of the Iceni deprived of their possessions.

19
They de-
stroyed 80,000
Romans.

Boadicea was a woman of too haughty a spirit to be able to bear such indignities. She therefore persuaded the Iceni to take up arms, which they very readily did. Then, being joined by the Trinobantes, and some other nations, they poured like a torrent on the Roman colonies. Every thing was destroyed with fire and sword. The ninth legion, which had been left for the defence of the country under Petilius Cerealis was defeated, the infantry totally cut in pieces, and the commander himself with the cavalry escaped with the utmost difficulty. Suetonius, alarmed at this news, immediately left Anglesey, and marched with the greatest expedition to London. The inhabitants were overjoyed at his arrival, and used their utmost endeavours to detain him for their defence. But he refused to stay, and in a short time left the place, notwithstanding the intreaties of the inhabitants. The whole city lamented his departure; and they had reason. Suetonius was scarce gone, when Boadicea with her Britons entered, and put all they found in it to the sword. None were taken prisoners, nor was any sex or age spared, and many were tortured in the most cruel manner. Seventy thousand persons are said to have perished on this occasion at London and other Roman colonies.

The Britons, now elated with success, assembled from all quarters in great numbers, so that Boadicea's army soon amounted to 230,000 men. They despised the Romans; and became so confident of victory, that they brought their wives and children along with them in waggons to be spectators of the destruction of their enemies. The event was what might naturally have been judged from such ill-judged confidence. The Britons were overthrown with most terrible slaughter, no fewer than 80,000 being killed in the battle and pursuit; while the Romans had not above 400 killed, and not many more wounded. Boadicea, not able to survive so great a calamity, put an end to her life by poison.

England.
20
They are
utterly de-
feated.

By this overthrow the Britons who had once been subdued were thoroughly prevented from raising any more insurrections, and even those who had not yet submitted to the Roman yoke seemed to be intimidated from making incursions into their dominions. Nothing remarkable therefore happened in Britain for some time. In the time of Vespasian, Petilius Cerealis being appointed governor of Britain, attacked the Brigantes, defeated them in several battles, and reduced great part of their country. He was succeeded by Julius Frontinus; who not only maintained the conquests of his predecessor, but reduced entirely the warlike nation of the Silures. Frontinus was succeeded by the celebrated Cneius Julius Agricola, who completed the conquest of all the Southern Britons.

21
Britain con-
quered by
Agricola.

Just before the arrival of Agricola, the Ordovices had cut in pieces a band of horse stationed on their confines, after which the whole nation had taken arms. The summer was pretty far spent, and the Roman army was quite separated and dispersed, the soldiers having assured themselves of rest for the remaining part of the year. Agricola, however, was no sooner landed, than, having drawn together his legions, he marched against the enemy without delay. The Britons kept upon the ridges of the mountains; but Agricola led them in person up the ascents. The Romans were victorious, and such a terrible slaughter was made of the Britons that almost all the whole nation of Ordovices was cut off. Without giving the enemy time to recover from the terror which this overthrow had occasioned, Agricola resolved upon the immediate reduction of Anglesey, which had been lost by the revolt of Boadicea. Being destitute of ships, he detached a chosen body of auxiliaries who knew the fords, and were accustomed to manage their arms and horses in the water. The Britons who had expected a fleet and transports, were so terrified by the appearance of the Roman forces on their island, that they immediately submitted, and Anglesey was once more restored to the Romans.

With the conquest of Anglesey, ended the first campaign of Agricola; and he employed the winter in reconciling the Britons to the Roman yoke. In this he met with such success, through his wife and equitable conduct, that the Britons, barbarous as they were, began to prefer a life of security and peace, to that independence which they had formerly enjoyed, and which continually exposed them to the tumults and calamities of war. The succeeding campaigns of Agricola were attended with equal success; he not only subdued the 17 nations inhabiting England, but carried the Roman arms almost to the extremity of Scotland. He also caused

caused his fleet to surround the island, and discovered the Orcaades, or Orkney islands, which had before been unknown to the rest of the world. His expedition took him up about six years, and was completed in the year of Christ 84.

Had this commander been continued in Britain, it is probable that both Scotland and England would have been permanently subdued; but he was recalled by Domitian in the year 85, and we are then almost totally in the dark about the British affairs till the reign of the emperor Adrian. During this interval the Caledonians had taken arms, and not only refused subjection to the Roman power themselves, but ravaged the territories of the Britons who continued faithful to them. Adrian, for what reason is not well known, abandoned to them the whole track lying between the Tyne and the Forth. At the same time, in order to restrain them from making incursions into the Roman territories, he built a wall 80 miles in length from the river Eden in Cumberland to the Tyne in Northumberland*. He was succeeded by

* See A-
drian.

Antoninus Pius, in whose reign the Brigantes revolted; and the Caledonians, having in several places broken down the wall built by Adrian, began anew to ravage the Roman territories. Against them the emperor sent Lollius Urbicus, who reduced the Brigantes; and having defeated the northern nations, confined them within narrower bounds, by a new wall †, extending probably between the Friths of Forth and Clyde. From the time of Antoninus to that of Severus, the Roman dominions in Britain continued to be much infested by the inroads of the northern nations. That emperor divided Britain into two governments, the southern and northern; but the governor of the northern division was so harassed by continual incursions of the Caledonians, that he was at length obliged to purchase a peace with money. The Caledonians kept the treaty for 15 years; after which, breaking into the Roman territories anew, they committed terrible ravages. Virius Lupus the governor, not being in a condition to withstand them, acquainted the emperor with his distress, intreating him to send powerful and speedy supplies. Upon this Severus resolved to put an end to the perpetual incursions of the enemy by making a complete conquest of their country; for which purpose he set out for Britain, together with his two sons Caracalla and Geta, at the head of a numerous army. The Caledonians no sooner heard of his arrival, than they sent ambassadors offering to conclude a peace upon honourable terms. But these the emperor detained till he was ready to take the field, and then dismissed them without granting their request.

As soon as the season was fit for action, Severus marched into the territories of the Caledonians, where he put all to fire and sword. He advanced even to the most northerly parts of the island; and though no battle was fought in this expedition, yet through the continual ambuscades of the enemy, and the inhospitable nature of the country, he is said to have lost 50,000 men. At last the Caledonians were obliged to sue for peace; which was granted them on condition of their yielding part of their country, and delivering up their arms. After this the emperor returned to York, leaving his son Caracalla to command the army,

and finish the new wall which had been begun between the friths of Forth and Clyde. But, the emperor being taken ill at York, the Caledonians no sooner heard of his indisposition, than they again took up arms. This provoked Severus to such a degree, that he commanded his son Caracalla to enter their country anew with the whole army, and to put all he met to the sword without distinction of sex or age. Before these orders, however, could be put in execution, his two sons, having concluded a shameful peace with the Caledonians, returned to Rome.

A long chasm now takes place in the history of the Roman dominions in Britain. In the beginning of Dioclesian's reign, Carausius a native of Gaul, passing over into Britain, took upon him the title of emperor, and was acknowledged by all the troops quartered here. He was, however, killed in a battle with one of Constantius's officers, after he had enjoyed the sovereignty for six or seven years. Constantine the Great began his reign in this island; and returned soon after he had left it, probably with a design to put a stop to the daily incursions of the Caledonians. He altered the division of that part of Britain subject to the Romans. Severus had divided it only into two provinces; but Constantine increased the number to three; viz. Britannia Prima, Britannia Secunda, and Maxima Caesariensis; and this last was afterwards divided into two, viz. Maxima Caesariensis and Flavia Caesariensis. The removal of the imperial seat from Rome to Constantinople, which happened in the reign of Constantine, gave the northern nations an opportunity of making frequent incursions into the Roman provinces; the emperor having carried with him, first into Gaul, and then into the East, not only most of the Roman troops, but likewise the flower of the British youth.

About the latter end of the reign of Constantius son to Constantine the Great, the government of the province of Britain and other Western parts of the empire, was committed to Julian, afterwards called the *apostate*. While he was in his winter-quarters at Paris, he was informed that the Scots and Picts, about this time first distinguished by these names, had broken into the Roman territories and committed every where dreadful ravages. Against them Julian dispatched a body of troops under the command of Lupicinius. He embarked from Bologne in the depth of winter, but was no sooner arrived at London than he was recalled; the enemy having probably found means to appease Julian by their submissions. To the reign of Valentinian I. these nations still continued to infest the Roman territories in Britain, and had now reduced the country to a most deplorable condition by their continual ravages. Valentinian sent against them Theodosius, father to the emperor of that name. That general having divided his forces into several bodies, advanced against the enemy who were rowing up and down the country. The Scots and Picts were obliged to yield to the superior valour and discipline of the Romans. Great numbers were cut in pieces, they were forced to abandon all the booty and prisoners they had taken, and to retire beyond the friths of Forth and Clyde. Theodosius then entered London in triumph, and restored that city to its former splendour, which had suffered greatly by the former incursions of the northern Britons. To restrain them from breaking anew into the provinces,

† See A-
ntoninus's
Wall.

22
Expedition
of Severus
into Bri-
tain.

England. Theodosius built several forts or castles between the two friths; and having thus recovered all the country between Adrian's wall and the friths of Forth and Clyde, he formed of it a fifth province which he called *Valentia*.

Though Britain was now reduced to a state of temporary tranquillity, yet as the Roman empire was daily declining, it is not to be supposed that sufficient care could be taken to secure such a distant province. In the reign of the emperor Honorius, the provincial Britons found themselves annoyed not only by the Scots and Picts, but also by the depredations of the Saxons who began to commit ravages on the sea-coasts. By the care, however, of Stilicho, prime minister to Honorius, matters were once more settled, and a particular officer was appointed to guard the coast against the attempts of the Saxons, with the title of *Comes limitis Saxonici*. But, not long after, the empire being over-run by barbarians, most of the Roman troops quartered in Britain were recalled, and the country left quite open to the attacks of the Scots and Picts. Upon this the provincials expecting no more assistance from Honorius, resolved to let up an emperor of their own. Accordingly they invested with the imperial dignity one *Mark*, an officer of great credit among them. Him they murdered in a few days, and placed on the throne one Gratian a native of Britain. After a reign of four months, Gratian underwent the fate of his predecessor; and was succeeded by *Constantine*, a common soldier, who was chosen merely for the sake of his name. He seems, however, to have been a man of some knowledge and experience in war. He drove the Scots and Picts beyond the limits of the Roman territories; but being elated with this success, he would now be satisfied with nothing less than the conquest of the whole Roman empire. He therefore passed over into Gaul; and took with him not only the few Roman forces that had been left, but such of the provincial Britons as were most accustomed to arms. That unhappy people, being now left entirely defenceless, were harried in the most cruel manner by their enemies; who broke into the country, and destroyed all with fire and sword. In this miserable situation they continued from the year 407, when the usurper Constantine passed over into Gaul, till the year 410. Having during the last three years frequently implored assistance from Rome without receiving any, they now resolved to withdraw their allegiance from an empire which was no longer able to protect them. Honorius himself applauded their conduct; and advised them by letters to provide for their own safety, which was in effect an implicit resignation of the sovereignty of the island.

The provincial Britons now regained their liberty; but they had lost the martial spirit which had at first rendered them so formidable to the Romans. They seem, however, to have met with some success in their first enterprises; for Zosimus tells us, that they delivered their cities from the insults of an haughty enemy. But, being at last overpowered, they were again obliged to have recourse to the Roman emperor, to whom they promised a most perfect submission, provided they were delivered from the hands of their merciless and implacable enemies. Honorius, touched with compassion, sent a legion to their relief. The Roman forces landed in Britain unexpectedly; and having destroyed great

numbers of the Scots and Picts, they drove them beyond the Friths of Forth and Dunbritton. After this they advised the natives to build a wall on the isthmus from sea to sea, and to reassemble their courage, and defend themselves from their enemies by their own valour. The Romans then quitted the country; being obliged to return, in order to repulse those barbarians who had broken into the empire from all quarters.

The Britons immediately set about building the wall, as they had been desired, with great alacrity. But, as it was constructed only of turf, the Scots and Picts soon broke it down in several places; and, pouring upon the defenceless and effeminate provincials, committed more cruel ravages than ever. At last, after very many and grievous calamities, the latter sent ambassadors once more to Rome. These appeared with their garments rent, and dust on their heads; and at last prevailed on the emperor, by their earnest intreaties, to send another legion to their relief. The troops arrived in Britain before the enemy had the least knowledge of their having set sail. They were therefore quite unprepared for an attack, and roving up and down the country in the utmost disorder. The Romans made a terrible havoc among them, and drove the remainder into their own country. As Honorius had sent them not with any ambitious view of retaining the island in subjection, but merely out of compassion to the unhappy provincials, the Romans told them, they had now no farther assistance to expect from them. They informed them, that the legion must immediately return to the continent, to protect the empire from the barbarians, who had extended their ravages almost to every part of it; and therefore, that they must now take their last farewell of Britain, and totally abandon the island. After this declaration, Gallio, the commander of the Roman troops, exhorted the provincials to defend themselves, by fighting bravely for their country, wives, and children, and what ought to be dearer than life itself, their liberty; telling them, at the same time, that their enemies were no stronger than themselves, provided they would but lay aside their fears, and exert their ancient courage and resolution. That they might the better withstand the attacks of the enemy, he advised them to build a wall not of turf, but of stone; offering to assist them with his soldiers, and to direct them himself in the execution. Upon this the Britons immediately fell to work; and with the assistance of the Romans, finished it in a short time, though it was no less than eight feet thick, and twelve feet in height. It is thought to have been built on the same place where Severus's wall formerly stood. Towers were also built at convenient distances on the east coast, to prevent the descents of the Saxons and other barbarians that came from Germany. Gallio employed the rest of his time in teaching the provincials the art of war. He left them patterns of the Roman weapons, which he also taught them to make; and after many encouraging exhortations, he took his last farewell of Britain, to which the Romans never returned. There is a great disagreement among chronologists as to the year in which the Romans finally abandoned Britain; some placing it in 422; others in 423, or 426; and some in 431, 435, or 437.

The final departure of the Romans was no sooner known to the Scots and Picts, than they poured in upon

England.

25
Send ambassadors a second time to Rome.

23
The Britons choose an emperor of their own.

24
Implore the assistance of the Romans.

26
Britain finally abandoned by the Romans.

England.

upon the provincial Britons from all quarters, like hungry wolves breaking into a sheep-fold. When the Scots approached the new-built wall, they found it completely finished, and guarded by great numbers of armed men. But so little had the provincial Britons profited by the military instructions of the Romans, that, instead of placing proper guards and centinels, and relieving one another by turns, their whole number had staid several days and nights upon the ramparts without intermission. Being therefore quite benumbed and wearied out, they were able to make but very little resistance. Many were pulled down with hooks from the battlements, and dashed in pieces. The rest were driven from their stations with showers of darts and arrows. They betook themselves to flight; but that could not save them. The Scots and Picts pursued them close, made a dreadful havoc among the fugitives, and took possession of the frontier towns, which they found deserted by the inhabitants. As they now met with no more opposition, they over-ran the whole country, putting every thing to fire and sword. Their ravages soon occasioned a famine; and this was followed by a kind of civil war. The provincials, unable to support themselves, were obliged to plunder each other of the little the common enemy had left them. The whole country at last became so incapable of supporting those who were left in it, that many fled into the woods, in order to subsist themselves there by hunting. In this extremity of distress, they had once more recourse to the Romans; and wrote in the most mournful style that can possibly be imagined to Aetius, who was then consul the third time. Their letter directed thus: "The groans of the Britons to the consul Aetius." The contents of this letter were answerable to the direction. "The barbarians, (say they,) drive us to the sea; the sea drives us back to the barbarians; between which we have only the choice of two deaths, either to be swallowed up by the waves, or to be cruelly massacred by the enemy."

To this letter the Roman general gave no satisfactory answer, and the provincials were thereupon reduced to despair. Great numbers of them fled over to Armorica, where they settled along with others who had formerly gone over with an usurper called *Maximus*; while others submitted to the Scots and Picts. Some, however, more resolute than the rest, had once more recourse to arms. They fell out in parties from the woods and caves where they had been obliged to hide themselves, and, falling unexpectedly on the enemy, cut great numbers of them in pieces, and obliged the rest to retire. Having thus obtained some respite, they began again to cultivate their lands; which, having lain fallow for a long time, now produced all sorts of corn in the greatest plenty. This plenty, according to the historian Gildas, occasioned the most consummate wickedness and corruption of manners among all ranks of men. The clergy, says he, who should have reclaimed the laity by their example, proved the ringleaders in every vice; being addicted to drunkenness, contention, envy, &c.—It is possible, however, that this description might be exaggerated by Gildas, who was himself a monk. But, however this was, the Britons had not long enjoyed peace, when they were alarmed by a report, that the Scots and Picts were about to return with a far greater force than

before, utterly to extirpate the name of their southern neighbours, and seize upon the country for themselves. This report threw them into a terrible consternation; and, to add to the rest of their misfortunes, they were now visited by a dreadful plague, which raged with such violence, that the living were scarce sufficient to bury the dead. The contagion no sooner ceased, than they found their country invaded by the Scots and Picts, who destroyed every thing with fire and sword; so that the provincials were soon reduced to the same miserable state they had formerly been in.

At this time the chief, if not the only, king of the southern division of Britain, was one *Vortigern*. He is said to have been a cruel, debauched tyrant, regardless of the public welfare, and totally incapable of promoting it. Being now roused from his insensibility, however, by a sense of his own danger, he summoned a council of the chief men of the nation, in order to deliberate about the proper means for delivering the country from those calamities under which it groaned. In this council the most pernicious measure was adopted that could possibly have been resolved on; namely, to invite to their assistance the *Saxons*, a people famous for their piracies and cruelty, and justly dreaded by the Britons themselves*. This fatal expedient being agreed upon, ambassadors were immediately dispatched into Germany with advantageous proposals to the Saxons in case they would come over to their assistance.

The British ambassadors soon arrived in Germany, and, according to *Witchind*, a Saxon historian of the ninth century, made the following speech before an assembly of the Saxons.—"Illustrious Saxons, the fame of your victories having reached our ears, the distressed Britons, harried by the continual inroads of a neighbouring enemy, send us to implore your assistance. We have a fertile and spacious country, which we are commanded to submit to you. We have hitherto lived under the protection of the Roman empire; but our ancient masters having abandoned us, we know no nation more powerful than you, and better able to protect us. We therefore recur to your valour. Forake us not in our distress, and we shall readily submit to what terms you yourselves shall think fit to prescribe to us."—If this abject and shameful speech was really made, it must give us a very strange idea of the national spirit of the provincial Britons at that time. It is, however, probable that the whole is a fiction designed only to excuse the perfidious treatment which these Britons afterwards received from the Saxons. The most respectable even of the Saxon historians make no mention of such a speech: and it is certain, that when the Saxons themselves wanted to quarrel with the Britons, they never insisted upon the promise made by the British ambassadors; which they most certainly would have done, had any such promise ever been made.

The British ambassadors were very favourably received by the Saxons. The latter embraced their proposal with joy; and the rather, because their soothsayers foretold that they should plunder their British allies for 150 years, and reign over them for twice that time. Three long ships, in the Saxon language called *chutes*, were therefore fitted out, under the conduct of *Hengist* and *Horsa*. These were two brothers much celebrated

England.

29
Are again
threatened
with an invasion.

30

They re-
solve to call
in the Sax-
ons.
* See Sax-
ons.

26
Britons mi-
serably har-
rassed by
the Scots
and Picts.

27
Implore the
assistance of
the Ro-
mans.

28
They at last
repulse
their ene-
mies.

brated.

England.

brated both for their valour and nobility. They were sons of Witigisl said to be great-grandson to the Saxon god Woden; a circumstance which added much to their authority. Having embarked about 1600 men on board their three vessels, the two brothers arrived in the isle of Thanet, in the year 449 or 450. They were received by the inhabitants with the greatest demonstrations of joy: the isle in which they had landed was immediately appointed for their habitation; and a league was concluded, in virtue of which the Saxons were to defend the provincial Britons against all foreign enemies; and the provincials were to allow the Saxons pay and maintenance, besides the place allotted them for their abode. Soon after their arrival, king Vortigern led them against the northern nations who had lately broke into the kingdom, and advanced as far as Stanford in the county of Lincolnshire. Here a battle was fought, in which the Scots and Picts were utterly defeated, and obliged to relinquish their booty.

Vortigern was so highly pleased with the behaviour of his new allies, that he bestowed large possessions in the country they had newly delivered, upon the two commanders Hengist and Horsa. It is said, that, even at this time, Hengist was taken with the wealth and fertility of the country; and at the same time observing the inhabitants to be quite enervated with luxury, began to entertain hopes of conquering part of it. He therefore, with Vortigern's consent, invited over some more of his countrymen; giving them notice at the same time of the fruitfulness of the country, the effeminacy of the inhabitants, and how easily a conquest might be effected.

The Saxons readily complied with the invitation; and, in 452, as many more arrived in 17 vessels, as, with those already in Britain, made up an army of 5000 men. Along with these, according to Nennius, came over Rowena the daughter of Hengist. Vortigern fell in love with this lady; and in order to obtain her in marriage, divorced his lawful wife. Hengist pretended to be averse to the match; but Vortigern obtained his consent by investing him with the sovereignty of Kent. The Saxon historians, indeed, make no mention of Rowena; but rather insinuate, that their countrymen made themselves masters of Kent by force of arms. It seems most probable, however, that Vortigern had as yet continued in friendship with the Saxons, and even put more confidence in them than in his own subjects. For, not long after the arrival of this first reinforcement, Hengist obtained leave to send for a second, in order, as was pretended, to defend the king from the attempts of his rebellious subjects, as well as of the Scots and Picts. These embarked in 40 ships, under the command of Oeta and Ebusa, the son and nephew, or, according to some, the brother and nephew of Hengist. They landed at the Orkney islands; and having ravaged them, as well as all the northern coasts of Scotland, they conquered several places beyond the Frith, and at last obtained leave to settle in Northumberland.

The pretence made for this settlement was, that the Saxons under Oeta and Ebusa might defend the northern frontiers of the kingdom, as those under Hengist and Horsa did the southern parts. Many more Saxons were, under various pretences, invited over;

till at last the countries from which they came were in a manner depopulated. And now their numbers being greatly increased, the Saxons began to quarrel with the natives. They demanded larger allowances of corn, and other provisions; threatening to lay waste the whole country if their demands were not complied with. The Britons, instead of complying with these demands, desired them to return home, since their numbers exceeded what they were able to maintain. Upon this, the Saxons concluded a peace with the Scots and Picts; and, turning their arms against the unhappy provincials, over-ran the whole country. The Saxons committed every where the greatest cruelties. All buildings, whether public or private, they levelled with the ground. The cities were pillaged and burnt; and the people massacred without distinction of sex or age, and that in such numbers, that the living scarce sufficed to bury the dead. Some of those who escaped the general slaughter, took refuge among inaccessible rocks and mountains; but there great numbers perished with hunger, or were forced to surrender themselves as slaves to their enemies. Some crossed the sea and settled either in Holland, or in Armorica, now the province of Brittany in France.

Vortigern, we are told by Nennius, was so far from being reclaimed by these calamities, that he added incest to his other crimes, and married his own daughter. At last, his own subjects, provoked at his enormous wickedness, and the partiality he shewed to the Saxons, deposed him, and raised his son Vortimer to the throne. He was a young man of great valour, and willingly undertook the defence of his distressed country. He first fell upon the Saxons with what troops he could assemble, and drove them into the isle of Thanet. Here they were besieged, till, being reinforced by fresh supplies from Germany, they opened themselves a way through the British troops. Vortimer, however, was not yet disheartened. He engaged the Saxons on the banks of the Derwent in Kent, where he obtained a complete victory, and cut in pieces great numbers of the enemy. Another battle was fought at Aylesford in Kent. Some ascribe the victory at this time to the Saxons, and some to the Britons. It is certain, however, that Horsa the brother of Hengist was killed in this engagement. He is said to have been buried at a place in the neighbourhood, which from him obtained the name of *Horsfield*.—A third battle was fought, in which the victory was uncertain, as is also the place where it happened. The fourth battle, however, according to Nennius, proved decisive in favour of the Britons. Vortimer engaged his enemies, according to some, at Folkstone, according to others, at a place called *Stonar*, in the isle of Thanet. The Saxons were defeated with great slaughter, and driven back to their ships. So complete is this victory said to have been, that the Saxons quitted the island, without making any attempt upon it for five years afterwards. These battles, however, rest entirely upon the credit of Nennius, and the historians who have followed him. They are taken notice of neither by Gildas nor Bede. The former only acquaints us, that the Saxons retired. This, by most historians, is understood of their returning home; tho' it is possible he might mean no more, than that, after they had laid waste the country, they retired into the territories allotted

England.

33
They quarrel with the Britons.

34
They are defeated and driven out by Vortimer.

31
The Saxons arrive in Britain, and defeat the Scots and Picts.

32
New supplies of Saxons arrive.

England.

England.

allotted them by Vortigern, in Kent and Northumberland.

Vortimer is said to have died after a reign of six years. On his death-bed, he desired his servants to bury him near the place where the Saxons used to land; being persuaded, that the virtue of his bones would effectually prevent them from ever touching the British shore. This command, however, was neglected; and Vortimer was buried at Lincoln, according to some, or London, according to others.—Hengist was no sooner informed of his death, than he invaded Britain anew with a numerous body of Saxons. He was opposed by Vortigern, who had been restored to the throne after the death of his son Vortimer. Several battles were fought on this occasion; but at last the provincials being overthrown at a place called *Greccan-ford*, with the loss of 4000 men, were obliged to abandon Kent to their enemies, and retire to London. This happened about the year 458 or 459, and from this time most historians date the erection of the first Saxon kingdom in Britain, viz. that of Kent. Hengist assumed the title of *king*, and chose Elk his son for his colleague.

The Britons under Vortigern still continued the war. Hengist finding himself unable to gain a decisive advantage over them in the field, had recourse to treachery. He pretended to be desirous of concluding a peace with the British monarch, and of renewing his ancient friendship with him; and therefore required an interview. To this Vortigern readily consented, and accepted of an entertainment prepared for him by Hengist. The king was attended by 300 nobility all unarmed, but the Saxons had concealed daggers below their garments. The British nobility were all treacherously massacred in the height of their mirth; Vortigern himself was taken and put in fetters; nor could his liberty be procured, but by ceding to the Saxons those provinces now called *Essex*, *Suffex*, and *Middlesex*. Thus the Saxons got such a footing in Britain that they could never afterwards be expelled. Vortigern, after being set at liberty, is said to have retired to a vast wilderness near the fall of the Wye in Radnorshire, where he was some time after consumed by lightning, together with a city called *Kaer Gourtigern* which he had built in that place.

On the retreat of Vortigern, the command of the British forces devolved upon Aurelius Ambrosius, or, as Gildas calls him, Ambrosius Aurelianus. He was a Roman, and perhaps the last that remained in the island. He is said to have gained several victories over the Saxons. Notwithstanding this, however, they still continued to gain ground; and in the year 491, the foundation of a second Saxon kingdom was laid in Britain. This at first comprehended only the county of *Suffex*, but soon after extended over most of the counties lying south of the Humber. It was called the *kingdom of the South Saxons*.

The German nations being now informed of the good success which had attended the Saxons in Britain, new adventurers daily flocked over to share the good fortune of the others. They were chiefly composed of three nations, the Saxons, Angles, and Jutes. All of these passed under the common appellation sometimes of *Saxons*, sometimes of *Angles*. They spoke the same language, and agreed very much in their customs

and institutions, so that all of them were naturally led to combine against the natives. The most active of these adventurers was *Cerdic* a Saxon, said to be the tenth in descent from Woden. He landed with his son *Cenric*, and as many men as he could convey in five ships, at Yarmouth in Norfolk. The provincials immediately attacked him with great vigour; but after a short engagement, they were totally defeated. Many other battles were fought, the event of which was always favourable to the Saxons, so that the Britons were forced to abandon their sea-coasts to them.

In 497, *Porta*, another Saxon, with his two sons *Bloda* and *Magla*, arrived at *Perthmouth*, so called, as some imagine, from this chieftain. The provincials, under the command of a young prince a native of the country, attempted to oppose the landing of the Saxons; but his army was defeated with great slaughter, and he himself killed in the engagement; after which *Porta* made himself master of all the neighbouring country. The progress of *Cerdic*, however, alarmed the Britons more than that of all the other Saxon princes. About the year 508, therefore, *Nazaleod*, styled, by Henry of Huntingdon, the *greatest of all the British kings*, assembled almost the whole strength of the provincial Britons in order to drive him out of the island. *Cerdic* on the other hand took care to strengthen himself by procuring assistance from all the Saxons already in the island. He then advanced against the Britons, commanding the right wing himself, and his son *Cenric* the left. As the two armies drew near each other, *Nazaleod* perceived the enemy's right wing to be much stronger than the left. He therefore attacked it with the flower of his army; and after an obstinate resistance, obliged *Cerdic* to save himself by flight. Being too eager in the pursuit, however, *Cenric* fell upon his rear, and the battle was renewed with great vigour. The British army was at last entirely defeated; and 5000 men, among whom was *Nazaleod* himself, were left dead on the spot.

Who succeeded *Nazaleod* in the kingdom of Britain, is not known. The Welsh annals leave an interregnum of about six years; after which they place the beginning of the reign of *Arthur*, the most renowned British prince mentioned in history. The history of *Arthur* is so much obscured by fables, and many absurd, romantic, and ridiculous stories, that some have supposed that no such person ever existed. On this subject *Milton* gives the following reasons against the existence of king *Arthur*: 1. He is not mentioned by *Gildas*, or any British historian except *Nennius*, who is allowed on all hands to have been a very credulous writer, and to have published a great many fables. 2. Tho' *William of Malmesbury* and *Henry of Huntingdon* have both related his exploits, yet the latter took all he wrote from *Nennius*; and the former, either from the same fabulous writer, or some Monkish legends in the abbey of *Glasterbury*, for both these writers flourished several centuries after king *Arthur*. 3. In the pretended history of *Geoffrey of Monmouth*, such contradictions occur concerning this monarch's victories in France, Scotland, Ireland, Norway, Italy, &c. as must cause us to look upon him as an hero altogether fabulous and romantic.

In answer to this it has been said, 1. That his not being mentioned by *Gildas* cannot seem strange to us, seeing

35
They re-
turn and
defeat the
Britons, and
erect a king-
dom in
Kent.

36
Treachery
of the Sax-
ons.

37
Second Sax-
on king-
dom.

38
Nazaleod
king of Brit-
tain defeat-
ed and kill-
ed.

39
Whether
such a per-
son as king
Arthur ever
existed.

England. seeing it was not that author's design to write an exact history of his country, but only to give a short account of the causes of its ruin by the Scots, Picts, and Saxons. He had also a particular system to support, namely, That the ruin of the Britons was owing to the judgments of God upon them for their wickedness. He lies therefore under a great temptation to conceal the successes of the Britons, and to relate only their misfortunes. 2. Though Nennius was a credulous writer, it is unreasonable to think that the whole history of king Arthur was an invention of his. It is more probable that he copied it from other more ancient authors, or took it from the common tradition of his countrymen. That the Saxon annals make no mention of this king is not to be wondered at, seeing it is natural to think that they would wish to conceal the many defeats he gave their nation. 3. The most convincing proof of the existence of king Arthur is, that his tomb was discovered at Glastenbury in Somersetshire, and his coffin dug up, in the reign of Henry II. with the following inscription upon it in Gothic characters: "Hic jacet sepultus inclytus rex Arturius in insula Avalonia." We are told that on his body were plainly to be seen the marks of 10 wounds, only one of which seemed to be mortal.

40.
His ex-
ploits.

This renowned prince is said to have defeated the Saxons under Cerdic in 12 pitched battles. The last of these was fought on Badon-hill, supposed to be *Badon* near Bath; in which the Saxons received such a terrible overthrow, that for many years they gave the Britons no further molestation. As new supplies of Saxons, however, were continually flocking over, a third and fourth kingdom of them were soon formed. The third kingdom comprehended the counties of Devon, Dorset, Somerset, Wiltshire, Hampshire, and Berkshire; to which was afterwards added Cornwall. This was called the *kingdom of the West Saxons*. The other kingdom, which was called the *kingdom of the East Saxons*, comprehended Essex, Middlesex, and part of Hertfordshire.

41.
Five other
Saxon king-
doms erec-
ted.

In the year 542, happened the death of the great king Arthur, said to have been killed in battle with a treacherous kinsman of his own. Five years afterwards, was erected the Saxon kingdom of Northumberland. It extended, however, much farther than the present bounds of that county; for it comprehended all Yorkshire, Lancashire, Durham, Cumberland, Westmoreland, and Northumberland, with part of Scotland, as far as the Frith of Forth.—Between these Saxon kings, frequent contentions now arose; by which means the Britons enjoyed an uninterrupted tranquillity for at least 44 years.—This interval, however, according to Gildas, they employed only in corrupting their manners more and more, till at last they were roused from their security by the setting up of a sixth Saxon kingdom, called the kingdom of the *East Angles*. It was founded in 575, and comprehended the counties of Norfolk, Suffolk, Cambridgeshire, and the Isle of Ely. The Saxons once more attacked the Britons, and overthrew them in many battles. The war was continued for ten years; after which, another Saxon kingdom called *Mercia* was set up. It comprehended 17 counties; viz. Gloucester, Hereford, Worcester, Warwick, Leicester, Rutland, Northampton, Lincoln, Huntingdon, Bedford, Buckingham, Oxford, Stafford,

Nottingham, Derby, Shropshire, Cheshire, and part of Hertfordshire.

The provincial Britons were now confined within very narrow bounds. However, before they entirely gave up the best part of their country to their enemies, they once more resolved to try the event of a battle. At this time they were assisted by the Angles, who were jealous of the overgrown power of the West Saxons. The battle was fought in Wiltshire, at *Woden's Beorth*, a place near the ditch called *Wansdike*, or *Wodensdike*; which runs through the middle of the county. The battle was very oblique and bloody; but at last the Saxons were entirely defeated, and almost their whole army cut off. The victory, however, proved of little service to the Britons: for, being greatly inferior in number to the Saxons, and harassed by them on the one side, and by the Scots and Picts on the other, they were daily more and more confined; and at last obliged to take refuge among the craggy and mountainous places in the west of the island, where their enemies could not pursue them. At first they possessed all the country beyond the rivers Dee and Severn, which anciently divided Cambria, or Wales, from England; the towns which stand on the eastern banks of these rivers having mostly been built in order to restrain the incursions of the Welsh. But the English, having passed the Severn, by degrees seized on the country lying between that river and the Wye. Nay, in former times, some parts of Flintshire and Denbighshire were subject to the kings of Mercia: for Uffa, the most powerful king of that country, caused a deep ditch to be drawn, and an high wall built, as a barrier between his dominions and the territories of the Welsh, from the mouth of the Dee, a little above Flint-castle, to the mouth of the Wye. This ditch is still to be seen in several places; and is called by the Welsh *Claudd Uffa*, or the Ditch of Uffa. The inhabitants of the towns on the east side of this ditch are called by the same people *Guyr y Mers*; that is, the men of Mercia.

42.
The Briton
defeat the
Saxons, but
are obliged
to retire into
Wales.

Thus, after a violent contest of near 150 years, the Saxons entirely subdued the Britons whom they had come to defend, and had erected seven independent kingdoms in England, now commonly denominated the *Saxon Heptarchy*. By these conquerors the country was now reduced to a degree of barbarity almost as great as it had been in when first invaded by the Romans. The provincial Britons, during their subjection to that people, had made considerable advances in civilization. They had built 28 considerable cities, besides a number of villages and country-seats; but now these were all levelled with the ground, the native inhabitants who remained in England were reduced to the most abject slavery; and every art and science totally extinguished among them.

Before these fierce conquerors could be civilized in any degree, it was necessary that all the seven kingdoms should be reduced under one head; for as long as they remained independent, their continual wars with each other still kept them in the same state of barbarity and ignorance.

The history of these seven kingdoms affords no event that can be in the least interesting. It consists only of a detail of their quarrels for the sovereignty. This was at last obtained by Egbert king of the West Saxons, or Wessex, in 827. Before this time, Chris-
tianity

43
the heptar-
chy.

England.

fraternal had been introduced into almost all the kingdoms of the heptarchy; and however much corrupted it might be by coming through the impure channel of the church of Rome, and misundestood thro' the ignorance of those who received it, it had considerably softened the barbarous manners of the Saxons. It had also opened a communication between Britain and the more polite parts of Europe, so that there was now some hope of the introduction of arts and sciences into this country. Another effect was, that, by the ridiculous notions of preserving inviolable chastity even between married people, the royal families of most of the kingdoms were totally extinct; and the people, being in a state of anarchy, were ready to submit to the first who assumed any authority over them.

All these things contributed to the success of Egbert in uniting the heptarchy under his own dominion. He was of the royal family of Wessex; and a nearer heir than Brithric, who had been raised to the kingdom in 784. As Egbert was a prince of great accomplishments, Brithric, knowing that he had a better title to the crown than himself, began to look upon him with a very jealous eye. Young Egbert, sensible of his danger, privately withdrew to France; where he was well received by Charlemagne, the reigning monarch. The French were reckoned at this period the most valiant and polite people in Europe; so that this exile proved of great service to Egbert.

He continued at the court of France till he was recalled by the nobility to take possession of the kingdom of Wessex. This recall was occasioned by the following accident. Brithric the king of Wessex had married Eadburga, natural daughter of Offa king of Mercia; a woman infamous for cruelty and incontinence. Having great influence over her husband, she often persuaded him to destroy such of the nobility as were obnoxious to her; and where this expedient failed, she herself had not scrupled to become their executioner. She had mixed a cup of poison for a young nobleman, who had acquired a great share of her husband's friendship; but, unfortunately, the king drank of the fatal potion along with his favourite, and soon after expired. By this, and other crimes, Eadburga became so odious to the people, that she was forced to fly into France, whence Egbert was at the same time recalled, as above-mentioned.

Egbert ascended the throne of Wessex in the year 799. He was the sole descendant of those conquerors who first invaded Britain, and who derived their pedigree from the god Woden. But, though this circumstance might have given him great advantages in attempting to subdue the neighbouring kingdoms, Egbert for some time gave them no disturbance; but turned his arms against the Britons, who had retired into Cornwall, whom he defeated in several battles. He was recalled from his conquests in that country, by hearing that Bernulf king of Mercia had invaded his dominions. Egbert quickly led his army against the invaders, whom he totally defeated at Ellendun in Wiltshire. He then entered their kingdom on the side of Oxfordshire with an army, and at the same time sent his eldest son Ethelwolf with another into Kent. The young prince expelled Baldred the tributary king of Kent, and soon made himself master of the country. The kingdom of Essex was conquered with equal ease;

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and the East Angles, who had been reduced under subjection by the Mercians, joyfully put themselves under the protection of Egbert. Bernulf himself marched against them, but was defeated and killed; and Ludecan his successor met with the same fate two years after.

These misfortunes greatly facilitated the reduction of Mercia. Egbert soon penetrated into the very heart of the Mercian territories, and gained an easy victory over a dispirited and divided people; but in order to engage them to submit with the less reluctance, he allowed Wiglaf, their countryman, to retain the title of king, whilst he himself exercised the real power of a sovereign. Northumberland was at present in a state of anarchy; and this tempted Egbert to carry his victorious arms into that kingdom also. The inhabitants, being desirous of living under a settled form of government, readily submitted, and owned him for their sovereign. To them, however, he likewise allowed the power of electing a king; who paid him a tribute, and was dependent on him.

Egbert became sole master of England about the year 827. A favourite opportunity was now offered to the Anglo-Saxons of becoming a civilized people, as they were at peace among themselves, and seemed free from any danger of a foreign invasion. But this flattering prospect was soon overcast. Five years after Egbert had established his new monarchy, the Danes landed in the isle of Shepey, plundered it, and then made their escape with safety. Encouraged by this success, next year they landed from a fleet of 35 ships. They were encountered by Egbert at Charnmouth in Dorsetshire. The battle was obstinate and bloody. Great numbers of the Danes were killed, but the rest made good their retreat to their ships. They next entered into an alliance with the Britons of Cornwall; and landing two years after in that country, they made an irruption into Devonshire. Egbert met them at Hengelsdun, and totally defeated them; but before he had time to form any regular plan for the defence of the kingdom, he died, and left the government to his son Ethelwolf.

The new king was weak and superstitious. He began with dividing the kingdom, which had so lately been united, with his son Athelstan. To the young prince he gave the counties of Essex, Kent, and Suffex. But though this division might have been productive of bad consequences at another time, the fear of the Danes kept every thing quiet for the present. These barbarians had some how or other conceived such hopes of enriching themselves by the plunder of England, that they scarce ever failed of paying it an annual visit. The English historians tell us, that they met with many severe repulses and defeats; but on the whole it appears, that they had gained ground. For in 851 a body of them took up their winter-quarters in England. Next year they received a strong reinforcement of their countrymen in 350 vessels; and advancing from the isle of Thanet, where they had stationed themselves, they burnt the cities of London and Canterbury. Having next put to flight Brichtic the governor of Mercia, they marched into the heart of Surrey, laying waste the whole country thro' which they passed.

Ethelwolf, though naturally little fitted for military enterprises, was now obliged to take the field.

15 Y

He

England.

44
Egbert the first king of England.

45
Danish invasion.

46
Ethelwolf.

England.

England.

He marched against the Danes at the head of the West Saxons, and gained an indecisive and bloody victory over his enemies. The Danes still maintained their settlement in the isle of Thanet. They were attacked by Ealher and Huda, governors of Kent and Surrey; both of whom they defeated and killed. Afterwards they removed to the isle of Shepey, where they took up their winter-quarters, with a design to extend their ravages the next year.

The deplorable state of the kingdom did not hinder Ethelwolf from making a pilgrimage to Rome, whither he carried his fourth and favourite son Alfred, then only six years of age. He passed a twelvemonth in that city; made presents to the principal ecclesiastics there; and made a grant of 300 mancuses (a silver coin about the weight of our half-crown) annually to the see of Rome. One third of this was to support the lamps of St Peter's, another those of St Paul's, and the third was for the Pope himself. In his return to England, Ethelwolf married Judith, daughter of the emperor Charles the Bald; but when he landed, he found himself deprived of his kingdom by his son Ethelbald. That prince assumed the government of Athelstan's dominions, who was lately dead; and, with many of Ethelwolf's nobles, formed a design of excluding him from the throne altogether, on account of his weakness and superstitious. Ethelwolf, however, delivered the people from the calamities of a civil war, by dividing the kingdom with his son. He gave to Ethelbald the government of the western, and reserved to himself that of the eastern part of the kingdom. Immediately after this, he summoned the states of the whole kingdom, and conferred on the clergy a perpetual donation of tithes, for which they had long contended, and which had been the subject of their fermons for several centuries.

This concession was deemed so meritorious by the English, that they now thought themselves sure of the favour of heaven; and therefore neglected to use the natural means for their safety which they might have done. They even agreed, that, notwithstanding the desperate situation of affairs at present, the revenues of the church should be exempted from all burdens, tho' imposed for the immediate security and defence of the nation. Ethelwolf died two years after he had made the above-mentioned grant, and left the kingdom to his two eldest sons Ethelbald and Ethelbert. Both these princes died in a few years, and left the kingdom to Ethelred their brother, in the year 866.

The whole course of Ethelred's reign was disturbed by the irruptions of the Danes. The king defended himself against them with great bravery, being seconded in all his military enterprizes by his younger brother Alfred, who afterwards ascended the throne. In this reign, the Danes first landed among the East Angles. That people treacherously entered into an alliance with the common enemy; and furnished them with horses, which enabled them to make an irruption into Northumberland. There they seized upon the city of York. Osfricht and Ælla, two Northumbrian princes who attempted to rescue the city, were defeated and killed. Encouraged by this success, the Danes penetrated into the kingdom of Mercia, took up their winter-quarters at Nottingham, and thus threatened the kingdom with a final subjection. From this post, however,

they were dislodged by Ethelred and Alfred, who forced them to retire into Northumberland. Their restless and savage disposition, however, did not suffer them to continue long in one place. They broke into East Anglia; defeated and took prisoner Edmund the tributary king of that country, whom they afterwards murdered; and committed every where the most barbarous ravages. In 871, they advanced to Reading; from whence they infested the neighbouring country by their incursions. The Mercians, desirous of recovering their independency, refused to join Ethelred with their forces; so that he was obliged to march against the Danes, attended only by the West Saxons, who were his hereditary subjects. Several actions ensued, in which the Danes are said to have been unsuccessful; but being continually reinforced from their own country, they became every day more and more formidable to the English. During the confusion and distress in which the nation was now necessarily involved, king Ethelred died of a wound he had received in an action with the Danes; and left to his brother Alfred the kingdom almost totally subdued by a foreign power.

Alfred, who may properly be called the founder of the English monarchy, ascended the throne in the year 871, being then only 22 years of age. His great virtues and shining talents saved his country from ruin, which seemed almost unavoidable. His exploits against the Danes, his dangers and distresses, are related under the article ALFRED. Having settled the nation in a much better manner than could have been expected, he died in 901, leaving the kingdom to his second son Edward the Elder.

The beginning of this monarch's reign was disturbed by those intestine commotions from which the wife and politic Alfred had taken so much pains to free the nation. Ethelwald, son to king Ethelbert, Alfred's elder brother, claimed a right to the throne. Having armed his partisans, he took possession of Winburne, where he seemed determined to hold out to the last extremity. On the approach of Edward, however, with a powerful army, he first fled into Normandy, and afterwards into Northumberland. He hoped to find the Northumbrians ready to join him, as most of them were Danes, lately subdued by Alfred, and very impatient of peace. The event did not disappoint his expectations. The Northumbrians declared for him; and Ethelwald having thus connected himself with the Danish tribes, went beyond sea, whence he returned with a great body of these banditti. On his return, he was joined by the Danes of East Anglia and Mercia. Ethelwald, at the head of the rebels, made an irruption into the counties of Gloucester, Oxford, and Wilts; and having ravaged the country, retired with his booty before the king could approach him. Edward, however, took care to revenge himself, by conducting his forces into East Anglia, and ravaging it in like manner. He then gave orders to retire; but the Kentish men, greedy of more plunder, slid behind, and took up their quarters at Bury. Here they were assaulted by the Danes; but the Kentishmen made such an obstinate defence, that though their enemies gained the victory, it was bought by the loss of their bravest men, and, among the rest, of the usurper Ethelwald himself.

The king, now freed from the attempts of so dangerous

47
Ethelred.45
Alfred the Great.49
Edward the elder.

England. gerous a rival, concluded an advantageous peace with the East Angles. He next set about reducing the Northumbrians; and for this purpose equipped a fleet, hoping that thus they would be induced to remain at home to defend their own country, without attempting to invade his territories. He was disappointed in his expectations. The Northumbrians were more eager to plunder their neighbours than to secure themselves. Imagining that the whole of Edward's forces were embarked on board his fleet, they entered his territories with all the troops they could raise. The king, however, was better prepared for them than they had expected. He attacked them on their return at Tetenhall in the county of Stafford, put them to flight, recovered all the booty, and pursued them with great slaughter into their own country.

The rest of Edward's reign was a scene of continued and successful action against the Northumbrians, East Angles, the Danes of Mercia, and those which came from their native country in order to invade England. He put his kingdom in a good posture of defence, by fortifying the towns of Chester, Eddesbury, Warwic, Cherbury, Buckingham, Towcester, Maldon, Huntingdon, and Colchester. He vanquished Thurketill a Danish chieftain, and obliged him to retire with his followers into France. He subdued the East Anglians, Northumbrians, and several tribes of the Britons; and even obliged the Scots to make submissions. He died in 925, and was succeeded by Athelstan his natural son.

⁵⁰ Athelstan. This prince, notwithstanding his illegitimate birth, ascended the throne without much opposition, as the legitimate children of Edward were too young to rule a nation so much liable both to foreign invasions and domestic troubles as England at present was. One Alfred, however, a nobleman of considerable power, entered into a conspiracy against him. It is said, that this nobleman was seized upon strong suspicions, but without any certain proof. He offered to swear to his innocence before the pope; and in those ages it was supposed that none could take a false oath in presence of such a sacred person, without being visited by an immediate judgment from God. Alfred was accordingly conducted to Rome, and took the oath required of him before Pope John. The words were no sooner pronounced, than he fell into convulsions, of which he expired in three days. The king, fully convinced of his guilt, confiscated his estate, and made a present of it to the monastery of Malmesbury.

This accident proved the means of establishing the authority of Athelstan in England. But, finding the Northumbrians bore the English yoke with impatience, he gave Sithric, a Danish nobleman, the title of king of Northumberland; and in order to secure his friendship, gave him his own sister Editha in marriage. This was productive of bad consequences. Sithric died the year after his marriage with Editha; upon which Anlaf and Godfrid, Sithric's sons by a former marriage, assumed the sovereignty without waiting for Athelstan's consent. They were, however, soon obliged to yield to the superior power of that monarch. The former fled to Ireland; and the latter to Scotland, where he was protected by Constantine king of that country. The Scottish monarch was continually importuned by Athelstan to deliver up his guest,

and even threatened with an invasion in case he did not comply. Constantine, detesting this treachery, advised Godfrid to make his escape. He did so, turned pirate, and died soon after. Athelstan, however, resenting this conduct of Constantine, invaded his kingdom, and reduced him, it is said, so low, that he was obliged to make the most humble submissions. This, however, is denied by all the Scottish historians.

Constantine, after the departure of Athelstan, entered into a confederacy with Anlaf, who subsisted by his piracies, and with some of the Welsh princes who were alarmed at the increase of Athelstan's power. All these confederates made an irruption into England at once; but Athelstan meeting them at Brumbyr in Northumberland, gave them a total overthrow. Anlaf and Constantine made their escape with difficulty, leaving the greatest part of their men dead on the field of battle. After this period, Athelstan enjoyed his crown in tranquillity. He died in 941, after a reign of 16 years. He passed a remarkable law, for the encouragement of commerce; viz. that a merchant, who had made three long sea-voyages on his own account, should be admitted to the rank of a thane or gentleman.

⁵² Athelstan was succeeded by his brother Edmund. Edmund. On his accession, he found the kingdom disturbed by the restless Northumbrians, who watched for every opportunity of rising in rebellion. They were, however, soon reduced; and Edmund took care to ensure the peace of the kingdom, by removing the Danes from the towns of Mercia where they had been allowed to settle, because it was found that they took every opportunity to introduce foreign Danes into the kingdom. He also conquered Cumberland from the Britons. This county, however, he bestowed upon Malcolm king of Scotland, upon condition that he should do homage for it, and protect the north of England from all future incursions of the Danes.

⁵³ Edmund was unfortunately murdered in Gloucester, Murdered by one Leolf a notorious robber. This man had been formerly sentenced to banishment; yet had the boldness to enter the hall where the king himself dined, and to sit at table with his attendants. Edmund immediately ordered him to leave the room. The villain refused to obey; upon which the king leaped upon him, and seized him by the hair. Leolf then drew a dagger, and gave the king a wound, of which he instantly died, A. D. 946, being the sixth year of his reign.

⁵⁴ As the children of Edmund were too young at the time of his decease, his brother Edred succeeded to the throne. The beginning of his reign, as well as those of his predecessors, was disturbed by the rebellions and incursions of the Northumbrian Danes, who looked upon the succession of every new king to be a favourable opportunity for shaking off the English yoke. On the appearance of Edred with an army, however, they immediately submitted; but before the king withdrew his forces, he laid waste their territories as a punishment for their offence. He was no sooner gone, than they rose in rebellion a second time. They were again subdued; and the king took effectual precautions against their future revolts, by placing English garrisons in all their towns, and appointing an English governor to watch their motions, and suppress their in-

England.

56
Celibacy of
the clergy
introduced

successions on the first appearance.—In the reign of Edred, celibacy of the clergy began to be preached up under the patronage of St Dunstan. This man had obtained such an ascendancy over Edred, who was naturally superstitious, that he not only directed him in affairs of conscience, but in the most important matters of state. He was placed at the head of the treasury; and being thus possessed of great power at court, he was enabled to accomplish the most arduous undertakings. He professed himself a partisan of the rigid monastic rules; and having introduced celibacy among the monks of Glaffenbury and Abingdon, he endeavoured to render it universal among the clergy throughout the kingdom. The monks in a short time generally embraced the pretended reformation; after which they inveighed bitterly against the vices and luxury of the age. When other topics of defamation were wanting, the marriages of clergymen became a sure object of invective. Their wives received the appellation of *concubines*, or some other more opprobrious name. The secular clergy, on the other hand, who were numerous and rich, defended themselves with vigour, and endeavoured to retaliate upon their adversaries. The people were thrown into the most violent ferments; but the monks, being patronised by king Edred, gained ground greatly upon their opponents. Their progress, however, was somewhat retarded by the king's death, which happened in 955, after a reign of nine years. He left children; but as they were infants, his nephew Edwy, son to Edmund, was placed on the throne.

57
Edwy.

The new king was not above 16 or 17 years of age at the time of his accession. His reign is only remarkable for the tragical story of his queen Elgiva. She was a princess of the royal blood, with whom Edwy was deeply enamoured. She was his second or third cousin, and therefore within the degrees of affinity prohibited by the canon law. Edwy, however, hearkening only to the dictates of his passion, married her, contrary to the advice of the more dignified ecclesiastics. The monks on this occasion were particularly violent; and therefore Edwy determined not to second their ambitious projects. He soon found reason to repent his having provoked such dangerous enemies. On his coronation day, while his nobility were indulging themselves in riotous mirth in a great hall where they had assembled, Edwy withdrew to another apartment to enjoy the company of his beloved queen and her mother. Dunstan guessed the reason of his absence. With unparalleled impudence, he burst into the queen's apartment; and upbraiding Edwy with his lasciviousness, as he termed it, pushed him back to the hall where the nobles were assembled. The king determined to resent such a daring insult. He required from Dunstan an account of his administration of the treasury during the late reign. The monk, probably unable to give a just account, refused to give any; upon which Edwy accused him of malversation in his office, and banished him the kingdom.

This proved the worst step that could possibly have been taken. Dunstan was no sooner gone, than the whole nation was in an uproar about his sanctity and the king's impiety. These clamours, as they had been begun by the clergy, so they were kept up and increased by them, till at last they proceeded to the most

outrageous violence. Archbishop Odo sent a party of soldiers to the palace. They seized the queen, and burned her face with a red-hot iron, in order to destroy her beauty by which she had enticed her husband; after which they carried her by force into Ireland, there to remain in perpetual exile. The king, finding it in vain to resist, was obliged to consent to a divorce from her, which was pronounced by Archbishop Odo. A catastrophe still more dismal awaited Elgiva. She had been cured of her wounds, and had even found means to efface the scars with which her persecutors had hoped to destroy her beauty. She then came to England, with a design to return to the king, whom she still considered as her husband. Unfortunately, however, she was intercepted by a party of soldiers sent for that purpose by the primate. Nothing but her most cruel death could now satisfy that wretch and his accomplices. She was hamstringed at Gloucester, and expired in a few days.

The minds of the English were at this time so much sunk in superstition, that the monstrous inhumanity above-mentioned was called a judgment from God upon Edwy and his spouse for their dissolute life, *i. e.* their love to each other. They even proceeded to rebellion against their sovereign; and having raised to the throne Edgar, the younger brother of Edwy, at that time only 13 years of age, they soon put him in possession of Mercia, Northumberland, and East Anglia. Edwy being thus confined to the southern counties, Dunstan returned, and took upon him the government of Edgar and his party; but the death of Edwy soon removed all difficulties, and gave Edgar peaceable possession of the government.

The reign of Edgar proved one of the most fortunate mentioned in the ancient English history. He took the most effectual methods both for preventing tumults at home, and invasions from abroad. He quartered a body of disciplined troops in the north, in order to repel the incursions of the Scots, and to keep the Northumbrians in awe. He built a powerful navy; and that he might keep the seamen in the practice of their duty, as well as present a formidable armament to his enemies, he commanded the fleet, from time to time, to make the circuit of his dominions.

The greatness of king Edgar, which is very much celebrated by the English historians, was owing to the harmony which reigned between him and his subjects; and the reason of this good agreement was, that the king sided with Dunstan and the monks, who had acquired a great ascendancy over the people. He enabled them to accomplish their favourite scheme of dispossessing the secular canons of all the monasteries; and he consulted them not only in ecclesiastical, but also in civil, affairs.—On these accounts, he is celebrated by the monkish writers with the highest praises; though it is plain, from some of his actions, that he was a man who could be bound neither by the ties of religion nor humanity. He broke into a convent, and carried off by force, and ravished, a nun called *Editha*. His spiritual instructor, Dunstan, for this offence, obliged the king, not to separate from his mistress, but to abstain from wearing his crown for seven years!

Edgar, however, was not to be satisfied with one mistress. He happened once to lodge at the house of a nobleman who had a very beautiful daughter. Ed-

England.

58
Tragical
death of the
queen.59
Edgar.60
His licentious
amour.

Edgar.

England

gar, enflamed with desire at the sight of the young lady, without ceremony asked her mother to allow her to pass a night with him. She promised compliance; but secretly ordered a waiting-maid, named *Elfrida*, to steal into the king's bed when the company were gone, and to retire before day-break. Edgar, however, detained her by force, till day-light discovered the deceit. His love was now transferred to the waiting-maid; who became his favourite mistress, and maintained a great ascendant over him till his marriage with *Elfrida*.

61
His marriage with *Elfrida*.

The circumstances of this marriage were still more singular and criminal than those abovementioned. *Elfrida* was daughter and heiress to *Olgar* earl of Devonshire. She was a person of such exquisite beauty, that her fame was spread all over England, though she had never been at court. Edgar's curiosity was excited by the accounts he had heard of her, and therefore formed a design of marrying her. He communicated his intention to earl *Athelwold* his favourite; and ordered him, on some pretence or other, to visit the earl of Devonshire, and bring him a certain account concerning *Elfrida*. *Athelwold* went as he was desired; but fell so deeply in love with the lady himself, that he resolved to sacrifice his fidelity to his passion. He returned to Edgar, and told him, that *Elfrida*'s charms were by no means extraordinary, and would have been totally overlooked in a woman of inferior station. After some time, however, turning the conversation again upon *Elfrida*, he told the king that he thought her parentage and fortune made her a very advantageous match; and therefore, if the king gave his consent, he would make proposals to the earl of Devonshire on his own behalf. Edgar consented, and *Athelwold* was married to *Elfrida*.—After his marriage, he used his utmost endeavours to keep his wife from court, that Edgar might have no opportunity of observing her beauty. The king, however, was soon informed of the truth; and told *Athelwold* that he intended to pay him a visit in his castle, and be made acquainted with his new-married wife. The earl could make no objections; only he desired a few hours to prepare for the visit. He then confessed the whole to *Elfrida*, and begged of her to appear before the king as much to the disadvantage as possible. Instead of this, she dressed herself to the greatest advantage. Edgar immediately conceived a violent passion for her; and, in order to gratify it, seduced *Athelwold* into a wood under pretence of hunting, where he stabbed him with his own hand, and afterwards married his widow.

The reign of Edgar is remarkable among historians for the encouragement he gave to foreigners to reside at his court and throughout the kingdom. These foreigners, it is said, corrupted the former simple manners of the nation. Of this simplicity, however, there seems to be no great reason to boast; seeing it could not preserve them from treachery and cruelty, the greatest of all vices: so that their acquaintance with foreigners was certainly an advantage to the people, as it tended to enlarge their views, and cure them of those illiberal prejudices and rustic manners to which islanders are often subject.—Another remarkable incident, is the extirpation of wolves from England. The king took great pleasure in hunting and destroying these animals himself. At last he found that they had

62
Wolves extirpated from England.

England

all taken shelter in the mountains and forests of Wales. Upon this he changed the tribute imposed upon the Welsh princes by *Athelstan*, into an annual tribute of 300 wolves heads; and this produced such diligence in hunting them, that the animal has never since appeared in England.

Edgar died in 957, after a reign of 16 years. He left a son named *Edward*, whom he had by his first wife the daughter of earl *Ordmer*; and another, named *Ethelred*, by *Elfrida*. The mental qualifications of this lady were by no means answerable to the beauty of her person. She was ambitious, haughty, treacherous, and cruel. The principal nobility, therefore, were greatly averse from the succession of her son *Ethelred*, which would unavoidably throw too much power into the hands of his mother, as he himself was only seven years of age. *Edward*, afterwards surnamed the *Martyr*, was therefore pitched upon; and was certainly the most proper person, as he was 15 years of age, and might soon be able to take the government into his own hands. *Elfrida* opposed his advancement with all her might: but *Dunstan* overcame every obstacle, by anointing and crowning the young prince at *Kingston*; upon which the whole kingdom submitted without farther opposition.

The only remarkable occurrence in this reign was the complete victory gained by the monks over the secular clergy, who were now totally expelled from the convents. Tho' this had been pretty nearly accomplished by Edgar, the secular clergy still had partisans in England who made considerable opposition; but these were all silenced by the following miracles. In one synod, *Dunstan*, finding the majority of votes against him, rose up, and declared that he had that instant received from heaven a revelation in favour of the monks. The whole assembly was so much overawed by this intelligence, that they proceeded no farther in their deliberations. In another synod, a voice issued from the crucifix, acquainting the members, that the establishment of the monks was founded on the will of heaven, and could not be opposed without impiety. But the third miracle was still more alarming. In another synod the floor of the hall sunk, and great numbers of the members were killed or bruised by their fall. It was remarked that *Dunstan* had that day prevented the king from attending the synod, and that the beam on which his own chair stood was the only one which did not sink. These circumstances, instead of making him suspected as the author of the miracle, were regarded as proofs of the interposition of Providence in his favour.

63
Miracles of St *Dunstan*.

Edward lived four years after he was raised to the throne, in perfect innocence and simplicity. Being incapable of any treacherous intention himself, he suspected none in others. Though his stepmother had opposed his succession, he had always behaved towards her with the greatest respect; and expressed on all occasions the most tender affection for his brother *Ethelred*. Being one day hunting in the neighbourhood of the castle where *Elfrida* resided, he paid her a visit unattended by any of his retinue. After mounting his horse with a design to return, he desired some liquor to be brought him. But while he was holding the cup to his head, a servant of *Elfrida* stabbed him behind. The king, finding himself wounded, clapped spurs to his

64
The king murdered.

England.

England.

his horse; but soon becoming faint by the loss of blood, he fell from the saddle, and his foot being entangled in the stirrup, he was dragged along till he expired. His body was found and privately interred at Werekham by his servants. The English had such compassion for this amiable prince, that they bestowed on him the appellation of *Martyr*, and even fancied that miracles were wrought at his tomb. Elfrieda built monasteries, and submitted to many penances, in order to atone for her guilt; but, even in that barbarous age, she could never regain the good opinion of the public.

66
Ethelred.

After the murder of Edward, his brother Ethelred succeeded to the throne without opposition. As he was a minor when he was raised to the throne, and, even when he came to man's estate, never discovered any vigour or capacity of defending the kingdom against invaders, the Danes began to renew their incursions. Before they durst attempt any thing of importance, however, they first made a small incursion by way of trial. In the year 981, they landed in Southampton from seven vessels; and having ravaged the country, they retired with impunity, carrying a great booty along with them. In 987, they made a similar attempt on the west coast, and were attended with the like success. Finding that matters were now in a favourable situation for their enterprises, they landed in Essex under the command of two chieftains; and, having defeated and killed Brithnot duke of that county, laid waste all the neighbouring provinces. In this extremity, Ethelred, furnished, on account of his preposterous conduct, the *Unready*, bribed the enemy with £10,000 to depart the kingdom. This advice was given by Siricius archbishop of Canterbury, and some of the degenerate nobility; and was attended with the success that might have been expected. The Danes appeared next year off the eastern coast. But, in the mean time, the English had determined to assemble at London a fleet capable of repulsing the enemy. This failed of success through the treachery of Alfric duke of Mercia. Having been formerly banished the kingdom, and found great difficulty in getting himself restored to his former dignity, he trusted thenceforth, not to his services or the affections of his countrymen, but to the influence he had over his vassals, and to the public calamities. These last he determined always to promote as far as he could; because in every revolution his assistance would be necessary, and consequently he must receive a continual accession of power. The English had formed a plan for surrounding and destroying the Danish fleet in the harbour; but Alfric not only gave the enemy notice of this design, but also deserted with his squadron the night before the engagement. The English by this means proved unsuccessful, and Ethelred in revenge, took Alfric's son, and ordered his eyes to be put out. This piece of cruelty could be productive of no good effect. Alfric had become so powerful, that, notwithstanding his treachery, it was found impossible to deprive him of the government of Mercia.

In 993, the Danes under the command of Sweyn their king, and the Norwegians conducted by Olave king of that country, failed up the Humber, and destroyed all around them. A powerful army was assembled to oppose these invaders; but thro' the treachery of the three leaders, all men of Danish extraction,

the English were totally defeated. Encouraged by this success, the Danes entered the Thames in 94 vessels, and laid siege to London. The inhabitants, however, made such a brave defence, that the besiegers were finally obliged to give over the attempt. Out of revenge for this disappointment, they laid waste Essex, Suffex, and Hampshire. In these counties they procured horses; by which means they were enabled to penetrate into the more inland parts, and threatened the kingdom with total subjection. Ethelred and his nobles had now recourse to their former expedient. They sent ambassadors to the two northern kings, to whom they promised subsistence and tribute, provided they would, for the present, put an end to their ravages, and soon after depart the kingdom. They agreed to the terms, and peaceably took up their quarters at Southampton. Olave even paid a visit to Ethelred, and received the rite of confirmation from the English bishops. The king also made him many valuable presents; and Olave promised never more to infect the English territories, which promise it is said he afterwards religiously observed.

After the departure of Olave with his Norwegians, Sweyn, though less scrupulous than the king of Norway, was obliged to leave the kingdom also. But this shameful composition procured only a short relief to the nation. The Danes soon after appeared in the Severn; and having ravaged Wales as well as Cornwall and Devon, they sailed round, and, entering the mouth of the Tamar, completed the ruin of these two counties. Then, returning to the Bristol channel, and penetrating into the country by the Avon, they over-ran all that country, and carried fire and sword even into Dorsetshire. In 998, they changed the seat of war; and, after ravaging the isle of Wight, they entered the Thames and Medway, where they laid siege to Rochester, and defeated the Kentish men in a great battle. After this victory, the whole province of Kent was made a scene of laughter and devastation. The extremity of these miseries forced the English into counsels for common defence both by sea and land: but the weakness of the king, the divisions among the nobility, the treachery of some, the cowardice of others, the want of concert in all, frustrated every endeavour; and their fleets and armies either came too late to attack the enemy, or were repulsed with dishonour. The English, therefore, devoid both of prudence and unanimity in council, had recourse to the expedient which by experience they had found to be ineffectual. They offered the Danes a large sum if they would conclude a peace and depart the kingdom. These ravagers continually rose in their demands; and now required the payment of £24,000, which the English submitted to give. The departure of the Danes procured them a temporary relief; which they enjoyed as if it was to be perpetual, without making any effectual preparations for giving them a more vigorous reception upon their next return.

Besides the receiving this sum, the Danes were at present engaged by another motive to depart from England. They were invited over by their countrymen in Normandy, who at this time were hard pressed by Robert king of France, and who found it difficult to defend their settlements against him. It is probable also, that Ethelred, observing the close connection of

all

67
England
invaded and
ruined by
the Danes.

England.

68

Marriage of
the king
with the
princes of
Normandy.

all the Danes with one another, however they might be divided in government or situation, was delicious of procuring an alliance with that formidable people. For this purpose, being at present a widower, he made his addressee to Emma, sister to Richard II. duke of Normandy. He soon succeeded in his negotiations; the princess came over to England, and was married to the king in the year 1001.

Though the Danes had been for a long time established in England, and though the similarity of their language with the Saxon had invited them to an early coalition with the natives; they had as yet found so little example of civilized manners among the English, that they retained all their ancient ferocity, and valued themselves only on their national character of military bravery. The English princes had been so well acquainted with their superiority in this respect, that Athelstan and Edgar had been accustomed to keep in pay large bodies of Danish troops, who were quartered about the country, and committed many violences upon the inhabitants. These mercenaries had attained to such an height in luxury, according to the old English writers, that they combed their hair once a-day, bathed themselves once a-week, changed their clothes frequently; and by all these arts of effeminacy, as well as by their military character, had rendered themselves so agreeable to the fair sex, that they debauched the wives and daughters of the English, and had dishonoured many families. But what most provoked the inhabitants was, that, instead of defending them against invaders, they were always ready to betray them to the foreign Danes, and to associate themselves with every flagrant party which came from that nation.

69

Danes mas-
sacred.

The animosities between the native English and the Danes who inhabited among them, had from these causes risen to a great height; when Ethelred, from a policy commonly adopted by weak princes, took the cruel resolution of massacring the Danes throughout the kingdom. On the 13th of November 1002, secret orders were dispatched to commence the execution every where on the same day; and the festival of St Brice, which fell on a Sunday, the day on which the Danes usually bathed themselves, was chosen for this purpose. These cruel orders were executed with the utmost exactness. No distinction was made betwixt the innocent and the guilty; neither sex nor age was spared; nor were the cruel executioners satisfied without the tortures, as well as death, of the unhappy victims. Even Gunilda, sister to the king of Denmark, who had married earl Palsy, and had embraced Christianity, was, by the advice of Edric earl of Wilts, seized and condemned to death by Ethelred, after seeing her husband and children butchered before her face. This unhappy princess foretold, in the agonies of despair, that her murder would soon be avenged by the total ruin of the English nation (A).

The prophecy of Gunilda was exactly fulfilled. In 1003, Sweyn and his Danes, who wanted only a pretence to renew their invasions, appeared off the western coast, and threatened revenge for the slaughter of their countrymen. The English took measures for repulsing the enemy: but these were defeated through the treachery first of Alfric; and then of Edric, a still greater traitor, who had married the king's daughter, and succeeded Alfric in the command of the British armies. The Danes therefore ravaged the whole country. Agriculture was neglected, a famine ensued, and the kingdom was reduced to the utmost degree of misery. At last the infamous expedient of buying a peace was resorted to; and the departure of the Danes was purchased, in 1007, at the expense of £ 30,000.

The English endeavoured to employ this interval in making preparations against the return of the Danes, which they had reason soon to expect. A law was made, ordering the proprietors of eight hides of land to provide themselves of a horseman and a complete suit of armour; and those of 310 hides to equip a ship for the defence of the kingdom. By this means a formidable armament was raised. There were 243,600 hides in England; consequently the ships equipped must be 785. The cavalry was 30,450 men. All hopes of success from this equipment, however, were disappointed by the factions, animosities, and dissensions of the nobility. Edric had caused his brother Brightric to advance an accusation of treason against Wolfnoth governor of Sussex, the father of the famous earl Godwin; and that nobleman, knowing the power and malice of his enemy, consulted his own safety by deserting with 20 ships to the Danes. Brightric pursued him with a fleet of 80 sail; but his ships being shattered in a tempest, and stranded on the coast, he was suddenly attacked by Wolfnoth, and all his vessels were burnt or otherwise destroyed. The treachery of Edric frustrated every plan of future defence; and the whole navy was at last scattered into the several harbours.

By these fatal miscarriages, the enemy had leisure to over-run the whole kingdom. They had now got such a footing, indeed, that they could hardly have been expelled though the nation had been ever so unanimous. But so far did mutual diffidence and dissension prevail, that the governors of one province refused to march to the assistance of another; and were at last terrified from assembling their forces for the defence of their own. At last the usual expedient was tried. A peace was bought with £ 48,000; but this did not procure even the usual temporary relief. The Danes, knowing that they were now masters of the kingdom, took the money, and continued their devastations. They levied a new contribution of £ 8000 on the county of Kent alone; murdered the archbishop of Canterbury, who had refused to countenance this exaction; and the English nobility submitted every where to the Danish

England.

70

New inva-
sion by
Sweyn.

(A) On the subject of this massacre, Mr Hume has the following observations: "Almost all the ancient historians speak of this massacre of the Danes as if it had been universal, and as if every individual of that nation throughout England had been put to death. But the Danes were almost the sole inhabitants in the kingdoms of Northumberland and East Anglia, and were very numerous in Mercia. This representation of the matter was absolutely impossible. Great resistance must have been made, and violent wars ensued; which was not the case. This account given by Wallingford, though he stands single, must be admitted as the only true one. We are told that the name of *Iurdane*, *lord Dane*, for an idle lazy fellow who lives at other peoples expense, came from the conduct of the Danes who were put to death. But the English princes had been entirely masters for several generations; and only supported a military corps of that nation. It seems probable, therefore, that these Danes only were put to death."

England.

71
Ethelred
flies to Nor-
mandy.

Danish monarch, swearing allegiance to him, and giving hostages for their good behaviour. At last, Ethelred himself, dreading equally the violence of the enemy and the treachery of his own subjects, fled into Normandy, whither he had already sent queen Emma and her two sons Alfred and Edward. The duke received his unhappy guests, with a generosity which does honour to his memory.

72
Returns,
but behaves
as ill as e-
ver.

The flight of king Ethelred happened in the end of the year 1013. He had not been above six weeks in Normandy, when he heard of the death of Sweyn, which happened at Gainborough before he had time to establish himself in his new dominions. At the same time he received an invitation from the prelates and nobility to resume the kingdom; expressing also their hopes, that, being now better taught by experience, he would avoid those errors which had been so fatal to himself and his people. But the misconduct of Ethelred was incurable; and, on his refusing the government, he behaved in the very same manner that he had done before. His son-in-law Eadric, notwithstanding his repeated treasons, retained such influence at court, that he instilled into the king jealousies of Sigefert and Morcar, two of the chief nobles of Mercia. Eadric enticed them into his house, where he murdered them; while Ethelred partook of the infamy of this action, by confiscating their estates, and confining the widow of Sigefert in a convent. She was a woman of singular beauty and merit; and in a visit which was paid her, during her confinement, by prince Edmund the king's eldest son, she inspired him with so violent an affection, that he released her from the convent, and soon after married her without his father's consent.

In the mean time, Canute, the son and successor of Sweyn, proved an enemy no less terrible to the English than his father had been. He ravaged the eastern coast with merciless fury; and put ashore all the English hostages at Sandwich, after having cut off their hands and noses. He was at last obliged, by the necessity of his affairs, to return to Denmark. In a short time, however, he returned, and continued his depredations along the southern coast. He then broke into the counties of Dorset, Wilts, and Somerset; where an army was assembled against him under the command of prince Edmund and duke Eadric. The latter still continued his perfidious machinations; and after endeavouring in vain to get the prince into his power, found means to dissipate the army, and then deserted to Canute with 40 vessels.

Edmund was not disheartened by this treachery. He again assembled his forces, and was in a condition to give the enemy battle. Ethelred, however, had now such frequent experience of the treachery of his subjects, that he had lost all confidence in them. He remained in London, pretending sickness, but in reality from an apprehension than they intended to buy their peace by delivering him into the hands of his enemies. The army called aloud for their sovereign to march at their head against the Danes; and on his refusal to take the field, they were so discouraged, that all the preparations which had been made became ineffectual for the defence of the kingdom. Edmund, deprived of all regular resources for the maintenance of the soldiers, was obliged to commit similar ravages to those

practised by the Danes; and after making some fruitless expeditions into the north, which had submitted entirely to Canute's power, he returned to London, where he found every thing in confusion by the death of the king.

Ethelred died in 1016, after an unhappy reign of 35 years; and was succeeded by his eldest son Edmund, surnamed *Ironside* on account of his great strength and valour. He possessed abilities sufficient to have saved his country from ruin, had he come sooner to the throne; but it was now too late. He bravely opposed the Danes, however, notwithstanding every disadvantage; till at last the nobility of both nations obliged their kings to come to a compromise, and divide the kingdom between them by treaty. Canute reserved to himself Mercia, East Anglia, and Northumberland, which he had entirely subdued. The southern parts were left to Edmund. This prince survived the treaty only about a month; being murdered at Oxford by two of his chamberlains, accomplices of Eadric.

After the death of Edmund, nothing was left for the English but submission to Canute. The least scrupulous of mankind, however, dare not at all times openly commit injustice. Canute, therefore, before he seized the dominions of Edwin and Edward, the two sons of Edmund, suborned some of the nobility to depose, that, in the last treaty with Edmund, it had been verbally agreed, that, in case of Edmund's death, Canute should either be successor to his dominions, or tutor to his children; for historians differ with regard to this particular. This evidence, supported by the great power of Canute, was sufficient to get him elected king of England. Immediately after his accession to the throne, he sent the two sons of Edmund to the court of Sweden, on pretence of being there educated; but charged the king to put them to death as soon as they arrived. The Swedish monarch did not comply with this request; but sent them to Solomon king of Hungary, to be educated in his court. The elder, Edwin, was afterwards married to Solomon's sister; but, he dying without issue, that prince gave his sister-in-law, Agatha, daughter of the emperor Henry II. in marriage to Edward, the younger brother; and she bore him Edgar Atheling; Margaret, afterwards queen of Scotland; and Christina, who retired into a convent.

Canute was obliged at first to make great concessions to the nobility: but he afterwards put to death many of those in whom he could not put confidence; and, among the rest, the traitor Eadric himself, who was publicly executed, and his body thrown into the Thames. In order to prevent any danger from the Normans, who had threatened him with an invasion, he married Emma the widow of Ethelred, and who now came over from Normandy; promising that he would leave the children he should have by that marriage, heirs to the crown after his decease. The English were at first displeased with Emma for marrying the mortal enemy of her former husband; but at the same time were glad to find at court a sovereign to whom they were accustomed, and who had already formed connections with them: and thus Canute, besides securing by his marriage the alliance with Normandy, gradually acquired by the same means the confidence of his own people.

England.

73
Ironside di-
vides the
kingdom
with the
Danes.

74
Canute.

75
Marries
Ethelred's
widow.

England.

The most remarkable transaction in this prince's reign, besides those mentioned under the article *CANUTE*, is his expedition to Scotland against Malcolm king of that country, whom he forced to do homage for the county of Cumberland, which the Scots at that time possessed. After this enterprise, Canute passed four years in peace, and died at Shaftsbury; leaving three sons, Sweyn, Harold, and Hardicanute. Sweyn, whom he had by his first marriage with Alfwen, daughter of the earl of Hampshire, was crowned in Norway; Hardicanute, whom Emma had born, was in possession of Denmark; and Harold, who was of the same marriage with Sweyn, was at that time in England.

76
Harold.

Harold succeeded to the crown of England; though it had been stipulated that Emma's son, Hardicanute, should be heir to that kingdom. This advantage Harold obtained by being on the spot, and getting possession of his father's treasures, while Hardicanute was at a distance. As Hardicanute, however, was supported by earl Godwin, a civil war was likely to ensue, when a compromise was made; by which it was agreed, that Harold should enjoy London, and all the provinces north of the Thames, while the possession of the south should remain to Hardicanute: and till that prince should appear and take possession of his dominions, Emma fixed her residence at Winchester, and ruled her son's part. Harold reigned four years; during which time, the only memorable action he performed was a most infamous piece of treachery.—Alfred and Edward, the two sons of Emma by Ethelred, paid a visit to their mother in England. But, in the mean time, earl Godwin being gained over by Harold, a plan was laid for the destruction of the two princes. Alfred was accordingly invited to London by Harold, with many professions of friendship; but when he had reached Guildford, he was set upon by Godwin's vassals: about 600 of his train were murdered in the most cruel manner; he himself was taken prisoner, his eyes were put out, and he was conducted to the monastery of Ely, where he died soon after. Edward and Emma, apprised of the fate which awaited them, fled beyond sea, the former into Normandy, the latter into Flanders; while Harold took possession of all his brother's dominions without opposition.—He died in April 1039.

Hardicanute succeeded his brother Harold without opposition. His government was extremely violent and tyrannical. However, it was but of short duration. He died, in 1041, of a debauch at the marriage of a Danish lord. After his death, a favourable opportunity was offered to the English for shaking off the Danish yoke. Sweyn, king of Norway, the eldest son of Canute, was absent; and as the two last kings had died without issue, there appeared none of that race whom the Danes could support as successor to the throne. For this reason, the eyes of the nation were naturally drawn towards prince Edward, who happened to be at court when the king died. There were some reasons, however, to fear, that Edward's succession would be opposed by earl Godwin, who was by far the most powerful nobleman in the kingdom. A declared animosity subsisted between Edward and Godwin, on account of the hand which the latter had in the murder of his brother Alfred; and this was thought to be an offence of so grievous a nature, that Edward

England.

could never forgive it. But here their common friends interposed; and representing the necessity of their good correspondence, obliged them to lay aside their animosities, and to concur in restoring liberty to their native country. Godwin only stipulated that Edward, as a pledge of his sincere reconciliation, should promise to marry his daughter Editha. This proposal was agreed to; Edward was crowned king of England, and married Editha as he had promised. The marriage, however, proved rather a source of discord than otherwise between the king and Godwin. Editha, though a very amiable woman, could never obtain the confidence and affection of her husband. It is even said, that, during the whole course of her life, he abstained from all matrimonial converse with her; and this ridiculous behaviour was highly celebrated by the monkish writers of the age, and contributed to the king's acquiring the title of Saint and Confessor.

78
Edward the
Confessor.

Though the neglect of his daughter could not fail to awaken Godwin's former enmity against king Edward, it was necessary to choose a more popular ground before he could vent his complaints against the king in a public manner. He therefore chose for his theme the influence which the Normans had on the affairs of government; and a declared opposition took place between him and these favourites. In a short time, this animosity openly broke out with great violence. Eustace count of Bologne having paid a visit to the king, passed by Dover on his return. One of his train being refused access to a lodging which had been appointed for him, attempted to make his way by force, and wounded the master of the house in the contest. The townsmen revenged this insult by the death of the stranger; the count and his train took arms, and murdered the townsman in his own house. A tumult ensued; near 20 persons were killed on each side; and Eustace, being overpowered with numbers, was at last obliged to fly. He complained to the king; who gave orders to earl Godwin, in whose government Dover lay, to punish the inhabitants. But this nobleman refused to obey the command, and endeavoured to throw the whole blame on count Eustace and his followers. The king was displeased; and threatened to make him feel the utmost effects of his resentment, in case he finally refused to comply. Upon this, Godwin assembled a powerful army, on pretence of repressing some disorders on the frontiers of Wales; but, instead of this, marched directly to Gloucester, where the king at that time was without any military force, as suspecting no danger.

79
Variance of
the king
and earl
Godwin.

Edward perceiving his danger, applied to Siward duke of Northumberland, and Leofric duke of Mercia, two very powerful noblemen. They hastened to him with such followers as they could assemble, issuing orders at the same time for all the forces under their respective governments to march without delay to the defence of the king. Godwin, in the mean time, suffered himself to be deceived by negotiations, till the king's army became so powerful, that he was not able to cope with it. He was therefore obliged to fly with his family to Flanders. Here he was protected by Baldwin earl of that country, together with his three sons Gurth, Sweyn, and Tosti; the last of whom had married Baldwin's daughter. Harold and Leofwin, two other sons of Godwin, took shelter in Ireland.

80
Godwin
flies to Flanders.77
His treachery
and cruelty.

England. After the flight of earl Godwin, he was proceeded

England.

against as a traitor by king Edward. His estates, and those of his sons, were confiscated; his governments given to others; queen Editha was confined in a monastery; and the great power of this family, which had become formidable to the crown itself, seemed to be totally overthrown. Godwin, however, soon found means to retrieve his affairs. Having hired some ships, and manned them with his followers, he attempted to make a descent at Sandwich. The king, informed of his preparations, equipped a fleet which Godwin could not resist, and he therefore retreated into the Flemish harbours. On his departure, the English dismissed their armament. This Godwin had expected, and therefore kept himself in readiness for the favourable opportunity. He immediately put to sea, and failed to the Isle of Wight, where he was joined by Harold with a squadron which he had collected in Ireland. Being thus master of the sea, Godwin entered the harbours on the southern coast; seized all the ships; and being joined by great numbers of his former vassals, he sailed up the Thames, and appeared before London.

The approach of such a formidable enemy threw every thing into confusion. The king alone seemed resolute to defend himself to the last extremity; but the interposition of many of the nobility, together with the submissions of Godwin himself, at last produced an accommodation. It was stipulated, that Godwin should give hostages for his good behaviour, and that all the foreigners should be banished the kingdom; after which, Edward, sensible that he had not power sufficient to detain the earl's hostages in England, sent them over to his kinsman the young duke of Normandy.

Soon after this reconciliation, Godwin died as he was sitting at table with the king. He was succeeded in the government of Wessex, Sussex, Kent, and Essex, and in the office of steward of the household, a place of great power, by his son Harold. The son was no less ambitious than the father had been; and as he was a man of much greater abilities, he became a more dangerous enemy to Edward than even Godwin had been. Edward knew no better expedient to prevent the increase of Harold's power, than by giving him a rival. This was Algar son of Leofric duke of Mercia, whom he invested with the government of East Anglia, which had formerly belonged to Harold. The latter, however, after some broils, finally got the better of his rival, and banished him the kingdom: Algar returned soon after with an army of Norwegians, with whom he invaded East Anglia; but his death in a short time freed Harold from all further apprehensions from that quarter. His power was still further increased in a short time after by the accession of his brother Tostig to the government of Northumberland; and Edward now declining in years, and apprehensive that Harold would attempt to usurp the crown after his death, resolved to appoint a successor. He therefore sent a deputation into Hungary, to invite over his nephew, Edward, son to his elder brother, who was the only remaining heir of the Saxon line. That prince accordingly came over with his children, Edgar Atheling, Margaret, and Christina; but died a few days after his arrival. His death threw the king into greater per-

plexity than ever. Being resolved to exclude Harold if possible, he secretly cast his eye on his kinsman William duke of Normandy; a person of whole power, character, and capacity, he had justly a very high opinion. This advice had formerly been given him by Robert archbishop of Canterbury, who was himself a Norman, and had been banished along with the rest upon the return of earl Godwin. But Edward finding that the English would more easily acquiesce in the restoration of the Saxon line, had in the mean time invited his brother's descendants from Hungary as already mentioned. The death of his nephew, and the inexperience and unpromising qualities of young Edgar, made him resume his former intentions in favour of the duke of Normandy, though his aversion to hazardous enterprises engaged him to postpone the execution, and even to keep his purpose concealed from all his ministers.

Harold in the mean time increased his popularity by all possible means, in order to prepare his way for being advanced to the throne after the death of Edward, which now seemed to be fast approaching. He had no suspicion of the duke of Normandy as a rival; but as he knew that a son and grandson of the earl Godwin were in the hands of that prince as hostages, he feared that they might be made use of as checks upon his ambition, in case he attempted afterwards to ascend the throne. He therefore prevailed upon Edward to release these hostages unconditionally; and having obtained his consent, he set out for Normandy himself, attended by a numerous retinue. He was driven by a tempest on the territory of Guy count of Ponthieu, who detained him prisoner, and demanded an exorbitant sum for his ransom. Harold found means to acquaint William with his situation. The duke of Normandy, desirous of gaining Harold over to his party, commanded Guy to restore his prisoner to his liberty. Upon this Harold was immediately put into the hands of the Norman ambassador, who conducted him to Rouen. William received him with great demonstrations of respect and friendship; but soon took an opportunity of acquainting him with his pretensions to the crown of England, and asked his assistance in the execution of his scheme. Harold was surprised with this declaration of the duke; but, being entirely in his power, he feigned a compliance with his desires, and promised to second to the utmost of his ability the will of king Edward. William, to secure him as much as possible to his interest, promised him his daughter in marriage, and required him to take an oath that he would fulfil his promises. Harold readily complied; but to make the oath more binding, William privately conveyed under the altar where the oath was taken, reliques of some of the most revered martyrs; and when Harold had taken the oath, he shewed him the relics, and admonished him to observe religiously such a solemn engagement.

Harold was no sooner at liberty, than he found himself master of casuistry sufficient to excuse the breaking of his oath which had been extorted from him, and which, if kept, might be attended with the subjection of his country to a foreign power. He continued to practise every art to increase his popularity; and about this time, two accidents enabled him to add much to that character which he had

81
Returns,
and is re-
conciled
with the
king.

82
His son Ha-
rold aspires
to the
crown.

England.

England.

had already so well established. The Welsh had for some time made incursions into the English territories, and had lately become so troublesome, that Harold thought he could not do a more acceptable piece of service to the public, than undertake an expedition against these invaders. Having therefore prepared some light-armed foot to pursue the natives into their fortresses, some cavalry to secure the open country, and a squadron of ships to attack the sea-coasts, he employed all these forces against the enemy at once; and thus reduced them to such distress, that they were obliged to purchase peace by sending their prince's head to Harold, and submitting to the government of two Welsh noblemen appointed by Edward.

The other incident was no less honourable to Harold. Tofti his brother had been created duke of Northumberland; but, being of a violent tyrannical temper, had treated the inhabitants with such cruelty, that they rose in rebellion against him, and drove him from his government. Morcar and Edwin, two brothers, grandsons of the great duke Leofric, joined in the insurrection; and the former being elected duke, advanced with an army to oppose Harold, who had been commissioned by the king to reduce and punish the Northumbrians. Before the armies engaged, Morcar endeavoured to justify his conduct, and represented to Harold, that Tofti had behaved in such a manner that no one, not even a brother, could defend him without participating of the infamy of his conduct: that the Northumbrians were willing to submit to the king, but required a governor that would pay some attention to their privileges; and they trusted that Harold would not defend in another that violent conduct from which his own government had always kept at so great a distance. This speech was accompanied by such a detail of well-supported facts, that Harold abandoned his brother's cause; and returning to Edward, persuaded him to pardon the Northumbrians, and confirm Morcar in his government. He even married the sister of that nobleman; and by his interest procured Edwin the younger brother to be chosen governor of Mercia. Tofti, in a rage, departed the kingdom, and took shelter in Flanders with Baldwin his father-in-law; while William of Normandy saw that now he had nothing to expect from Harold, who plainly intended to secure the crown for himself.

83
Harold succeeds Edward the Confessor.

Edward died in 1067, and was succeeded by Harold with as little opposition as though he had been the lawful heir. The very day after Edward's death, he was anointed and crowned by the archbishop of York. The whole nation seemed joyfully to swear allegiance to him. But he did not long enjoy the crown, to obtain which he had taken so much pains, and which he seemed to have such capacity for wearing. His brother Tofti, provoked at his success, stirred up against him every enemy he could have any influence with. The duke of Normandy also was enraged to the last degree at the perfidy of Harold; but before he commenced hostilities, he sent an embassy to England, upbraiding the king with his breach of faith, and summoning him to resign the kingdom immediately. Harold replied, that the oath, with which he was reproached, had been extorted by the well-grounded fear of violence, and for that reason could never be re-

garded as obligatory: that he never had any commission either from the late king or the states of England, who alone could dispose of the crown, to make any tender of the succession to the duke of Normandy; and if he, a private person, had assumed so much authority, and had even voluntarily sworn to support the duke's pretensions, the oath was unlawful, and it was his duty to take the first opportunity of breaking it: that he had obtained the crown by the unanimous suffrages of the people; and should shew himself totally unworthy of their favour, did he not strenuously maintain those liberties with which they had entrusted him: and that the duke, if he made any attempt by force of arms, should experience the power of an united nation, conducted by a prince, who, sensible of the obligations imposed on him by his royal dignity, was determined, that the same moment should put a period to his life and to his government.

This answer was according to William's expectations, and therefore he had already made preparations for invading England. He was encouraged and assisted in this enterprise by Howel count of Brittany, Baldwin earl of Flanders, the emperor Henry IV. and pope Alexander II. The latter declared Harold a perjured usurper; denounced excommunication against him and his adherents; and the more to encourage William in his enterprise, sent him a consecrated banner, and a ring with one of St Peter's hairs in it. Thus he was enabled to assemble a fleet of 3000 vessels, on board of which were embarked 60,000 men, chosen from among those numerous supplies which were sent him from all quarters. Many eminent personages were enlisted under his banners. The most celebrated were Eustace count of Boulogne, Aimeri de Thouars, Hugh d'Estaples, William d'Evreux, Geoffroy de Rotrou, Roger de Beaumont, William de Warenne, Roger de Montgomeri, Hugh de Grantmesnil, Charles Martel, and Geoffroy Gifford.

In order to embarrass the affairs of Harold the more effectually, William also excited Tofti, in concert with Halfager king of Norway, to insult the English coasts. These two having collected a fleet of 350 ships, sailed up the Humber, and disembarked their troops, who began to commit great depredations. They were opposed by Morcar earl or duke (a) of Northumberland, and Edwin earl of Mercia, who were defeated. Harold, on the news of this invasion, assembled a considerable army, engaged the enemy at Stamford, and after a bloody battle entirely defeated them. Tofti and Halfager were killed in the action, and all the fleet fell into the hands of the victors; but Harold generously allowed Olave the son of Halfager to depart with 20 vessels.

84
On Defeats the Danes.

The king of England had scarce time to rejoice on account of his victory, when news were brought him that the Normans were landed in Suffolk. Harold's victory had considerably weakened his army. He lost many of his bravest officers and soldiers in the action; and he disgusted the rest, by refusing to distribute the Danish spoils among them. He hastened, however, by quick marches, to repel this new invader; but though he was reinforced at London and other places with fresh troops, he found himself weakened by the desertion of his old soldiers, who, from fatigue and discontent, secretly withdrew from their colours. Gurth,

(a) Anciently these two titles were synonymous.

England.

England.

85
Is defeated
and killed
by William
of Norman-
dy.
* See Ha-
stings.

86
William the
Conqueror

87
The English
grievously
oppressed.

the brother of Harold, a man of great conduct as well as bravery, became apprehensive of the event; and entreated the king to avoid a general engagement for some time, or at least not to hazard his person. But though this advice was in itself evidently proper, and enforced by all the arguments which Gurth could suggest, Harold continued deaf to every thing that could be said. Accordingly, on the 14th of October 1066, the two armies engaged near Hastings a town of Suffex. After a most obstinate and bloody battle*, the English were entirely defeated, Harold and his two brothers killed, and William left master of the kingdom of England.

Nothing could exceed the terror of the English upon the news of the defeat and death of Harold. As soon as William passed the Thames at Wallingford, Stigand, the primate, made submissions to him in the name of the clergy; and before he came within sight of London, all the chief nobility, and even Edgar Atheling himself, who, being the rightful heir to the throne, had just before been declared king, came and submitted to the conqueror. William very readily accepted of the crown upon the terms that were offered him; which were, that he should govern according to the established customs of the country. He could indeed have made what terms he pleased; but, though really a conqueror, he chose rather to be thought an elected king. For this reason he was crowned at Westminster by the archbishop of York, and took the oath administered to the former kings of England; namely, that he would protect and defend the church, observe the laws of the realm, and govern the kingdom with impartiality.

The English historians complain of the most grievous oppression by William and his Normans. Whether by his conduct the conqueror willingly gave the English opportunities of rebelling against him, in order to have a pretence for oppressing them afterwards, is not easy to say; but it is certain that the beginning of his reign cannot justly be blamed. The first disgust against his government was excited among the clergy. William could not avoid the rewarding of those numerous adventurers who had accompanied him in his expedition. He first divided the lands of the English barons who had opposed him among his Norman barons; but as these were found insufficient, he quartered the rest on the rich abbies, of which there were many in the kingdom, until some other opportunity of providing for them offered itself.

Though this last step was highly resented by the clergy, it gave very little offence to the laity. The whole nation, however, was soon after dignified, by seeing all the real power of the kingdom placed in the hands of the Normans. He disarmed the city of London, and other places which appeared most warlike and populous, and quartered Norman soldiers wherever he dreaded an insurrection. This was indeed acting as a conqueror, and not as an elected king; but the event shewed the necessity of such precautions. The king having thus secured, as he imagined, England from any danger of a revolt, determined to pay a visit to his Norman dominions. He appointed his brother Odo, bishop of Bayeux, and William Fitz-Osborne, regents in his absence; and to secure himself yet farther, he resolved to carry along with him such of the English

nobility as he put the least confidence in.

Having taken all these methods to ensure the tranquillity of his new kingdom, William set sail for Normandy in March 1067; but his absence produced the most fatal consequences. Discontents and murmurings were multiplied every where; secret conspiracies were entered into against the government; hostilities were commenced in many places; and every thing seemed to threaten a speedy revolution. William of Poitiers, a Norman historian, throws the blame entirely on the English. He calls them a fickle and mutinous race, while he celebrates with the highest encomiums the justice and lenity of Odo's and Fitz Osborne's administration. On the other hand, the English historians tell us, that these governors took all opportunities of oppressing the people, either with a view to provoke them to rebellion, or, in case they tamely submitted to their impositions, to grow rich by plundering them. Be this as it will, however, a secret conspiracy was formed among the English for a general massacre of the Normans, like what had formerly been made of the Danes. This was prosecuted with so much animosity, that the vassals of the earl of Coxo put him to death because he refused to head them in the enterprise. The conspirators had already taken the resolution, and fixed the day for their intended massacre, which was to be on Ash-Wednesday, during the time of divine service, when all the Normans would be unarmed as penitents, according to the discipline of the times. But the presence of William disconcerted all their schemes. Having got intelligence of their bloody purpose, he hastened over to England. Such of the conspirators as had been more open in their rebellion, consulted their safety by flight; and this served to confirm the proofs of an accusation against those who remained. From this time the king not only lost all confidence in his English subjects, but regarded them as inveterate and irreconcilable enemies. He had already raised such a number of fortresses in the country, that he no longer dreaded the tumultuous or transient efforts of a discontented multitude. He determined therefore to treat them as a conquered nation. The first instance of this treatment was his revival of the tax of *Danegelt*, which had been imposed by the Danish conquerors, and was very odious to the people. This produced great discontents, and even insurrections. The inhabitants of Exeter and Cornwall revolted; but were soon reduced, and obliged to implore the mercy of the conqueror. A more dangerous rebellion happened in the north; but this was also soon quashed, and the English became sensible that their destruction was intended. Their easy submission after the battle of Hastings had inspired the Normans with contempt; their commotions afterwards had rendered them objects of hatred; and they were now deprived of every expedient which could make them either regarded or beloved by their sovereign. Many fled into foreign countries; and among the rest Edgar Atheling himself, who made his escape to Scotland, and carried thither his two sisters Margaret and Christina. They were well received by Malcolm, who soon after married Margaret the elder sister, and also received great numbers of other exiles with the utmost kindness.

The English, though unable to make any resistance openly, did not fail to gratify their resentment against the

England.

the Normans in a private manner. Seldom a day passed, but the bodies of assassinated Normans were found in the woods and high-ways, without any possibility of bringing the perpetrators to justice. Thus, at length, the conquerors themselves began again to wish for tranquillity and security; and several of them, though entrusted with great commands, desired to be dismissed the service. In order to prevent these desertions, which William highly relented, he was obliged to allure others to stay by the largeness of his bounties. The consequences were, fresh exactions from the English, and new insurrections on their part against their cruel masters. The Norman power, however, was too well founded to be now removed, and every attempt of the English to regain their liberty served only to rivet their chains the more firmly. The county of Northumberland, which had been most active in these insurrections, now suffered most severely. The whole of it was laid waste, the houses were burned, the instruments of agriculture destroyed, and the inhabitants forced to seek new places of abode. On this occasion it is said that above 100,000 persons perished either by the sword or famine; and the country is supposed even to this day, to retain the marks of its ancient depopulation. The estates of all the English gentry were next confiscated, and bestowed on the Normans. By this means all the ancient and honourable families were reduced to beggary; and the English found themselves totally excluded from every road that led either to honour or preferment.

83
Diffensions
in William's
family.

By proceeding in this manner, William at last broke the spirit of the English nation, and received no farther trouble from them. In 1076, however, he found that the latter part of his life was likely to be unhappy through diffensions in his own family. He had four sons, Robert, Richard, William, and Henry, besides several daughters. Robert, his eldest son, surnamed *Curthose*, from the shortness of his legs, was a prince who inherited all the bravery and ambition of his family. He had formerly been promised by his father the government of the province of Maine in France, and was also declared successor to the dukedom of Normandy. He demanded from his father the fulfilment of these promises; but William gave him a flat denial, observing, that "it was not his custom to throw off his clothes till he went to bed." Robert declared his resentment; and openly expressed his jealousy of his two brothers William and Henry, (for Richard was killed, in hunting, by a stag.) An open rupture was soon commenced. The two young princes one day took it into their heads to throw water on their elder brother as he passed through the court after leaving their apartment. Robert construed this frolic into a studied indignity; and having these jealousies still farther inflamed by one of his favourites, he drew his sword, and ran up stairs with an intent to take revenge. The whole castle was quickly filled with tumult, and it was not without some difficulty that the king himself was able to appease it. But he could not allay the animosity which from that moment prevailed in his family. Robert, attended by several of his confederates, withdrew to Rouen that very night, hoping to surprize the castle; but his design was defeated by the governor. The popular character of the prince, however, engaged all the young nobility of

England.

Normandy, as well as of Anjou and Britany, to espouse his quarrel; even his mother is supposed to have supported him in his rebellion by secret remittances. The unnatural contest continued for several years; and William was at last obliged to have recourse to England for support against his own son. Accordingly, he drew an army of Englishmen together; he led them over to Normandy, where he soon compelled Robert and his adherents to quit the field, and was quickly re-instated in all his dominions. Robert then took shelter in the castle of Gerberoy, which the king of France had provided for him, where he was shortly after besieged by his father. As the garrison was strong, and conscious of their treason, they made a gallant defence; and many skirmishes and duels were fought under its walls. In one of these the king and his son happened to meet; but being both concealed by their helmets, they attacked each other with mutual fury. The young prince wounded his father in the arm, and threw him from his horse. The next blow would probably have put an end to his life, had he not called for assistance. Robert instantly recollected his father's voice, leaped from his horse, and raised him from the ground. He prostrated himself in his presence, asked pardon for his offences, and promised for the future a strict adherence to his duty. The king was not so easily appeased; and perhaps his resentment was heightened by the disgrace of being overcome. He therefore gave his malediction to his son; and returned to his own camp on Robert's horse, which he had assisted him to mount. After some recollection, however, he was reconciled to Robert, and carried him with him into England.

William returned in 1081; and being now freed from his enemies both at home and abroad, began to have more leisure to attend to his own domestic affairs. For this purpose the *DOOMSDAY-Book* was composed by his order, of which an account is given under that article. He reserved a very ample revenue for the crown; and in the general distribution of land among his followers, kept possession of now fewer than 1400 manors in different parts of the country. No king of England was ever so opulent; none was able to support the splendor and magnificence of a court to such a degree; none had so many places of trust and profit to bestow; and consequently none ever had such implicit obedience paid to his commands. He delighted greatly in hunting; and to indulge himself in this with the greater freedom, he depopulated the county of Hampshire for 30 miles, turning out the inhabitants, destroying all the villages, and making the wretched outcasts no compensation for such an injury. In the time of the Saxon kings, all noblemen without distinction had a right to hunt in the royal forests; but William appropriated all these to himself, and published very severe laws to prohibit his subjects from encroaching on this part of his prerogative. The killing of a boar, a deer, or even an hare, was punished with the loss of the delinquent's eyes; at the time when the killing of a man might be atoned for by paying a moderate fine or composition.

As the king's wealth and power were so great, it may reasonably be supposed, that the riches of his ministers were in proportion. Odo, bishop of Bayeux, William's brother, was become so rich, that he resolu-

ved

England. ved to purchase the papacy. For this purpose, taking the opportunity of the king's absence, he equipped a vessel in the Isle of Wight, on board of which he sent immense treasures, and prepared for his embarkation. He was detained, however, by contrary winds; and, in the mean time, William, being informed of his designs, resolved to prevent the exportation of so much wealth from his dominions. Returning therefore from Normandy, where he was at that time, he came to England the very instant his brother was stepping on board. He immediately ordered him to be made prisoner: but his attendants, respecting the bishop's ecclesiastical character, scrupled to execute his commands; so that the king was obliged to seize him with his own hand. Odo appealed to the Pope: but the king replied, that he did not seize him as bishop of Bayeux, but as earl of Kent; and, in that capacity, he expected, and would have, an account of his administration. He was therefore sent prisoner to Normandy; and, notwithstanding all the remonstrances and threats of pope Gregory, was detained in custody during the remainder of William's reign.

89
Death of
the queen.

Soon after this, William felt a severe blow in the death of Matilda his queen; and, almost at the same time, received information of a general insurrection in Maine, the nobility of which had always been averse from his government. Upon his arrival on the continent, he found that the insurgents had been secretly assisted and excited by the king of France, who took all opportunities of lessening the Norman power, by creating dissensions among the nobles. His displeasure on this account was very much increased, by notice he received of some rilleries thrown out against him by the French monarch. It seems that William, who was become corpulent, had been detained in bed some time by sickness; and Philip was heard to say, that he only lay in of a big belly. This so provoked the English monarch, that he sent him word, he would soon be up, and would, at his churching, present such a number of tapers as would set the kingdom of France in a flame.

90
And of the
king.

To perform this promise, he levied a powerful army; and, entering the Isle of France, destroyed every thing with fire and sword. He took the town of Mante, and reduced it to ashes. But a period was soon put to the conquests and to the life of this great warrior by an accident. His horse, happening to put his fore-foot on some hot ashes, plunged so violently, that the rider was thrown forward, and bruised his belly on the pommel of the saddle. Being now in a bad habit of body, as well as somewhat advanced in years, he began to be apprehensive of the consequences, and ordered himself to be carried in a litter to the monastery of St Gerwaise. Finding his illness increase, and being sensible of the approach of death, he discovered at last the vanity of all human grandeur; and was struck with remorse for those many cruelties and violences of which he had been guilty. He endeavoured to make compensation by presents to churches and monasteries, and gave orders for the liberation of several English noblemen. He was even prevailed upon, though not without reluctance, to release his brother Odo, against whom he was very much incensed. He left Normandy and Maine to his eldest son Robert. He wrote to Lanfranc the primate of England, desiring him to

England. crown William king of England. To Henry he bequeathed nothing but the possessions of his mother Matilda; but foretold, that one day he would surpass both his brothers in power and opulence. He expired on the 9th of September 1087, in the 63d year of his age, in the 21st of his reign over England, and 54th of that over Normandy.

91
William
Rufus.

William, surnamed *Rufus* from his red hair, was in Normandy at the time of his father's illness. He no sooner received the letter for Lanfranc, than, leaving his father in the agonies of death, he set out for England; where he arrived before intelligence of the decease of the Conqueror had reached that kingdom. Being sensible that his brother Robert, as being the eldest son, had a preferable title to himself, he used the utmost dispatch in getting himself firmly established on the throne. The English were so effectually subdued, that they made no opposition; but the Norman barons were attached to Robert. This prince was brave, open, sincere, and generous; and even his predominant fault of indolence was not disagreeable to those haughty barons, who affected an almost total independence of their sovereign. The king, on the other hand, was violent, haughty, and tyrannical. A powerful conspiracy was therefore carried on against William; and Odo, bishop of Bayeux, undertook to conduct it. Many of the most powerful nobility were concerned; and as the conspirators expected to be in a short time supported by powerful succours from Normandy, they retired to their castles, and put themselves in an offensive posture.

William, sensible of his danger, engaged the English on his side, by promising some mitigation of their hardships, and liberty to hunt in the royal forests. Robert, in the mean time, through his natural indolence, neglected to give his allies proper assistance. The conspirators were obliged to submit. Some of them were pardoned; but most of them confiscated, and their estates bestowed on the barons who had continued faithful to the king.

William, freed from this danger, thought no more of his promises to the English. He proved a greater tyrant than his father; and, after the death of Lanfranc, who had been his preceptor, and kept him within some bounds, he gave full scope to his violent and rapacious disposition. Not content with oppressing the laity, he invaded the privileges of the church; which, in those days, were held most sacred. He seized the temporalities of all the vacant bishoprics and abbays, and openly put to sale those sees and abbays which he thought proper to dispose of.

These proceedings occasioned great murmurs among the ecclesiastics, which were quickly spread through the nation, but the terror of William's authority preserved the public tranquillity. In 1090, the king thought himself strong enough to attempt the conquest of Normandy, which at that time was in the greatest confusion through the indolent and negligent administration of Robert. Several of the barons had revolted, and these revolts were encouraged by the king of France. Robert also imagined he had reason to fear the intrigues of his other brother Henry, whom for 3000 marks he had put in possession of *Cotenin*, near a third part of the duchy of Normandy. He therefore threw him into prison; but finding himself threatened with an invasion

92
Attempts
the con-
quest of
Normandy.

from

England. fion from the king of England, he gave Henry his liberty, and even made use of his assistance in suppressing the insurrections of his rebellious subjects. William, however, was no sooner landed in Normandy, than the nobility on both sides interposed, and a treaty of peace was concluded. In this treaty Henry finding his interests entirely neglected, retired to St Michael's Mount, a strong fortress on the coast of Normandy, and infested the neighbourhood with his incursions. He was besieged by his two brothers, and obliged to capitulate in a short time; after which, being deprived of all his dominions, he wandered about for some time with very few attendants, and often in great poverty.

The peace with Robert was of no long duration. In the interval some hostilities with Scotland succeeded, and these terminated in the death of Malcolm king of that country; after which new broils ensued with Normandy. The rapacious temper of William prompted him to encroach upon his brother's territories, and the same rapacity prompted him to use a very extraordinary expedient in order to accomplish his designs. Having gone over to Normandy to support his partisans, he ordered an army of 20,000 men to be raised in England, and conducted to the sea-coast as if they were to be immediately embarked: but when they came there, instead of embarking, they were forced to pay the king ten shillings a man; after which they were dismissed to their several counties. With this money William engaged the king of France to depart from the protection of Robert; and also bribed many of the Norman barons to revolt. He was called from Normandy, however, by an irruption of the Welsh; and having repulsed them, he was prevented from attempting other enterprises by a conspiracy of his barons.

94
Purchases
the duchy
for 10,000
marks.

In 1096, however, the superstition of Robert put the king of England in possession of those dominions which he had not been able to conquer by force of arms. The crusades were now commenced, and Robert was desirous of undertaking an expedition into the Holy Land. As money for this purpose was wanting, he mortgaged his dominions to his brother for 10,000 marks. The king raised the money by violent extortions on his subjects; forcing even the convents to melt their plate, in order to furnish the quota demanded of them. He was then put in possession of Normandy and Maine; and Robert with a magnificent train set out for the Holy Land.

After the death of Lanfranc, the king had retained in his own hands the revenues of Canterbury, as he had done those of many other bishoprics; but falling into a dangerous illness, he was seized with remorse; and the clergy represented to him that he was in danger of eternal perdition if he did not make atonement for those impieties and sacrileges of which he had been guilty. He therefore instantly resolved to supply the vacancy of Canterbury: he sent for Anselm, a Piedmontese by birth, abbot of Bee in Normandy, who was much celebrated for his piety and devotion. The abbot refused the dignity with great earnestness; fell on his knees, wept, and entreated the king to change his purpose; and when he found him obstinate in forcing the pastoral staff upon him, he kept his fist so hard clenched, that it required the utmost violence of the by-standers to open it, and force him to receive that ensign of his spiritual dignity. William soon after re-

covered his health, and with it his violence and rapacity. As he now spared the church no more than before, a quarrel with Anselm soon ensued; and this was the more dangerous to the king, on account of the great character for piety which the primate had acquired by his zeal against abuses of all kinds, particularly those of dress and ornament.

England.

95
His quarrel
with the
primate.

At this time there was a mode which prevailed not only in England, but throughout Europe, both among men and women, of giving an enormous length to their shoes, drawing the toe to a sharp point, and affixing to it the figure of a bird's bill, or some such ornament, which was turned upwards, and which was often sustained by gold or silver chains tied to the knee. The ecclesiastics took exception at this ornament, which they said was an attempt to bely the scripture, where it is affirmed, that no man can add a cubit to his stature; and they not only declaimed against it with vehemence, but assembled some synods, in which the fashion was absolutely condemned. Such, however, are the contradictions in human nature, that all the influence of the clergy, which at that time was sufficient to send vast multitudes of people into Asia to butcher one another, was not able to prevail against those long-pointed shoes. The fashion, contrary to what hath happened to almost all others, maintained its ground for several centuries; and even Anselm found his endeavours against it ineffectual. He was more successful in decrying the long hair and curled locks then worn by the courtiers. He refused the ashes on Ash-Wednesday to such as were so accoutred; and his authority and eloquence had such influence, that the young men universally abandoned that ornament, and appeared in the cropt hair recommended to them by the sermons of the primate. For this reformation Anselm is highly celebrated by his historian Eadmer, who was also his companion and secretary.

When William's profaneness returned with his health, he was engaged in almost perpetual contests with this austere prelate *. These were pretty well settled, when the king, who had undertaken an expedition into Wales, required Anselm to furnish him with a certain number of soldiers. The primate regarded this as an invasion of the rights of the church; and therefore, tho' he durst not refuse compliance, sent the men so miserably accoutred, that the king was exceedingly displeased, and threatened him with a prosecution. Anselm demanded restitution of all his revenues which the king had seized, and appealed to the Pope. The quarrel, however, ran so high that the primate found it dangerous to remain in England. He desired and obtained the king's permission to retire beyond sea. His temporalities were confiscated immediately on his departure; but pope Urban received him as a martyr in the cause of religion, and even threatened the king with sentence of excommunication. William, however, proceeded in his projects of ambition and violence, without regarding the threats of the Pope; who he knew was at that time too much engaged with the crusades, to mind any other business. Though his acquisition of Maine and Normandy had brought him in to perpetual contests with the haughty and turbulent barons who inhabited those countries, and raised endless tumults and insurrections; yet William seemed still intent on extending his dominions either by purchase or

* See Anselm.

96
Who leaves
the king-
dom.

England.

England.

conquest. William earl of Poitiers and duke of Guineen had resolved upon an expedition to the holy land; and, for this purpose, had put himself at the head of a vast multitude, consisting, according to some historians, of 60,000 horse, and a much greater number of foot. Like Robert of Normandy, he offered to mortgage his dominions for money sufficient to conduct this multitude into Asia. The king accepted his offer; and had prepared a fleet and army to take possession of these dominions, when an unfortunate accident put an end to his projects and his life. He was engaged in hunting, the sole amusement, and indeed the principal occupation, of princes in those rude times. Walter Tyrrel, a French gentleman remarkable for his skill in archery, attended him in this recreation, of which the new forest was the scene. William had dismounted after a chase; and Tyrrel, impatient to shew his dexterity, let fly an arrow at a stag which suddenly started before him. The arrow glanced from a tree, and struck the king to the heart. He instantly fell down dead; and Tyrrel, terrified at the accident, clapt spurs to his horse, hastened to the sea-shore, and embarked for France, where he joined the crusade that was setting out from that country. This happened on the 2d of August 1100, after the king had reigned 13 years, and lived about 40. His body was found in the woods by the country-people, and buried without ceremony at Winchester.

97
Death of
the king.

After the death of William, the crown of right devolved to Robert his eldest brother; for William had no legitimate children. But what Robert had formerly lost by his inddence, he was again deprived of by his absence at the holy war. Prince Henry was in the forest with William Rufus at the time the latter was killed. He no sooner heard the important news, than he hurried to Winchester, and secured the royal treasure. William de Breteuil, keeper of the treasure, arrived almost the same instant, and opposed his pretensions; telling him, that the treasure belonged to his elder brother, who was now his sovereign, and for whom he was determined to keep it. But Henry, drawing his sword, threatened him with instant death if he dared to disobey him; and others of the late king's retinue, who came every moment to Winchester, joining the prince's party, he was obliged to desist. Henry lost no time in fully accomplishing his purpose. In less than three days he got himself crowned king of England, by Maurice bishop of London. Present possession supplied every deficiency of title; and no one dared to appear in defence of the absent prince.

98
Prince Henry
usurps
the crown.

99
His charter
in favour of
the people.

The beginning of king Henry's reign, promised to be favourable to the English liberty; owing chiefly to his fear of his brother. To conciliate the affections of his subjects, he passed a charter calculated to remove many of the grievous oppressions which had been complained of during the reigns of his father and brother. He promised, that, at the death of any abbot or bishop, he never would seize the revenues of the see or abbey during the vacancy, but would leave the whole to be reaped by the successor; and that he would never let to farm any ecclesiastical benefice, or dispose of it for money. To the laity he promised, that, upon the death of any earl, baron, or military tenant, his heir should be admitted to the possession of his estate, on paying a just and lawful relief; without being ex-

posed to those enormous exactions which had been formerly required. He remitted the wardship of minors; and allowed guardians to be appointed, who should be answerable for the trust. He promised not to dispose of any heiress in marriage but by advice of all the barons; and if any baron intended to give his daughter, sister, niece, or kinswoman, in marriage, it should only be necessary for him to consult the king, who promised to take no money for his consent, nor ever to refuse permission, unless the person to whom it was proposed to marry her should happen to be his enemy. He granted his barons and military tenants the power of bequeathing by will their money or personal estates; and if they neglected to make a will, he promised that their heirs should succeed to them. He renounced the right of imposing moneyage, and of levying taxes at pleasure, on the farms which the barons kept in their own hands. He made some general professions of moderating fines; he offered a pardon for all offences; and remitted all debts due to the crown. He also required, that the vassals of the barons should enjoy the same privileges which he granted to his own barons; and he promised a general confirmation and observance of the *laws of king Edward* *. To give * See Feodal System. greater authenticity to these concessions, a copy of the charter was lodged in some abbey of each county.

King Henry, farther to increase his popularity, degraded and committed to prison Ralph Flambard bishop of Durham, who had been the chief instrument of oppression under his brother. He sent for Anselm who was then at Lyons, inviting him to return and take possession of his dignities. Anselm returned; but when Henry proposed to him to do the same homage to him which he had done to his brother, the king met with an absolute refusal. During his exile, Anselm had assisted at the council of Bari; where, besides fixing the controversy between the Greek and Latin churches concerning the procession of the Holy Ghost, the right of election to church-preferments was declared to belong to the clergy alone, and spiritual censures were denounced against all ecclesiastics who did homage to laymen for their fees or benefices, and on all laymen who exacted it. The rite of homage † by the feudal customs was, that the vassal should throw himself on his knees, put his joined hands between those of his superior, and should in that posture swear fealty to him. But the council declared it execrable, that pure hands, which could create God, and offer him up for the salvation of mankind, should be put, after this humiliating manner, between profane hands, which, besides being inured to rapine and bloodshed, were employed day and night in impure purposes and obscene contacts. To this decree therefore Anselm appealed; and declared, that so far from doing homage for his spiritual dignity, he would not even communicate with any ecclesiastic who paid that submission, or who accepted of investitures from laymen. Henry durst not insist; and therefore desired that the controversy might be suspended, and that messengers might be sent to Rome to accommodate matters with the Pope, and to obtain his confirmation of the laws and customs of England.

100
Quarrels
with the
primate.

† See Feodal Tenure.

Henry now took another step which seemed capable of confirming his claims to the crown without any danger of a rival. The English remembered with regret their

England their Saxon monarchs, when they compared the liberty they enjoyed under them with the tyranny of the Normans. Some descendants of that favourite line still remained; and among the rest, Matilda, the niece of Edgar Athelug. Upon her the king fixed his eyes as a proper consort, by whose means the breach between the Saxons and Normans might be cemented. A difficulty, however, occurred, because she had been educated in a nunnery. The affair was examined by Anselm in a council of prelates and nobles summoned at Lambeth. Matilda there proved, that she had put on the veil, not with a design of entering into a religious life, but merely in imitation of a custom familiar to the English ladies, who protected their chastity from the brutal violence of the Normans by taking shelter under that habit, which amidst the horrid licentiousness of the times was yet generally revered. The council, sensible that even a princess had otherwise no security for her honour, admitted this reason as valid. They pronounced that Matilda was still free to marry; and her nuptials with Henry were celebrated by Anselm with great solemnity and pomp.

101
He marries
Matilda.

102
Crown of
England
claimed by
Robert.

While Henry was thus rendering himself popular at home, his brother Robert, who had loitered away a twelvemonth in Italy, where he married Sibylla daughter of the count of Conversano, arrived in England, in 1101, in order to put in his late and ineffectual claim to the crown. His fame, however, on account of the exploits he had performed in Palestine, was so great, that even yet he was joined by many noblemen of the first rank, and the whole nation seemed prepossessed in his favour. But Henry, having paid his court to Anselm, by his means retained the army in his interests, and marched with them to Portsmouth, where Robert had landed his forces a few days before. The armies lay for some time in sight of each other; when an accommodation was effected through the mediation of Anselm and other great men. By this treaty it was agreed, that Robert should resign his pretensions to England, and receive in lieu of them an annual pension of 3000 marks; that if either of the princes died without issue, the other should succeed to his dominions; that the adherents of each should be pardoned, and restored to all their possessions either in Normandy or England; and that neither Robert nor Henry should thenceforth encourage, receive, or protect, the enemies of each other.

The two princes separated with mutual marks of friendship; but next year, Henry, under various pretences confiscated the estates of almost all the noblemen who had favoured his brother's pretensions. Robert, enraged at the fate of his friends, ventured to come to England in order to reconcile with his brother in person. But he met with such a bad reception, that, apprehending his liberty to be in danger, he was glad to make his escape by resigning his pension.

103
Normandy
Invaded by
Henry.

• See Normandy.

This infringement of the treaty was followed the ensuing year by an invasion of Normandy, at the desire of Henry's own subjects, whom he was totally incapable of governing*. The event of this war was the defeat and captivity of Robert, who was henceforth deprived not only of all his dominions, but of his personal liberty. He lived 28 years a prisoner, and died in the castle of Cardiff in Glamorganshire. It is even said by some, that he was deprived of his sight by a red-hot copper-balon applied to his eyes, and that king

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Henry appeased his conscience by founding the monastery of Reading.

England.

The conquest of Normandy was completed in 1006; and next year the controversy between the king and primate, concerning the investitures of clergymen and their doing homage to princes, was resumed. The king was very lenient that it was not his interest to quarrel with such a powerful body as the clergy were at that time; and on the other hand he fully understood the necessity of guarding the prerogatives of the crown from their encroachments. While, therefore, he avoided an open rupture with Anselm, he obligingly refused to give up the privileges which had been enjoyed by his predecessors. On the first arrival of Anselm, the king had avoided the dispute in the manner already mentioned. A messenger was dispatched to Rome, in order to compromise matters with the Pope. The messenger returned with an absolute refusal of the king's demands. One of the reasons given by the pope on this occasion, was expressed in the following words: "It is monstrous that a son should pretend to beget his father, or a man to create his God: priests are called *gods* in scripture, as being the vicars of God: and will you, by your abominable pretensions to grant them their investitures, assume the right of creating them?" Henry was not yet convinced; but as he was determined to avoid, or at least to delay, the coming to any dangerous extremity with the church, he persuaded Anselm, that by farther negotiation he should be able to compound matters with the Pope. Messengers were therefore dispatched to Rome a second time from the king; and also from Anselm, who wanted to be fully assured of the pope's intentions. They returned with letters wrote in the most arrogant and positive manner, both to the king and primate. The king suppressed the letter sent to himself; and persuaded the three bishops, by whom it was sent, to assert, upon their episcopal faith, that the pope had assured them of his private good intentions towards king Henry, and of his resolution not to resent any future exertion of his prerogative in granting investitures; though he himself scrupled to give this assurance under his hand, left other princes should copy the example and assume a like privilege. Anselm's two messengers, who were monks, affirmed that it was impossible this story could have any foundation: but their word was not deemed equivalent to that of three bishops; and the king, as if he had finally gained his cause, proceeded to fill the sees of Hereford and Salisbury, and to invest the new bishops in the usual manner. Anselm, however, gave no credit to the assertions of the king's messengers; and therefore refused not only to consecrate them, but even to communicate with them; and the bishops themselves, finding they were become universally odious, returned the ensigns of their spiritual dignity.

104
Quarrel
with the
primate.

The quarrel continued between the king and primate, till the latter, sensible of his dangerous situation, desired leave to make a journey to Rome, in order to lay the case before the pope. This permission was easily obtained; but no sooner was the primate gone, than Henry confiscated all his revenues, and sent another messenger to negotiate with the pope. The new messenger told his holiness, that his master would sooner part with his crown than the right of granting investitures. "And I, (replied the pope), would rather

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thcr

England.

ther lose my head than allow him to retain it." This quarrel now became very dangerous to the king; as he was threatened by the pope with excommunication, which would have been attended with terrible consequences. At last, however, a compromise was made in the following manner. Before bishops took possession of their dignities, they had formerly been accustomed to pass through two ceremonials: They received, from the hands of the sovereign, a ring and crozier as the symbols of their office, and this was called their *investiture*: they also made those submissions to the prince, which were required of the vassals by the rites of the feudal law, and which received the name of *homage*. The pope, therefore, was for the present contented with Henry's resigning his right of granting investitures, by which the spiritual dignity was supposed to be conferred; and he allowed the bishops to do homage for their temporal properties and privileges. After this, the pope allowed Anselm to communicate with the prelates who had already received investitures from the crown; and he only required of them some submissions for their past conduct. He also granted to Anselm a plenary power of remedying every disorder, which he said might arise from the barbarousness of the country. About the same time, the marriage of priests was prohibited; and even laymen were not allowed to marry within the seventh degree of affinity. By this contrivance the pope augmented the profits which he reaped from granting dispensations, and likewise those from divorces. For, as the art of writing was then rare, and parish-registers were not regularly kept, it was not easy to ascertain the degrees of affinity even among people of rank; and any man who had money to pay for it, might obtain a divorce, on pretence that his wife was more nearly related to him than was permitted by the canons. A decree was also published, prohibiting the clergy to wear long hair; and the king, though he would not resign his prerogatives to the church, very willingly cut his hair in the form which was required of him, obliging all the courtiers at the same time to follow his example.

From the time of this compromise, which happened in 1107, to the year 1120, nothing remarkable happened except some slight commotions in Normandy: but this year, prince William, the king's only son, was unfortunately drowned off the coast of Normandy; and Henry was so much affected, that he is said never afterwards to have smiled, or recovered his wonted cheerfulness. It is very doubtful, however, whether the death of this prince was not an advantage to the British nation, since he was often heard to express the utmost hatred to the natives; inasmuch that he had threatened, that, when he came to the throne, he would make them draw the plough, and would turn them into beasts of burden. These prepossessions he inherited from his father; who, though he was wont, when it might serve his purposes, to value himself on his birth as a native of England, shewed, in the course of his government, an extreme prejudice against that people. All hopes of preferment to ecclesiastical as well as civil dignities were denied to the English during this whole reign; and any foreigner, however ignorant or worthless, was sure to have the preference in every competition. The charter formerly mentioned, which the king granted at the beginning of his reign, was no

more thought of; and the whole fell so much into neglect and oblivion, that in the following century, when the barons, who had heard an obscure tradition of it, desired to make it the model of the great charter which they exacted from king John, they could only find one copy of it in the whole kingdom; while the grievances, proposed to be redressed by it, continued still in their full extent.

As Henry had now no legitimate children except Matilda, whom in 1110, he had betrothed, though only eight years of age, to the emperor of Germany, he was induced to marry a second time in hopes of having sons. He made his addresses accordingly to Adelais the daughter of Godfrey duke of Louvain, and niece to pope Calixtus; a young princefs of an amiable person. But Adelais brought him no children: and in 1135, the king died in Normandy, from eating too plentifully of lampreys; having lived 67 years, and reigned 35.

By the will of king Henry, his daughter Matilda became heiress of all his dominions. She had been married, after her first husband's death, to Geoffrey Plantagenet eldest son of the count of Anjou, by whom she had a son named Henry; but as Geoffrey had given umbrage to the king of England in several instances, no notice was taken of him in the will. The nobility had already sworn fealty to her; and the foremost to shew this mark of submission to the king's will had been Stephen, son of the count of Blois (who had married Adela the daughter of William the Conqueror.) He had been married to Matilda daughter and heiress of Eustace count of Boulogne; who brought him, besides that feudal sovereignty of France, a vast property in England, which in the distribution of lands had been conferred by the conqueror on the family of Boulogne. By this marriage Stephen acquired a new connection with the royal family of England: for Mary, his wife's mother, was sister to David the present king of Scotland, and to Matilda the first wife of Henry and mother of the empress. The king also, imagining that by the aggrandizement of Stephen he strengthened the interest of his own family, had enriched him with many possessions; but, instead of this, it appeared by the event that he had only put it more and more in his power to usurp the throne.

No sooner was Henry dead, than Stephen hastened from Normandy into England. The citizens of Dover and Canterbury, apprized of his purpose, shut their gates against him; but when he arrived at London, some of the lower class of people, incited by his emissaries, immediately proclaimed him king. The archbishop of Canterbury refused to give him the royal unction; but this difficulty was got over by Stephen's brother the bishop of Winchester. Hugh Bigod, steward of the household, made oath before the primate, that the late king, on his death-bed, had discovered a dissatisfaction with his daughter Matilda, and had expressed his intention of leaving the count of Boulogne heir to all his dominions; and the bishop, either believing, or pretending to believe, this testimony, gave Stephen the royal unction. Very few of the nobility attended his coronation; but none opposed his usurpation, however unjust or flagrant.

Stephen, in order to establish himself on the throne as firmly as possible, passed a charter, in which he

England.

106
Death of
King Henry.

105
Prince William
drowned.

107
Stephen usurps the throne.

England.

made liberal promises to all ranks of men. To the clergy he promised, that he would speedily fill all the vacant benefices, and never would levy any of the rents during the vacancy. To the nobility he gave liberty to hunt in their own forests; and to the people he promised to remit the tax of danegelt, and to restore the laws of Edward the Confessor. He seized the king's treasure at Winchester, amounting to 100,000 pounds; with part of which money he hired mercenary soldiers from the continent; and with another part procured a bull from the Pope, confirming his title to the English throne.

Matilda, in the mean time, endeavoured to recover her just rights of which Stephen had deprived her; but for some time she met with no success either in England or Normandy. Her husband Geoffrey himself was obliged to conclude a peace with Stephen, on condition of the king's paying him during that time an annual pension of 5000 pounds.

Robert earl of Gloucester was the first who shook the power of Stephen. He was natural son to the late king; a man of great honour and ability, and was very much attached to the interests of Matilda. When Stephen usurped the throne, he offered to do him homage, and take the oath of fealty; but with an express condition, that the king should maintain all his stipulations, and never invade any of Robert's rights or dignities. With this condition Stephen was obliged to comply, on account of the great power of that nobleman, tho' he knew that it was meant only to afford him a favourable opportunity of revolting when occasion served. The clergy imitated Robert's example; and annexed to their oath of allegiance the following condition, namely, that they were only bound as long as the king defended the ecclesiastical liberties, and supported the discipline of the church. The barons, in return for their submission, exacted terms of still more pernicious tendency. Many of them required to have the right of fortifying their castles, and putting themselves in a posture of defence; and with this exorbitant demand the king was forced to comply. All England was immediately filled with these fortresses; which the noblemen garrisoned either with their vassals, or with licentious soldiers, who flocked to them from all quarters. The whole kingdom now became a scene of rapine and devastation. Wars were carried on by the nobles in every quarter; the barons even assumed the right of coining money, and of exercising, without appeal, every act of jurisdiction; and the inferior gentry, as well as the people, finding no defence from the laws, during this total dissolution of sovereign authority, were obliged, for their immediate safety, to pay court to some neighbouring chieftain, and to purchase his protection, both by submitting to his exactions, and by assisting him in his rapine upon others.

In 1137, the earl of Gloucester having projected an insurrection, retired beyond sea, sent the king a defiance, and solemnly renounced his allegiance. The next year David king of Scotland appeared with an army in defence of his niece's title; and, penetrating into Yorkshire, committed the greatest devastations. He was defeated, however, with great slaughter, at Northallerton, by some of the northern barons, who had raised a powerful army; and this success so much overaw-

ed the malecontents in England, that Stephen's power might have received some stability, had he not unfortunately engaged himself in a contest with the clergy. He had already seen the mischief arising from the liberty he had granted of fortifying so many castles in different parts of the kingdom. He therefore determined to abridge this liberty as much as possible; and for that purpose he began with the castles erected by the clergy, who seemed to have less right to these military securities than the barons. Taking advantage therefore of a fray which had arisen at court between the retinue of the bishop of Salisbury and the earl of Britain, he seized the bishops both of Salisbury and Lincoln, threw them into prison, and obliged them to deliver up the castles which they had lately erected. This produced such a violent commotion, that the opportunity seemed favourable to the pretensions of Matilda. On the 22d of September 1139, she landed in England with Robert earl of Gloucester, attended only by 140 knights; but her partisans daily increased, and she was soon in a condition to face Stephen with equal forces in the field. Numberless encounters happened, the detail of which could afford very little entertainment to the reader. War was spread through every quarter; and the turbulent barons having, in a great measure, shaken off all restraint of government, and now obtained the sanction of fighting in the cause of their country, redoubled their oppressions, tyrannies, and devastations. The castles of the nobility became receptacles of licensed robbers; who, falling forth day and night, spoiled the open country, plundered the villages, and even cities. They tortured the captives to make them reveal their treasures; sold their persons to slavery; and set fire to the houses, after they had pillaged them of every thing valuable. In consequence of this destruction, the land was left untilled; the instruments of husbandry were abandoned; and a grievous famine reduced the nation to the most deplorable state that can be imagined.

After a multitude of indecisive conflicts, a battle ensued which seemed likely to ensure the public peace for some time. Stephen had marched his forces to relieve the city of Lincoln; the earl of Gloucester led a body of troops to assist those of Matilda's party, who were besieging that place. The two armies engaged on the 2d of February within sight of the city, and a desperate battle ensued. At last Stephen's army was defeated. He himself was for some time left without attendants; and fought on foot in the midst of his enemies, assaulted by multitudes, and resisting all their efforts with astonishing intrepidity. Being hemmed in on every side, he forced a way for some time with his battle-ax; but that breaking, he drew his sword, and with it furiously assailed his antagonists for some time longer. But at length the sword also flying in pieces, he was obliged to surrender himself a prisoner. He was conducted to Gloucester; and tho' at first treated with respect, he was in a short time, upon some suspicious, thrown into irons.

About a month after, Matilda was crowned at Winchester with great solemnity; but soon shewed herself totally incapable of governing such a turbulent nation. She determined to repress the power of the nobles, who had now left only the shadow of authority to their sovereign. But, being destitute of policy or prudence

England.

108
Matilda
lands in
England.

109
Distracted
state of the
kingdom.

109
Stephen de-
feated and
taken pri-
soner.

110
Matilda
crowned.

England. sufficient to accomplish so difficult an undertaking, a conspiracy was soon formed against her, and the bishop of Winchester detached a party of his friends and vassals to block up the city of London where the queen resided. - At the same time measures were taken to interrogate the Londoners to a revolt, and to seize the queen's person. Matilda, having timely notice of this conspiracy, fled to Winchester. Here she was soon after besieged by the bishop: but, the town being distressed by famine, she with difficulty made her escape while her brother the earl of Gloucester, endeavouring to follow, was taken prisoner, and exchanged for Stephen.

111
Stephen re-
stored.

Matilda was now obliged to take shelter in Oxford, while Stephen reascended the throne. The civil war broke out with redoubled fury. Many battles were fought, and both parties were involved in many distresses. Matilda escaped from Oxford at a time when the fields were covered with snow, by being dressed all in white, with four knights her attendants dressed in the same colour. Another time Stephen was surprised by the earl of Gloucester at Wilton, and made his escape with the utmost difficulty. At last Matilda was obliged to quit the kingdom; and the death of the earl of Gloucester soon after seemed to give a fatal blow to her interests. In 1153, however, prince Henry, Matilda's son by her second husband Geoffrey, came over to England, in order once more to dispute Stephen's pretensions to the crown. After some success on his first landing, he was opposed by Stephen with a powerful army, and matters seemed likely to come to the decision of a general engagement. But while the two armies continued within a quarter of a mile of each other, a treaty was set on foot by the interposition of William earl of Arundel, for terminating the dispute in an amicable manner. The death of Eustace, Stephen's son, whom he had designed for the throne, which happened during the course of the treaty, facilitated its conclusion. It was agreed, that Stephen should reign during his life, and that justice should be administered in his name; that Henry, on Stephen's death, should succeed to the kingdom; and that William, Stephen's son, should inherit Boulogne and his patrimonial estate. This treaty filled all Europe with joy; and after the barons had sworn to it, Henry left England, and Stephen returned to the peaceable enjoyment of his throne. His reign, however, was but of short continuance; his death happening on the 25th of October 1154.

112
His death.

Henry was on the continent besieging a castle of one of the mutinous barons, when news was brought him of Stephen's death. But, as he was sensible of the goodness of his title, he did not abandon his enterprise till the place was reduced. He then set out on his journey, and was received in England with the utmost joy. The first acts of his reign seemed to promise an happy and prosperous administration. He instantly dismissed the mercenary soldiers who had committed the greatest disorders throughout the nation. He ordered all the castles which had been erected since the death of Henry I. to be demolished, except a few which he retained in his own hands for the protection of the kingdom. The adulterated coin which had been struck during the reign of Stephen was cried down, and new money struck of the right value and standard.

113
Henry II.

England. He resumed many of those benefactions which had been made to churches and monasteries in the former reigns. He gave charters to several towns, by which the citizens claimed their freedom and privileges independent of any superior but himself. These charters were the ground-work of the English liberty; for thus a new order, namely, the more opulent of the people, began to claim a share in the administration, as well as the nobility and clergy. Thus the feudal government was at first impaired; and liberty began to be more equally diffused throughout the nation.

Henry II. on his accession to the British throne, found himself possessed of very extensive dominions on the continent. In the right of his father, he possessed Anjou, Touraine, and Maine; in that of his mother, Normandy; in that of his wife, Guienne, Poitou, Xaintogne, Auvergne, Perigord, Angoumois, and the Limousin. Soon after, he annexed Brittany to his other states, by marrying his son, who was yet a child, to the heiress of Brittany, who was a child also, and was already in possession of the superiority over that province. These territories composed above a third of the French monarchy, and were by far the most opulent part of it; so that Henry, though vassal to the king of France, was greatly superior to him in power: and when England was added to all these, the French king had great reason to apprehend some disaster to himself and family. The king of England, however, resided at too great a distance to be able to employ this formidable power with success against the French monarch. He soon became a kind of stranger in his continental dominions; and his subjects there considered their allegiance as more naturally due to their superior lord, who lived in their neighbourhood, and who was acknowledged to be the supreme head of their nation. Their immediate lord was often at too great a distance to protect them; and a commotion in any part of Henry's extensive dominions gave great advantages against him. The wise and vigorous administration of Henry, however, counterbalanced in a great measure these disadvantages; and he maintained a surprising tranquillity throughout his extensive dominions during the greatest part of his reign.

Henry found no great difficulty in circumscribing the power of the barons; but when he attempted to do the same thing with the clergy, he met with the most violent opposition. That body had carried their independence on the civil power so far, that now they seemed to aim at nothing less than a liberty to commit all manner of crimes with impunity. During the reign of Stephen, they had extorted an immunity from all but ecclesiastical penalties*; and that grant they were resolved to maintain for the future. It may easily be supposed, that a law which thus screened their wickedness, contributed to increase it; and we accordingly find upon record, not less than 100 murders committed by men in holy orders, in the short period since the king's accession, not one of which was punished even with degradation; while the bishops themselves seemed to glory in this horrid indulgence. The king did not make any attempts against them during the life of Theobald archbishop of Canterbury, who was a man of a mild character, and besides had great merit, because, during the former reign, he had refused to put the crown on the head of Eustace, Stephen's son.

England.

* See (Beneft of) Clergy.

114
Monstrous wickedness of the clergy.

England. son. He died in 1162; and the king, after his death, advanced to the see of Canterbury Thomas a Becket, his chancellor, on whose compliance he thought he might entirely depend.

115
Contexts
of the king
with Tho-
mas a Bec-
ket.

The new archbishop was the first man of English pedigree, who, since the Norman conquest, had risen to any considerable station. Before his instalment in the see of Canterbury, Becket had been exceedingly complaisant, good-humoured, and agreeable to his master; and had also been accustomed to live very freely. But no sooner was he invested with this high dignity, than he totally altered his conduct, and put on all those airs of affected and ostentatious humility which could recommend him to the superstitious and ignorant multitude in that age. The first step taken by this hypocrite after his advancement, was to resign the office of chancellor. This he did without consulting the king: the reason he gave was, that henceforth he must detach himself from secular affairs, and be solely employed in the duties of his sacred function; but in reality, that he might break off all connexion with Henry. As he knew that the king intended to abridge the ecclesiastical power, he thought the best method would be to become himself the aggressor. He therefore summoned the earl of Clare to surrender the barony of Tunbridge; which, ever since the Conquest, had remained in the family of that nobleman; but which, as it had formerly belonged to the see of Canterbury, the primate pretended that his predecessors were prohibited by the canons from alienating.—William de Eynsford, a military tenant of the crown, was patron of a living which belonged to a manor that held of the archbishop of Canterbury; and Becket, without regard to William's right, presented, on a new and illegal pretence, one Laurence to that living, who was violently expelled by Eynsford. Upon this, Eynsford was excommunicated. He complained to the king, that he, who held in *capite* of the crown, should, contrary to the practice established by the Conqueror, and maintained ever since by his successors, be subjected to that terrible sentence, without the previous consent of the sovereign. Henry, by a messenger, commanded Becket to absolve Eynsford. The haughty primate answered, that it belonged not to the king to inform him whom he should absolve, and whom excommunicate; but, after all, he was obliged to comply with the king's orders, though with the worst grace imaginable.

As Henry perceived that the crown was now in danger, through the superstition of the people, of falling totally under the power of the clergy, he resolved to exert himself to the utmost against their scandalous usurpations. Among their other inventions to obtain money, they had now inculcated the necessity of penance as an atonement for sin; and having again introduced the practice of paying them large sums as an equivalent for these penances, the sins of the people had thus become a revenue to the priests; and the king computed, that, by this invention alone, they levied more money from his subjects than what flowed by all the funds and taxes into the royal exchequer. To ease the people of so heavy and arbitrary an imposition, the king required, that a civil officer of his appointment should be present in all ecclesiastical courts, and should for the future give his consent to every composition

made for spiritual offences.—About this time also the king had an opportunity of proceeding against the clergy on another footing. A clerk in Worcester-shire, having debauched a gentleman's daughter, murdered her father. The king required that the clerk should be delivered up to the magistrate. Becket pleaded the privileges of the church; confined the criminal in the bishop's prison, lest he should be seized by the king's officers; and maintained that no greater punishment could be inflicted on him than degradation. The king then required, that, immediately after he was degraded, he should be tried by the civil powers; but the primate asserted, that it was iniquitous to try a man twice upon the same accusation, and for the same crime. Upon this, Henry summoned an assembly of all the prelates in England; and put to them this decisive question, Whether or not they were willing to submit to the ancient laws and customs of the kingdom? The bishops unanimously replied, that they were willing, *saving their own order*. The king was provoked to the last degree at this equivocal answer. He left the assembly with evident marks of displeasure; and required the primate instantly to surrender the castles of Eye and Berkham. The other prelates were terrified; but Becket continued inflexible: however, he was at last prevailed upon, by the interposition of Philip the pope's legate and almoner, to retract the saving clause, and promise without any reserve to observe the ancient customs.

The king was not now to be satisfied with general promises from the clergy. He was determined that the ancient laws and customs should be defined, as well as the privileges of the clergy. He therefore summoned another great council of the clergy and nobility at Clarendon, to whom he submitted this important affair. A number of regulations was there drawn up, which were afterwards well known by the title of the *Constitutions of Clarendon*. By these it was enacted, that clergymen accused of any crime should be tried in the civil courts; that laymen should not be tried in spiritual courts, except by legal and reputable witnesses; that the king should ultimately judge in ecclesiastical and spiritual appeals; that the archbishops and bishops should be regarded as barons, and obliged to contribute to the public expences like other persons of their rank; that the goods forfeited to the king, should not be protected in churches or church-yards by the clergy; and that the sons of villains should not take orders without the consent of their lord. These, with some others of less consequence, to the number of 16, were subscribed by all the bishops present, and even by Becket himself; who, at first, shewed some reluctance.

Nothing now remained but to get the constitutions ratified by the pope; but in this the king was disappointed. The pope rejected them with the utmost indignation; and, out of 16, admitted only six, which he thought were not important enough to deserve censure.—Becket was now mortified to the highest degree. He retracted his consent to the constitutions, redoubled his austerities, and even refused to execute any part of his sacerdotal function till he had obtained absolution from his holiness. Henry, considering these humilities as insults offered to himself, desired the pope to send him a legate. He did so; but annexed a clause

England.

England.

to his commission, by which he was prohibited from acting against the archbishop of Canterbury. The king sent back the commission to the pope; and being now exasperated beyond all patience, commenced furious prosecutions against Becket. He first sued him for some lands belonging to his primacy; and Becket being detained by sickness from coming into court, his non-attendance was construed into disrespect. The primate afterwards defended his cause in person; but all his goods and chattels were confiscated, and the bishop of Winchester was obliged to pronounce the sentence. Another suit was commenced against him for 300 pounds, which he had levied on the honours of Eye and Berkham, and the primate agreed to give securities for the payment of the sum. The next day a third suit was commenced against him for 1000 marks, which the king had lent him upon some former occasion: and, immediately upon the back of these, a still greater demand was made; namely, that Becket should give an account of the money he had received and expended during the time he was chancellor. The money was computed at no less than 40,000 marks; and the primate, unable either to give an account, or find securities, took the following extraordinary method of evading the king's designs. He arrayed himself in his episcopal vestments; and, with the cross in his hand, went forward to the palace. Having entered the royal apartments, he sat down, holding up the cross as his banner and protection. The king, who sat in an inner apartment, ordered by proclamation all the prelates and nobility to attend him; to whom he loudly complained of Becket's insolence. The whole council joined in condemning this instance of his unaccountable pride; and determined to expostulate with him about his inconsistency concerning the constitutions of Clarendon. But all their messages, threats, and arguments, were to no purpose. Becket put himself, in the most solemn manner, under the protection of the supreme pontiff, and appealed to him against any penalty which his iniquitous judges might think proper to inflict. Then, leaving the palace, he asked the king's immediate permission to quit Northampton; but being refused, he secretly withdrew in disguise, and at last found means to cross over to the continent.

116
Becket flies
to the con-
tinent.

Becket was received with the greatest marks of esteem, first by the king of France, (who hated Henry on account of his great power), and then by the pope, whose cause he had so strenuously defended in England. Henry at the same time sent ambassadors to the pope, who were treated with coolness and contempt, while Becket was honoured with the greatest marks of distinction. These favours bestowed upon an exile and a perjured traitor, (for such had been Becket's sentence of condemnation in England), irritated the king to such a degree, that he resolved to throw off at once all dependence upon the pope. He accordingly issued out orders to his justices; inhibiting, under severe penalties, all appeals to the pope or the archbishop; and forbidding any of them to receive mandates from them, or to apply to their authority. He declared it treasonable to bring over from either of them any interdict upon the kingdom. This he made punishable in secular clergymen by the loss of their livings, and by castration; in regulars, by the amputa-

tion of their feet; and in laymen, by death. On the other hand, the pope and the archbishop did not fail to issue forth their fulminations in such a manner as to shake the very foundation of the king's authority. Becket excommunicated by name all the king's chief ministers who had been concerned in sequestrating the revenues of his see, and all who obeyed or favoured the constitutions of Clarendon. He even threatened to excommunicate the king if he did not speedily repent; and had not the pope himself been threatened every day with the machinations of an antipope, whose pretensions he was afraid the king of England might support, the sentence of excommunication would certainly have been denounced.

At first, Henry paid little regard to these fulminations; but afterwards, when he found that his authority over his subjects began to decline on that account, and that his rivals on the continent were endeavouring to disturb the tranquillity of his dominions, he began sincerely to desire a reconciliation. This the pope and Becket also became desirous of, because they saw that their utmost endeavours were insufficient to draw Henry's subjects into a revolt against him. The treaty of accommodation, however, was often broke off, through the extreme jealousy of each of the parties; but at length, by the mediation of the pope's legate, all differences were adjusted, and Becket was reinstated in the see of Canterbury.

On the recovery of his dignity, the primate behaved with all his usual arrogance. Instead of retiring quietly to his diocese when he landed in England, he made a progress through Kent with all the splendor and magnificence of a sovereign pontiff. As he approached Southwark, the clergy, the laity, and all ranks of people, came forth to meet him, and celebrated his triumphal entry with hymns of joy. Being thus confident of the support of the people, he resolved to make his enemies feel the severest effects of his vengeance. He suspended the archbishop of York, who had crowned Henry's eldest son in his absence. He excommunicated the bishops of London and Salisbury, with some of the principal nobility and prelates who had assisted at the coronation. One man he excommunicated for having spoken against him, and another for having cut off the tail of one of his horses. The excommunicated and degraded prelates immediately made their complaints to the king; and he having dropped some passionate expressions intimating a desire to have Becker's life taken away, the supposed will of the king was instantly accomplished; nor could the king's express orders to the contrary arrive time enough to hinder the execution of this fatal purpose.*

The king was thrown into the utmost consternation on hearing of Becker's murder. He knew that the primate's death would accomplish what his most violent opposition during his life could never have done, and therefore he gave himself up to sorrow. For three days he even refused all nourishment; till at last his courtiers were obliged to break in upon his solitude, and induce him to acquiesce in an event which could not possibly be recalled. The pope was with some difficulty made sensible of the king's innocence; but refused to grant him a pardon, except on condition that he should make every future submission and perform every injunction the holy see thought proper to demand.

117
Is restored
and behaves
with his
former in-
solence.

* See
Becket.
118
Grief of the
king for his
death.

England. demand. When things were thus adjusted, the assassins who had murdered Becket were allowed to retire in safety to the enjoyment of their former dignities; and the king, with a view to divert the minds of the people to a different object, undertook an expedition into Ireland, and totally reduced that island†.

† See Ire-
land.

119
Diffusions
in Henry's
family.

The king was scarce freed from the war with Ireland, and the dangerous controversy which he had engaged in with the church of Rome, when he found himself involved in the most unnatural contests with his children, to whom he had always behaved in the most tender and affectionate manner. He had ordered Henry his eldest son to be anointed king; and had destined him for his successor in the kingdom of England, the duchy of Normandy, and the counties of Anjou, Maine, and Touraine; territories which lay contiguous, and which might thus easily lend their assistance to one another. Richard his second son was invested in the duchy of Guienne and county of Poitou; Geoffrey, his third son, inherited, in right of his wife, the duchy of Brittany; and the new conquest of Ireland was destined for the appendage of John his fourth son, for whom he had negotiated a marriage with Adelaïs the only daughter of Humbert count of Savoy and Maurienne; and with whom he was to receive as a dowry, very considerable demesnes in Piedmont, Savoy, Bresse, and Dauphiny. This greatness of Henry's family alarmed the king of France; and he therefore excited young prince Henry to demand of his father, either the immediate resignation of the crown of England, or the duchy of Normandy. The king refused to comply with such an extravagant demand; upon which the prince made his escape to Paris, where he was protected by the French king. This happened in 1173; and the same year, queen Eleanor, finding that she was now grown very disagreeable to the king, communicated her discontent to her two younger children Geoffrey and Richard, whom she engaged also to demand the territories assigned them, and then fly to the court of France. The queen herself was meditating an escape to the same court, and had put on man's apparel for that purpose, when she was seized and confined by Henry's order. The licentious barons in the mean time wished for a change of government; hoping to have liberty, under young and inexperienced princes, to commit those rapines and violences which they could not do with safety when governed by such a prudent and vigilant king as Henry. In the midst of this universal defection, however, the English monarch still retained his usual intrepidity, and prepared with as much vigour as possible for the contest. As he could depend on the fidelity of very few of his nobility, he was obliged to enlist in his service a number of desperate ruffians called *Brabengons*, and sometimes *Routiers*, or *Cottereaux*, though for what reason is not mentioned in history. These banditti were very numerous during the times of the feudal government, when many private wars were carried on between the nobles; and 20,000 of these, with a few forces furnished by his faithful barons, composed the whole of Henry's army on this occasion.

With this force the king of England totally overthrew the schemes of his enemies on the continent; but being very desirous of putting an end to the war, he this very year (1173) agreed to a conference with

the king of France. At this interview, Henry offered his children the most advantageous terms. He insisted only on retaining the sovereign authority in all his dominions. To Henry he offered half the revenues of the crown of England, with some places of surety in that kingdom; or if he chose rather to reside in Normandy, half the revenues of that duchy, with all those of Anjou. He made a like offer to Richard in Guienne; he promised to resign all Brittany to Geoffrey; and if these concessions were not deemed sufficient, he agreed to add to them whatever the Pope's legates, who were present, should require of him. The conference, however, was broke off by the violence of the earl of Leicester; who not only reproached Henry in the most indecent manner, but even put his hand to his sword, as if he intended to attempt some violence against him.

In the mean time, the most of the English nobility united in opposition against their sovereign; and an irruption at this time by the king of Scotland assisted their rebellious schemes. The earl of Leicester soon after invaded Suffolk at the head of a body of Flemings; but they were repulsed with great slaughter, and the earl himself was taken prisoner. Soon after, William king of Scotland, who had been repulsed, and agreed to a cessation of arms, broke the truce, and invaded England with an army of 80,000 men, committing the most terrible devastations. Henry in the mean time, to reconcile himself thoroughly to the church, performed the penances at the tomb of Thomas a Becket, which he had formerly promised to do. As soon as he came within sight of the church of Canterbury, he alighted from his horse, walked barefoot towards the altar, and prostrated himself before the shrine of the saint. He remained a whole day in prayer and fasting, watched the holy relics all night, made a grant of 50 pounds a year to the convent for a constant supply of tapers to illuminate the shrine; and not satisfied with these submissions, he assembled a chapter of monks, disrobed himself before them, put a scourge into each of their hands, and presented his bare shoulders to their strokes. Next day he received absolution; and, departing for London, had the agreeable news of the defeat and captivity of William king of Scotland, which happened on the very day of his absolution.

This victory proved decisive in Henry's favour. The English barons who had revolted, or were preparing for a revolt, instantly delivered up their castles to the victor, and the kingdom was in a few weeks restored to perfect tranquillity. Prince Henry, who was ready to embark with a great army to join the English rebels, abandoned all thoughts of the enterprise. Soon after, a treaty was concluded with the king of France; in which Henry granted his children much less advantageous terms than he had offered them before. The principal were some pensions for their support, castles for their residence, and an indemnity to all their adherents. The greatest sufferer by this war was William king of Scotland. He was compelled to sign a treaty, by which he obliged himself to do homage to Henry for the kingdom of Scotland. It was agreed, that his barons and bishops should do the same; and that the fortresses of Edinburgh, Stirling, Berwick, Roxburgh, and Jedburgh, should be delivered into the hands of the conqueror, till the articles were performed.

121
King of
Scotland
defeated
and taken
prisoner.

122
Owens him-
self Henry's
vassal.

120
Queen E-
leanor con-
fined.

England. formed. This treaty was executed most punctually and rigorously on the 10th of August 1175. The king, barons, and prelates of Scotland, did homage to Henry in the cathedral of York; the greatest humiliation to which the Scottish nation had ever been subjected.

123
New diffi-
culty in
Henry's fa-
mily.

Henry was now freed from all troubles either at home or abroad, for five years; during which time he made several salutary laws for the good of his kingdom. But, in 1180, the ambitious spirits of his children involved him in fresh calamities. Richard, who had been invested by his father with the sovereignty of Guienne, refused to do homage to his elder brother, as king Henry had required him to do. Young Henry and Geoffrey, uniting their arms, invaded their brother's dominions; and while the king was endeavouring to compose their differences, he found himself conspired against by them all. The conspiracy, however, was defeated by the death of prince Henry in 1183. He had retired to Martel, a castle near Turenne, where he was seized with a fever; and perceiving the approaches of death he was at last struck with remorse for his undutiful behaviour towards his father. He sent a messenger to the king, who was not far distant; expressed his contrition for his faults; and intreated the favour of a visit, that he might at least die with the satisfaction of having received his forgiveness. The king, who had so often experienced his son's ingratitude and violence, apprehended that his sickness was entirely a feint, and dared not trust himself in the prince's hands. But soon after, receiving certain intelligence of his death, and proofs of his sincere repentance, the good old king was affected with the deepest sorrow. He thrice fainted away; he accused his own hard-heartedness in refusing the dying request of his son; and he lamented that he had deprived the prince of the last opportunity of making atonement for his offences.

Prince Henry, who died in the 28th year of his age, left no posterity. His brother Richard succeeded to his dominions, and soon discovered as turbulent a spirit as that which had actuated his brother. He refused to give up Guienne, which Henry had designed for his fourth son John; and even made preparations for carrying on war against his father, and brother Geoffrey. Henry sent for Eleanor his queen, the heirs of Guienne; to whom Richard, either dreading an insurrection in her favour, or out of a sense of duty, willingly yielded up the territory, and retired peaceably to his father's court. This breach, however, was no sooner made up, than Geoffrey, demanded Anjou to be added to his dominions in Brittany. This the king refused; upon which he fled to the court of France, and prepared to levy an army against his father. Henry, however, was freed from the danger which threatened him from that quarter, by his son's death, who was killed in a tournament at Paris. The loss of this prince gave few, except the king himself, any uneasiness; for he was universally hated, and went among the people by the name of the *Child of Perdition*. The widow of Geoffrey, soon after his decease, was delivered of a son, who received the name of *Arthur*, and was invested in the duchy of Brittany, under the guardianship of his grandfather, who, as duke of Normandy, was also superior lord of that territory. Philip, as lord paramount, disputed for some time his title to this wardship; but was obliged to

yield to the inclinations of the Bretons, who preferred the government of Henry. Some other causes inflamed the diffension between these two monarchs, and Philip once more seduced Richard from his duty. He insisted that his marriage with Adelais, Philip's sister, should be immediately completed, and threatened to enforce his pretensions with a formidable army. This occasioned another conference between Gisors and Trie, the usual place of meeting, under a vast elm that is said to have shaded more than an acre. In the midst of this conference the archbishop of Tyre appeared before the assembly in the most miserable habit, and begged assistance against the Infidels, who, under Saladin, had almost totally expelled the Christians from Asia. His intelligence appeared so very dismal, that the kings of France and England laid aside their animosity. Both of them immediately took the cross; but Richard, who had long wished to have all the glory of such an expedition to himself, could not bear to have even his father for a partner in his victories. He therefore entered into a confederacy with the king of France; so that Henry found himself at last obliged to give up all thoughts of the crusade, in order to defend himself against this unnatural combination. The event of the war proved very unfortunate for Henry, who lost several towns, and narrowly escaped falling into the hands of the enemy himself. At last a treaty was concluded at the intercession of the duke of Burgundy, the count of Flanders, and the archbishop of Rheims; but upon terms very humiliating to the king of England. It was agreed, that Richard should marry the princess Adelais, and be crowned king of England during the lifetime of his father; that Henry should pay 20,000 marks to the king of France, as a compensation for the charges of the war; that his own barons should engage to make him observe this treaty, and, in case of violating it, to join Philip and Richard against him; and that all his vassals who had espoused the cause of Richard should receive an indemnity for their offence. These terms, mortifying as they were, Henry bore with patience; but when, upon receiving a list of the barons that were to be pardoned, he found his own son John, who was his favourite, among them, he could no longer support his grief. He broke out into the most lamentable expressions of despair; cursed the day in which he received his miserable being; and bestowed on his ungrateful children a malediction which he could never afterwards be prevailed upon to retract. Soon after, he fell into a lingering fever occasioned by his grief; and of this he died on the 6th of July 1189, in the 58th year of his age and 35th of his reign. His natural son Geoffrey, who alone had behaved dutifully towards him, attended his corpse to the nunnery of Fontevrault, where it lay in state in the abbey-church. Next day Richard, who came to visit the dead body of his father, was struck with horror at the sight. At his approach, the blood was seen to gush out at the mouth and nostrils of the corpse; and this accident was, by the superstition of the times, interpreted as the most dreadful rebuke. Richard could not endure the sight. He exclaimed that he was his father's murderer; and expressed a strong, though too late, sense of his undutiful conduct.

Richard succeeded to the throne without opposition, immediately after his father's death; and, on his

England.

124.
His ex-
treme grief
and death.

125

ac-

England.

accession, set his mother Eleanor (who had been again confined) at liberty. A romantic desire for strange adventures, and an immoderate zeal for the external rites of religion, were the ruling passions of the times. By the first of these Richard was inflamed to the highest degree, and therefore behaved as if the whole design of his government had been to attempt the recovery of the Holy Land from the Infidels. The superstition of the people showed itself in a most violent and tragical manner on the very day of the king's coronation. The Jews were the objects of universal hatred, so that Richard had issued orders forbidding any of them from appearing at his coronation. But some of them bringing him large presents from their nation, presumed, notwithstanding these orders, to approach the hall in which the king dined. Being discovered, they were exposed to the insults and injuries of the bystanders; in consequence of which they fled, and were pursued by the people. A report was spread, that the king had given orders to massacre all the Jews. This supposed command was executed in the most cruel manner. Multitudes were slaughtered in the city of London, and this example was followed in most of the cities in England. Five hundred Jews had retired into York castle for safety; but finding themselves unable to defend the place, they murdered their wives and children; threw the dead bodies over the wall against their enemies who attempted to scale it; and then, setting fire to the houses, perished in the flames. The gentry in the neighbourhood, who were all indebted to the Jews, ran to the cathedral where their bonds were kept, and made a solemn bonfire of them before the altar.

126
Massacre of
the Jews.

127
Richard's
prepara-
tions for his
journey into
Palestine.

Richard immediately began to take measures for his expedition into Palestine. His father had left him 100,000 merks; and this sum he augmented by all expedients he could think of, however pernicious to the public, or dangerous to the royal authority. He set up to sale the revenues and manors of the crown, and several offices of the greatest trust and power. Liberties, charters, castles, were given to the best bidders. His friends warned him of the danger attending this venality; but he told them he would sell the city of London itself, if he could find a purchaser. Numerous exactions were also practised upon all ranks and stations; menaces, promises, and expropriations, were used to fright the timid, and allure the avaricious. A zealous preacher of those times was emboldened to remonstrate against the king's conduct; and advised him to part with his three daughters, which were pride, avarice, and sensuality. To this Richard readily replied, "You counsel right, my friend; and I have already provided husbands for them all. I will dispose of my pride to the templars; my avarice to the monks; and as for my sensuality, the clergy shall share that among them." At length the king having got together a sufficient supply for his undertaking, and even sold his superiority over Scotland for a moderate sum, set out for the Holy Land; whether he was impelled by repeated messages from the king of France, who was ready to embark in the same enterprise.

An account of Richard's exploits in this expedition is given under the articles EGYPT, SICILY, CYPRUS, &c.—Having at last concluded a truce with Saladin,

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he set out on his return for England. He was, however, at a loss how to proceed. He durst not return by the way he came, as this would put him in the power of the king of France, between whom and the king of England an irreconcilable enmity had taken place. No way therefore was left, but by going more to the north; for which reason he took shipping for Italy, but was wrecked near Aquileia. From thence he travelled towards Ragusa, and resolved to make his way through Germany in the habit of a pilgrim. But his experiences and liberalities having betrayed him notwithstanding this disguise, he was arrested by Leopold duke of Austria, who commanded him to be loaded with shackles. This prince had served under Richard at the siege of Acres, (the ancient Ptolemais) where, having received some disgust, he took this base method of revenging himself. Henry VI. emperor of Germany, was then equally an enemy to Richard on account of his having married Berengaria the daughter of Tancred king of Sicily. He therefore required the royal captive to be delivered up to him, and stipulated a large sum of money to the duke as a reward for his service.

The kingdom of England in the mean time was in great confusion. Richard had left it under the direction of Hugh bishop of Durham, and Longchamp bishop of Ely. The tempers of these prelates being very different, an animosity between them soon took place. Longchamp at last arrested his colleague, and obliged him to resign his power in order to obtain his liberty. The king, by many letters, commanded Longchamp to replace his coadjutor, but to no purpose. When the situation of the king became uncertain, Longchamp tyrannized to such a degree, that John the king's brother thought proper to oppose him. He then left the kingdom; and upon this the archbishop of Rouen was made judiciary in his room. The king of France being informed of these dissensions, strove to increase them as much as possible; and had even almost prevailed upon John to throw off his allegiance, by promising to put him in possession of all Richard's continental dominions.

When the English first received the news of Richard's captivity, a general indignation was excited through the whole nation. The greatest, and almost the only traitor in the kingdom, was the king's own brother John. On the very first invitation from the court of France, he went abroad; and held a consultation with Philip, the object of which was the perpetual ruin and captivity of his unhappy brother. He promised to deliver into Philip's hands a great part of Normandy; and, in return, he received the investiture of all Richard's transmarine dominions: it is even said, that he did homage to the French king for the crown of England.

In consequence of this treaty, Philip invaded Normandy, and made considerable progress in the conquest of it. He was, however, at last repulsed by the earl of Leicester, who was now returned from the Holy Land; and a truce was concluded on condition of paying the French king 20,000 merks, and putting four castles into his hands by way of security for the payment.—John, who had come over to England, met with still less success in his enterprises. He was only able to make himself master of the castles of Windsor and Walling-

16 B

ford;

England.

128
Taken pri-
soner on his
return.

129
Treachery
of John the
king's brother.

England. ford ; but when he came to London, and demanded the kingdom as heir to his brother, of whose death he pretended to have received certain intelligence, he was rejected by all the barons, and measures were taken to oppose and subdue him. The defence of the kingdom was so well provided for, that John, after some fruitless efforts, was obliged to conclude a truce with his opponents ; and, before the expiration of it, he thought proper to retire to France, where he openly acknowledged his alliance with Philip.

All the efforts of Richard's enemies proved ineffectual to detain him in captivity. He was brought before the diet of the empire at Worms, where the emperor Henry brought against him a charge of many crimes and misdemeanors : but to this the king replied with so much spirit and eloquence, that the German princes exclaimed loudly against the conduct of the emperor ; the Pope threatened him with excommunication ; and Henry, who had hearkened to the proposals of the king of France and prince John, found that it would be impossible for him to execute his and their base purposes, and detain the king of England any longer in captivity. He therefore concluded a treaty with him for his ransom ; and agreed to restore him to his liberty for 150,000 marks, about L. 300,000 of our money, of which 100,000 marks were to be paid immediately, and 67 hostages delivered for the remainder.

¹³⁰ Richard released from captivity.

The money for the king's ransom was most cheerfully raised by the English. The churches and monasteries melted down their plate to the amount of 30,000 marks ; the bishops, abbots, and monks, paid a fourth part of their yearly rent ; the parochial clergy contributed a tenth part of their tithes ; and the requisite sum being thus collected, queen Eleanor and Walter archbishop of Rouen set out with it for Germany, paid the money to the emperor and duke of Austria at Mentz, delivered them hostages for the remainder, and freed Richard from his captivity. His escape was very critical. Henry had been detected in the assassination of the bishop of Liege, and in an attempt of the like nature on the duke of Louvaine ; and finding himself extremely obnoxious to the German princes on account of these odious practices, he had determined to seek support from an alliance with the French king, and to detain Richard in perpetual captivity, notwithstanding the sum he had already received for his ransom. He therefore gave orders that Richard should be pursued and arrested ; but the king making all imaginable haste, had already embarked at the mouth of the Schelde, and was out of sight of land when the emperor's messengers reached Antwerp. The king of France no sooner heard of Richard's deliverance, than he wrote to John his confederate in these terms : " Take care of yourself : the devil is broke loose."

¹³¹ Returns to England.

The king of England returned from captivity on the 20th of March 1194, and was received with the utmost joy by his subjects. He had been but one day landed, when his treacherous brother John came to make his submission. At the intercession of queen Eleanor he was received into favour. " I forgive him, (said the king), and hope I shall as easily forget his offences as he will my pardon." Richard was impatient to revenge himself on the king of France, and

therefore instantly made war upon him. But though both kings were inflamed with the most violent resentment against each other, they found it impossible to engage their powerful barons heartily in their cause. The war, therefore, produced no remarkable event ; and, in 1195, was concluded by a truce for five years. On some slight occasion it was ready to break out anew, when the pope's legate interposed, and a treaty was about to be concluded. King Richard in the mean time was wounded by an arrow at the siege of Chalus, a castle of Limoges. The wound was not in itself dangerous ; but being unskillfully treated, a mortification ensued, and the king expired on the 6th of April 1199, in the 10th year of his reign and 42d of his age. By his will he left the kingdom to his brother John, but distributed a fourth part of his treasure among his servants.

¹³² His death.

John succeeded to the crown of England without opposition, but soon found his affairs embarrassed on the continent. The king of France, who, during the life of king Richard, had always supported the pretensions of John, now gave a like support to the claims of prince Arthur the son of Geoffrey, who, though only 12 years of age, promised to be deserving of the kingdom. But in this matter the king of France shewed so much regard to his own interest, that Constantia the mother of the young prince, thinking that he really designed to keep for himself the provinces which he pretended to conquer for Arthur, submitted herself and her son to John, who detained them in Mans ; and thus became undisputed master of the whole British empire.

¹³⁴ His bad qualities.

The new king was weak, tyrannical, cruel, and treacherous. In short, he seemed to be endowed with almost every bad quality that can fall to the share of man. His conduct, therefore, soon rendered him universally odious. Imagining himself now secure on the side of France, he indulged his passion for Isabella the daughter and heiress of the count of Angouleme, with whom he was much enamoured. His queen, the heiress of the family of Gloucester, was still alive ; and Isabella was married to the count de la Marche, tho', by reason of her youth, the marriage had not been consummated. John persuaded the count de Angouleme to carry off his daughter from her husband ; at the same time that he procured, under some pretence or other, a divorce from the queen. Thus he incurred the displeasure of the pope, and also of the count de la Marche, and a powerful confederacy was formed against him.

As John had neither courage nor policy sufficient to keep his barons in awe, he took a method for that purpose equally base and cruel. This was by hiring a set of ruffians, whom he called his *champions*, to fight duels with them, in cases where they required to clear themselves from any charge by fighting a duel, according to the custom of those times. Thus he proposed to get rid of his refractory barons ; but they, despising opponents who were so far below their rank, refused to fight with them, and a dangerous combination was formed among the barons against him.

The murder of prince Arthur rendered John still more generally detested. The young prince with his mother had fled to the court of France, where they were received with the greatest kindness, and found their interests

¹³⁵ Murders his nephew.

England.

terests more vigorously supported than before. Their enterprises were attended with considerable success, when Arthur himself had the misfortune to be taken prisoner. All the other captives were sent to England; but the prince was shut up in the castle of Falaise, and from that time was never heard of. It was universally believed that John had murdered him with his own hand; and this inflamed the general resentment against him to such a degree, that he soon after lost all his French provinces. In 1205, the duchy of Normandy itself was also conquered by Philip, and John was forced to fly with disgrace to England.

The king was resolved to wreak his vengeance upon the barons, who, he pretended, had deserted his standard in Normandy. For this reason, he levied large sums on his estates; in order, as he said, to undertake an expedition to the continent. This expedition, however, he several times capriciously deferred; and once having ventured out to sea, returned again without making the smallest attempt. At last, he landed at Rochelle, and burnt the city of Angers; but hearing that the enemy were preparing to oppose him, he returned without attempting any thing else.

This irresolute and cowardly behaviour of John made him contemptible in the eyes of his subjects; but the Norman princes had so far extended the prerogatives of the English crown, that the barons, however discontented, durst not yet attempt to change the form of government. John, by entering into a controversy with the church, completed his ruin. The clergy, who for some time had acted as a community totally independent of the civil power, had their elections of each other generally confirmed by the pope, to whom alone they owed subjection. The election of archbishops, however, had been a subject of continual dispute between the suffragan bishops and the Augustine monks. In the mean time the archbishop of Canterbury died; and the Augustine monks, in a very private manner, elected Reginald, their superior, in his place. The bishops exclaimed against this election, as a manifest innovation of their privileges; and a furious theological contest was likely to ensue. John very imprudently took a side in this controversy, and espoused the cause of the suffragan bishops; in consequence of which, John de Grey bishop of Norwich was chosen. The cause was appealed to Rome; and pope Innocent III. seizing with avidity an opportunity of extending his power, commanded the monks to choose cardinal Stephen Langton, an Englishman, then at the court of Rome. The being able to nominate an archbishop of Canterbury, (a person of almost equal authority with the king) was an acquisition that would effectually give the court of Rome an unlimited authority over England. John therefore was resolved not to submit to this imposition; but he had not judgment sufficient to conduct him. He violently expelled the monks from their convent, and seized upon their revenues. The pope, perceiving from this absurd conduct, that John was unequal to the task he had undertaken, after some intreaties, threatened to put the whole kingdom under an interdict. The prelates threw themselves on their knees before the king, and in the most earnest manner intreated him to avoid the resentment of the holy tribunal, by receiving the primate, and restoring the monks to their convent. John, however, broke out into the most violent invectives. He

swore by *God's teeth*, (his usual oath), that if the kingdom was put under an interdict, he would banish the whole body of the clergy, and confiscate all their possessions. The pope at last, finding he might do it with safety, issued forth this terrible sentence so much dreaded by the whole nation. A stop was immediately put to divine service, and the administration of all the sacraments except baptism. The church-doors were shut, and the images of the saints laid on the ground. The dead were refused Christian burial; and were thrown into ditches and on the highways, without any funeral solemnity. Marriage was celebrated in the church-yards, and the people prohibited the use of meat as in times of public penance. They were debarred from all pleasure; even from shaving their beards, saluting each other, or paying any regard to their apparel. The clergy deplored the unhappy state of the nation in the most lamentable manner; while John, in revenge, imprisoned all their concubines, and treated the adherents of Langton with the utmost rigour.

The furious and imprudent efforts of John proved totally ineffectual. He had scarce a friend left in the whole nation; and therefore, in 1209, the pope denounced a sentence of excommunication against himself. This was soon followed by another still more terrible; namely, the absolving all the subjects of the king of England from their allegiance, and declaring every one to be excommunicated who had any commerce with him at his table, council, or even in private conversation. The king, rendered quite furious by these repeated indignities, wreaked his vengeance on his unhappy subjects, whose affections he ought rather to have attempted to conciliate. The pope, therefore, proceeded to execute the full measure of his wrath on this devoted prince, by giving away his kingdom to Philip of France. He published a crusade all over Europe against king John; exhorting the nobility, the knights, and men of every condition, to take up arms against him, and enlist under the French banner. Philip was not less active on his part. He summoned all the vassals of the crown to attend him at Rouen; and having collected a fleet of 1700 vessels, was ready, in 1213, to invade England.

The pope had now overstretched his power; and had the English nation been governed by a prince of any degree of prudence or resolution, the power of the clergy would in all probability have been totally broken. The people, however superstitious and ready to obey in matters of religion, could not tamely submit to be given away by the pope as slaves from one master to another; and therefore this consideration, added to the natural antipathy subsisting between the French and English, put John, notwithstanding all his offences, at the head of an army of 60,000 men. But the pope was too great a politician to suffer matters to be carried to extremities. He promised himself many more advantages from the submission of John, than from an alliance with Philip; and therefore came over in person, or, according to some, sent over his legate, to England, under pretence of conferring with the barons, but in reality to hold a conference with John. He there represented to this forlorn prince, the numbers of the enemy, the hatred of his own subjects, and the secret confederacy there was against him in Eng-

England.

137
The king laid under an interdict.

138
The king excommunicated, and the kingdom given to Philip of France.

136
His content with the pope.

England.

England.

139
John's sub-
mission to
the pope.

land. He intimated, that there was but one way to secure him from the impending danger; namely, to put himself under the protection of the pope, who was a merciful father, and still willing to receive a repenting sinner. The abject and irresolute spirit of John submitted to this last piece of arrogance, and he took an oath to obey whatever the pope should command. In consequence of this oath, he took another, the most extraordinary mentioned in the records of history; and which, as it was taken while he commanded an army of 60,000 men, discovers a meanness of spirit almost incredible. The terms imposed by it were expressed in the following words. "I John, by the grace of God king of England and lord of Ireland, in order to expiate my sins, from my own free will, and the advice of my barons, give to the church of Rome, to pope Innocent and his successors, the kingdom of England, and all other prerogatives of my crown. I will hereafter hold them as the pope's vassal. I will be faithful to God, to the church of Rome, to the pope *my master*, and his successors legitimately elected. I promise to pay him a tribute of 1000 marks; to wit, 700 for the kingdom of England, and 300 for the kingdom of Ireland."

This oath was taken by the king before all the people, kneeling, and with his hands held up between those of the legate. Having then agreed to reinstate Langton in the primacy, he received the crown which he had been supposed to have forfeited; while the legate, to add to his former insolence, trampled under his feet the tribute which John had consented to pay. — The king of France was enraged at this behaviour of the pope; and resolved to execute his project of conquering England, in spite of him and all his censures. His fleet, however, was attacked in their harbours by the English, who took 300 vessels, and destroyed about 100 more; while Philip, finding it impossible to prevent the rest from falling into the hands of the enemy, set fire to them himself, and thus was obliged to give up all hopes of success.

140
The barons
attempt to
reduce the
prerogatives of the
crown.

John being thus freed from all danger, continued to follow the same cruel and tyrannical measures which had hitherto rendered him odious to his subjects. His scandalous subjection to the clergy, now gave the barons an opportunity of exerting themselves, in order to reduce the enormous prerogatives of the crown. Their designs were greatly facilitated by the concurrence of Langton the primate, who on all occasions shewed a sincere regard for the interests of the kingdom. At a synod of his prelates and clergy, convened in St Paul's, on pretence of examining into the losses of some bishops who had been exiled by John, he privately conferred with a number of barons, to whom he expatiated upon the vices and injustice of their sovereign. He shewed them a copy of Henry the first's charter; (being the only one in the kingdom, and which had been buried in the rubbish of an obscure monastery). Langton exhorted the barons to insist on a renewal of it, and this they solemnly swore to perform. The same agreement was afterwards renewed at a more numerous meeting of barons summoned by Langton at St Edmundsbury. Here it was resolved, that at Christmas they would prefer their common petition in a body; and in the mean time they separated with a design to put themselves in a posture of defence, enlist men, and fortify their castles.

In the beginning of January 1215, they repaired to London, accoutred in their military garb and equipage, and presented their petition to the king, alleging that he had promised to grant a confirmation of the laws of Edward the Confessor, at the time he was absolved from his excommunication. John resented their presumption; and required a promise under their hands and seals, that they would never demand, or attempt to extort, such privileges for the future. This they refused with such unanimity and resolution, that the king desired time to consider of their demands. He promised, that, at the festival of Easter, he would give a positive answer to their petition; and offered them the archbishop of Canterbury, the bishop of Ely, and the earl marshal, as sureties for fulfilling his engagements.

The barons accepted of his securities, and departed peaceably; but John had no design of complying with their desires. He had recourse to the clergy, whose power he had seen and felt in so many instances. He courted their favour, by granting them a charter establishing all those rights of which they were already in the possession, and which he now pretended to confirm when he had not the liberty to refuse. To ingratiate himself still farther with this body, he took the cross, and appealed to the pope against the usurpation of the barons. The pope wrote letters to England, reproaching the primate and bishops with favouring these dissensions; and commanded them to promote peace between the two parties. He exhorted the barons to conciliate the king, not with menaces, but with humble intertreaties; and promised, upon their obedience, to interpose his own authority in favour of such of their petitions as he should find to be just. At the same time he annulled their association, and forbade them to enter into any confederacy for the future.

The barons paid no regard to the pope's remonstrances; knowing that the fulminations of the court of Rome would be of little avail, unless they were seconded by the clergy of England. After waiting till Easter, when the king promised to return them an answer, they met by agreement at Stamford. There they assembled a force of above 2000 knights, and a prodigious number of foot. Thence they marched to Brackley, about 15 miles from Oxford, the place where the court then resided. John, hearing of their approach, sent the archbishop of Canterbury, the earl of Pembroke, and others of his council, to know the particulars of their request, and what those liberties were which they so much importuned him to grant. The barons delivered a schedule containing the chief articles of their demands, founded on the charters of Henry and Edward; but which were in the highest degree displeasing to the king. He burst into a furious passion, asked the barons why they did not also demand his kingdom, and swore that he would never comply with such exorbitant demands. The confederates then chose Robert Fitzwalter for their general; whom they dignified with the title of "Marshal of the army of God and of the holy church." They laid siege to Northampton, took Bedford, and were joyfully received into London. They wrote letters to all the nobility and gentry who had not yet declared in their favour, threatening their estates with devastation in case of refusal or delay.

England.

In the mean time the king was left at a place called *Odibam* in Surrey, attended only by seven knights. He vainly endeavoured to avert the storm by the mediation of his bishops and ministers. He appealed to Langton against the barons, not suspecting that he was engaged in the confederacy; and desired him to fulminate the church-censures against those who had made war upon their lawful prince. Langton declared that he would pass no censure where he found no delinquent; but said, that much might be done if the king would dismiss some foreign auxiliaries which he had lately brought over. Upon this John disbanded a great body of Germans and Flemings whom he had hitherto retained in his service, and Langton refused to excommunicate a single baron. The king, being now quite defenceless, was obliged at last to comply with the demands of his subjects. A conference was accordingly appointed, and all things were adjusted for this most important treaty.

The king's commissioners met the barons at a place called *Ruimede*, between Staines and Windlor; and which is yet held in reverence as the spot where the standard of freedom was first erected in England. Here the king signed the charter called *Magna Charta*; which continues in force to this day, and is still regarded as the great bulwark of British liberty. See *MAGNA Charta*.

But tho' John had thus obliged himself, by writing, to allow liberty to his subjects, he had no mind that they should enjoy it in reality. The sense of his subjection to his own vassals sunk deep in his mind. He became sullen, silent, and reserved. He shunned the society of his former friends; and retired into the Isle of Wight, as if to hide his disgrace in solitude; but, in reality, to meditate revenge against the barons. He sent to the continent to enlist a large body of mercenary troops, and made complaints to the pope of the insurrections of the barons against him. The pontiff very warmly espoused his cause; a bull was sent over, annulling the whole charter; and at the same time the foreign troops arriving, the king once more found himself in a condition to demand his own terms from his subjects.

The barons had made no preparations for war, not suspecting the introduction of a foreign army. The king, therefore, was for some time undisputed master of the field, and the most horrid cruelties were committed by his army. The barons being totally unable to raise an army capable of contending with that of John, applied to their old enemy Philip of France, offering to acknowledge his eldest son Lewis for their sovereign, on condition of his protecting them from the fury of John and his mercenaries. The French king accepted their proposal with joy; and twenty-five hostages which he demanded being sent over, began to make the most diligent preparations for this expedition, regardless of the menaces of the pope, who threatened him with excommunication, and actually excommunicated his son Lewis some time after.

The first troops who came to the assistance of the barons, were only a body of 7000 men; but, soon after, Lewis with a powerful army landed at Sandwich. The first effect of this invasion was, that most of John's foreign troops deserted, refusing to serve against the heir of their monarchy. Many considerable noblemen also deserted his cause, and Lewis daily gain-

ed ground. This prince advanced to London, where the barons and burghers did him homage, and took the oath of allegiance, after he had sworn to confirm the liberties and privileges of the people. His imprudence, however, in preferring on all occasions his French subjects to the English, soon excited a jealousy against him, which proved very prejudicial to his cause. This jealousy was greatly increased by the death-bed confession of the count de Melun, one of his courtiers, who declared to those about him, that it was Lewis's design to exterminate the English barons as traitors, and to bestow their dignities and estates upon his French subjects, on whose fidelity he could more safely rely. This caused a considerable desertion among Lewis's party; so that John once more found himself in a condition to make an effort for his crown. He resolved to penetrate into the heart of the kingdom; and, for this purpose, he departed from Lynn, and took the road towards Lincolnshire at the head of a great body of troops. His road lay along the shore, which was overflowed at high water; but the king, not being apprised of this, or being ignorant of the tides of the place, lost all his carriages, treasure, and baggage by their influx. He himself escaped with the utmost difficulty, and arrived at the abbey of Swinestead; where his grief for the loss he had sustained, and the distracted state of his affairs, threw him into a fever, which soon appeared to be attended with fatal symptoms. He died at Newark in the year 1216, the 51st of his age, and 18th of his reign. He left two legitimate sons: Henry, who succeeded him on the throne, and was now about nine years of age; and Richard, who was about seven. He left also three daughters; Jane, married to Alexander king of Scotland; Eleanor, married to the earl of Pembroke; and Isabella, married to the emperor Frederic II.

When John died, the earl of Pembroke was marshal of England. By this office he was at the head of the army, and of consequence, in times of such turbulence, at the head of the state. He was a nobleman of great honour and fidelity, and had continued faithful to John in his greatest reverses of fortune. He now determined to support the authority of the infant prince Henry; and therefore carried him immediately to Gloucester, where the ceremony of coronation was performed, in the presence of Gualo the legate and a very few noblemen, by the bishops of Winchester and Bath. The young prince was obliged to swear fealty to the pope, and renew the homage which his father had done for the kingdom; after which the earl of Pembroke was chosen protector.

Till the king arrived at the years of maturity, the transactions of his reign can only be considered as the consequences of the disposition of his tutors. Pembroke caused him grant a new charter of liberties, consisting of the concessions extorted from John, with new charters, some alterations; and the next year it was renewed, with the addition of some other articles. Thus these famous charters were issued very nearly to the shape in which they have ever since stood; and they were, during many generations, esteemed the most sacred rampart to national liberty and independence. As they secured the rights of all orders of men, they were anxiously defended by all, and became in a manner the basis of the English monarchy, and a kind of original contract,

England.

144
Death of
king John145
Henry II.146
He grants
new charters.147
They force
him to sign
Magna
Charta.148
He raises an
army against
them.149
The king-
dom offered
to Lewis
the French
king's son.

England.

contract, which both limited the authority of the king, and ensured the conditional allegiance of his subjects. Though often violated, they were still claimed and recalled by the nobility and people; and as no precedents were supposed valid that infringed them, they rather acquired, than lost, authority, from the frequent attempts made against them, in several ages, by regal and arbitrary power.

These charters were made use of by Pembroke as arguments to draw off the malecontent barons from their allegiance to Lewis. He represented to them, that, whatever jealousy they might have entertained against the late king, a young prince, the lineal heir of their ancient monarchs had now succeeded to the throne, without succeeding either to the resentments or principles of his predecessor: That the desperate expedient, which they had employed, of calling in a foreign potentate, had, happily for them, as well as for the nation, failed of entire success; and it was still in their power, by a quick return to their duty, to restore the independence of the kingdom, and to secure that liberty for which they so zealously contended: That, as all past offences of the barons were now buried in oblivion, they ought, on their part, to forget their complaints against their late sovereign; who, if he had been any wife blameable in his conduct, had left to his son the salutary warning to avoid his paths, which had led to such fatal extremities: And that, having now obtained a charter for their liberties, it was their interest to shew, by their conduct, that that acquisition was not incompatible with their allegiance; and that the rights of the king and people, so far from being hostile and opposite, might mutually support and sustain each other.

147
Decline of
prince
Lewis's
party.

These considerations, enforced by Pembroke's known character of constancy and fidelity, had a very great influence on the barons. Most of them began to negotiate with him, and many actually returned to their duty. At the same time Lewis continued to disgust those of his own party by the preference which he visibly gave to the French. Though he went over to France, therefore, and brought fresh succours from thence, he found that his party was greatly weaker than before, by the desertion of his English confederates; and that the death of king John had, contrary to his expectations, occasioned the total ruin of his affairs. In a short time Pembroke was so much strengthened by deserters from Lewis's party, that he ventured to invest Mount-Sorel; though upon the approach of the count de Perche with the French army, he desisted from that enterprize. The French general immediately marched to Lincoln; and, being admitted into the town, laid siege to the castle, and soon reduced it to extremity. Pembroke summoned his forces from every quarter, in order to relieve this important place; and he appeared so much superior to the French, that they shut themselves up within the city, resolving to take shelter there. But the garrison of the castle having received a strong reinforcement, made a vigorous sally upon the besiegers, while the English army assaulted them from without. The French army was totally routed; the count de Perche with only two persons more were killed; but many of the chief commanders, and about 400 knights, were made prisoners. On the news of this fatal event, Lewis raised

the siege of Dover, and retired to London; where he received intelligence of a new disaster, which put an end to all his hopes. A French fleet, which carried a strong reinforcement, had appeared on the coast of Kent; where they were attacked and repulsed with considerable loss, by Philip D'Albiny. He is said to have gained the victory by the following stratagem. Having got the wind of the French, he came down upon them with violence; and throwing on their faces a great quantity of quicklime, which he purposely carried on board, they were so blinded that they were disabled from defending themselves. This misfortune so discouraged the barons who yet adhered to Lewis, that they halted from every quarter to make their submission to Pembroke; and Lewis himself, finding his affairs totally desperate, was glad to make his escape from a country where every thing was become hostile to him. He therefore concluded a peace with the Protector; promised to evacuate the kingdom; and only stipulated in return, an indemnity to his adherents, and a restitution of their honours and fortunes, together with the free and equal enjoyment of those liberties which had been granted to the rest of the nation.

When the king grew up, he was found to be very unfit for the government of such a turbulent people as the English at that time were. Though his temper was mild and humane, he was also very weak, fickle, and irresolute. He disgusted the people by the cares he bestowed on foreigners; and this disgust rose once to such a height, that the barons refused to assemble in the general council of the nation, or parliament, at his desire. When commanded to do so, they sent a message to Henry, desiring him to dismiss his foreigners; otherwise they would drive both him and them out of the kingdom, and put the crown on the head of one who was more worthy to wear it. The facility of Henry's temper also induced him to heap riches upon his foreign favourites in a manner which he could by no means afford: this often brought him into very great straits; and to relieve himself, he was obliged to have recourse to many arbitrary measures, which he would not otherwise have chosen. Nothing, however, of very great moment happened till the year 1255, when the Pope found means to embark Henry in a scheme for the conquest of Naples, or Sicily on this side the Fare, as it was called; an enterprize which not only brought much dishonour on the king, but involved him for some years in very great expence and trouble. The court of Rome some time before had reduced the kingdom of Sicily to the same state of feudal vassalage which the pretended to exercise over England; but Mainfroy, an usurper, under pretence of governing the kingdom for the lawful heir, had seized the crown, and was resolved to reject the Pope's authority. As the Pope found that his own force alone was not sufficient to gain his point, he had recourse to Richard the king of England's brother, who had been created earl of Cornwall, and had such talents for amassing money, that he was reckoned the richest prince in Christendom. To him the Pope offered the kingdom of Sicily, upon the single condition of his conquering it from the usurper. Richard was too wise to accept this offer; upon which the Pope applied to Henry, and offered him the crown of Sicily for his second son Edmund. Henry, dazzled by this propo-

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149
He leaves
the king-
dom.

149
The pope undertakes
the conquest
of Sicily for
Henry's
son.

sal,

England.

fal, without reflecting on the consequences, or without consulting his brother or the parliament, gave the Pope unlimited credit to expend whatever sums he thought necessary for completing the conquest of Sicily. The consequence of this was, that Henry soon found himself involved in a debt of above 100,000 merks; and tho' greatly mortified at the largeness of the sum, he was still more so at the little prospect he had of succeeding in his enterprise; but, fearing the Pope's displeasure, he was obliged to call a parliament, in order to procure a supply.

The barons were greatly offended; and, instead of supplies, answered the king only with expostulations. The parliament was therefore dissolved, and a new one called, but with as little success as before. Henry was now reduced to go about among such of his subjects as were firmly attached to him, and beg assistance from them at their own houses. At length his barons, perceiving the exigencies to which he was reduced, seemed willing to afford him aid; and, upon his promising to grant them a plenary redress of grievances, a very liberal supply was obtained, for which he renewed their charter with more than usual solemnity. All the prelates and abbots were assembled with burning tapers in their hands; the magna charta was read in their presence; and they denounced sentence of excommunication upon all who should infringe upon its decisions. They then put out their tapers on the ground, and exclaimed, "May every foul that proves false to this agreement to sink and corrupt in hell." The king subjoined, "So help me God, I will inviolably keep all these things, as I am a man, as I am a Christian, as I am a knight, and as I am a king crowned and anointed."

150
Henry's
renewed
Magna
Charta.

151
He breaks
his engage-
ments,
which occa-
sions a re-
volution.

No sooner had the king received the supplies of which he stood so much in need, than he forgot all his engagements, put his confidence entirely in foreign counsellors, and evaded or broke thro' in numberless instances the charters he had given. This conduct rendered him so obnoxious to the barons, that Simon Mountfort earl of Leicester, a man of a very violent and ambitious temper, determined to attempt an innovation in the government. He formed a powerful confederacy against the king, and the designs of the conspirators were effectually put in execution in the year 1258. Henry had summoned a parliament in expectation of receiving supplies for his Sicilian project; when the barons appeared in the hall, clad in complete armour, with their swords by their sides. The king, struck with this unusual appearance, asked them what was their purpose, and whether they pretended to make him their prisoner. Roger Bigod, earl of Marischal, answered in name of the rest, that he was not their prisoner; that they even intended to grant him large supplies, in order to fix his son on the throne of Sicily; that they only expected some return for this expense and service; and that as the king had frequently made submissions to the parliament, had acknowledged his past errors, and had still allowed himself to be carried into the same path, which gave them such just reason of complaint, he must now yield to more strict regulations, and confer authority on those who were able and willing to redress the public grievances. Henry instantly assured them of his intentions to grant them all possible satisfaction; and for that purpose summoned

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another parliament at Oxford, to digest the new plan of government, and to elect proper persons who were to be entrusted with the chief authority. This assembly, afterwards called the *mad parliament*, went very expeditiously to work on the business of reformation. Twenty-four barons were appointed, with supreme authority, to reform the abuses of the state; and Leicester was placed at their head. Their first step was to order four knights to be chosen out of each county, who should examine into the state of their respective constituents, and should attend at the ensuing parliament to give information of their complaints. They ordained that three sessions of parliament should be regularly held every year; that a new high sheriff should be elected annually; that no wards nor castles should be entrusted to foreigners, no new forests made, nor the revenues of any counties let to farm.

152
Bad con-
duct of the
new rulers.

These constitutions were so just, that some of them remain to this day. But the parliament having once obtained the sovereign power, took care not to part with it again. They not only protracted the time of their sitting under various pretences; but at last had the effrontery to impose an oath upon every individual of the nation, declaring an implicit obedience to all the statutes executed, or to be yet executed by the barons who were thus appointed as rulers. They not only bridged the authority of the king, but the efficacy of parliament also; giving up to 12 persons the whole parliamentary power between each session.—Their usurpations were first opposed by the knights of the shire, whom they themselves had appointed. These had for some time begun to be regularly assembled in a separate house, to consider of the national grievances; the first of which was the conduct of the 24 rulers. They represented, that though the king had performed all that was required of him, the barons had hitherto done nothing on their part that shewed an equal regard for the people; that their own interest and power seemed the only aim of all their decrees; and they even called upon the king's eldest son prince Edward to interpose his authority, and save the sinking nation.

153
Opposed by
prince Ed-
ward.

The prince was at this time about 22 years of age, and by his active and resolute conduct had inspired the nation with great hopes. He told those who made the application to him, that he had sworn to the late constitutions; and, on that account, though they were contrary to his own private opinions, he was resolved not to infringe them. At the same time, however, he sent a message to the barons, requiring them to bring their undertaking to an end, or otherwise to expect the most vigorous resistance to their usurpations. On this the barons were obliged to publish a new code of laws, which, though it contained scarce any thing material, yet, it was supposed, would for a while dazzle the eyes of the people, until they could take measures to establish their authority upon surer foundations. In this manner, under various pretences, they continued their power for three years; while the whole nation loudly condemned their treachery, and the Pope himself at last absolved the king and his subjects from the oath they had taken to obey their injunctions. Soon after this, a parliament was called, and the king reinstated in his former authority. The barons were obliged to submit for a time; but the earl

of

England.

England.

of Leicester having joined the Welsh, who at this time made an irruption into England, the kingdom was reduced to the most deplorable situation. The pusillanimity of the king prevented any proper or judicious method from being pursued for extricating the people from their distresses; and at last a treaty was concluded with the barons on the most disadvantageous terms that can be imagined. They were restored to the sovereignty of the kingdom, took possession of all the royal castles and fortresses, and even named the officers of the king's household. They summoned a parliament to meet at Oxford, in order more fully to settle the plan of government; and by this assembly it was enacted, that the authority of the 24 barons should continue not only during the life of king Henry, but also during that of prince Edward.

154
Who is de-
feated and
taken pri-
soner, with
the king
and his bro-
ther.

These scandalous conditions would have been easily complied with by king Henry; but they were utterly rejected by prince Edward, and a civil war immediately ensued. The prince was at first successful; but, through his impetuosity, occasioned the loss of a great battle, in which his father and uncle were taken prisoners, and he himself was obliged soon after to surrender to the earl of Leicester. The king was now reduced to the most deplorable situation. His partisans were totally disarmed, while those of the earl of Leicester still kept themselves in an offensive posture. Leicester seized the estates of no fewer than 18 barons; engrossed to himself the ransom of all the prisoners; monopolized the sale of wool to foreign markets; and at last ordained that all power should be exercised by nine persons, who were to be chosen by three others, or the majority of them; and these three were the earl of Leicester himself, the earl of Gloucester, and the bishop of Chichester.

155
First house
of com-
mons.

The miserable situation to which the kingdom was now reduced, proved at last the means of settling the government on a more proper foundation. Leicester, in order to secure himself, was obliged to have recourse to an aid, till now, entirely unknown in England, namely, that of the body of the people. He called a parliament, where, besides the barons of his own party, and several ecclesiastics who were not proper tenants of the crown, he ordered returns to be made of two knights from every shire; and also deputies from the boroughs, which had been hitherto considered as too inconsiderable to be allowed any share in the legislation. This parliament was called on the 20th of January 1265; and here we find the first outline of an English house of commons; an institution which has ever since been considered as the bulwark of British liberty.

The new parliament was far from being so compliant to Leicester as he had desired or expected. Many of the barons who had hitherto steadfastly adhered to his party, were disgusted with his boundless ambition; and the people, who found that a change of masters was not a change from misery to happiness, began to wish for the re-establishment of royal authority. Leicester at last, to make a merit of what he could not prevent, released prince Edward from his confinement, and had him introduced at Westminster-hall, where his freedom was confirmed by the unanimous voice of the barons. But though Leicester had all the popularity of restoring the prince, he was yet politic enough to keep him guarded by his emissaries, who watched all his actions. At last,

however, he found means to make his escape in the following manner. The duke of Gloucester, being disgusted with Leicester, retired from court, and went to his estates on the borders of Wales. His antagonist pursued him thither; and to give the greater authority to his arms, carried the king and prince of Wales along with him. This furnished young Edward with the opportunity he had so long desired. Being furnished by the earl of Gloucester with an horde of extraordinary swiftness, he took leave of his attendants, who were in fact his guards, but were not able to come up with him. They pursued him, however, for some time; but the appearance of a body of troops belonging to Gloucester soon put an end to their pursuit.

The prince no sooner recovered his liberty, than the royalists joined him from all quarters, and an army was soon procured which Leicester could not withstand. This nobleman now found himself in a remote quarter of the kingdom; surrounded by his enemies; and debarred from all communication with his friends by the river Severn, whose bridges Edward had broken down. In this extremity, he wrote to his son to hasten to his assistance from London, with a considerable army which he had under his command. With this view his son advanced to Kenilworth; but here he was surprised, and his army entirely dispersed, by prince Edward. The young prince, immediately after this victory, advanced against Leicester himself; who, ignorant of the fate of his son's army, had passed the Severn in boats. He was by no means able to cope with the royalists; his men being inferior both in numbers and resolution to their antagonists. His army was defeated with great slaughter. Leicester himself was slain, though he called out for quarter, together with his eldest son Henry, and about 160 knights and other gentlemen. The old king had been purposely placed by the rebels in the front of the battle, where he was wounded, and in great danger of being killed; but, crying out, "I am Henry of Winchester your king," he was saved and put in a place of security by his son, who had flown to his assistance. The body of Leicester being found among the dead, was barbarously mangled by one Roger Mortimer; and then sent to his widow, as a testimony of the royal party's barbarity and success.

This victory, gained at Evesham, proved decisive in favour of the royal party. Almost all the castles, garrisoned by the barons, hastened to make their submissions, and opened their gates to the king. The Isle of Axholme alone, and that of Ely, trusting to the strength of their situation, ventured to make resistance; but were at last reduced, as well as the castle of Dover, by the valour and activity of prince Edward. Adam de Gourdon, a courageous baron, maintained himself some time in the forests of Hampshire, committing depredations in the neighbourhood; and obliged the prince to lead a body of troops into that country against him. Edward attacked the camp of the rebels; and being transported by the ardour of action, leaped over the trench with a few followers, and encountered Gourdon himself in single combat. The victory was long disputed between these two valiant combatants; but ended at last in the prince's favour, who wounded his antagonist, threw him from his horse, and took him prisoner. He not only granted him his life; but introduced him that very night to the queen at Guildford,

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Prince Ed-
ward recov-
ers his li-
berty.

157
Earl of Lei-
cester de-
feated and
killed.

pro-

England. procured his pardon, and was ever after faithfully served by him.

158
Death of Henry III.

In 1271, prince Edward, having settled the affairs of the kingdom, undertook an expedition to the Holy Land, where he signalized himself by many acts of valour. The king's health declined visibly after the departure of his son; and at last, worn out with cares and the infirmities of age, he expired at St Edmondsbury on the 16th of November 1272, in the 64th year of his age and the 56th of his reign.

159
Edward I.

Prince Edward had reached Sicily in his return from the Holy Land, when he received an account of his father's death; at which he expressed much concern. As he knew that England was at that time in a state of perfect tranquillity, he was in no haste to return, but spent near a year in France before he made his appearance in England. He was received by his subjects with the utmost joy, and crowned at Westminster by Robert archbishop of Canterbury on the 19th of August 1274. He immediately applied himself to the correcting of those disorders which the civil commotions, and weak administration of his father, had introduced. A system of strict justice, bordering on severity, was introduced and kept up through the whole of this reign. The Jews were the only part of his subjects whom Edward oppressed. Many arbitrary taxes were levied upon them; 280 of them were hanged at once for adulterating the coin, the goods of the rest were confiscated, and all of them banished the kingdom.

160
Conquers Wales.

In 1276, the king undertook an expedition against Llewelyn prince of Wales, who had refused to do homage for his crown. The conquest of that country was not fully accomplished till the year 1283; after which the principality of Wales was annexed to the crown of England, and thenceforth gave a title to the king's eldest son*.—In 1286, the settlement of Wales appeared so complete, that the king went abroad in order to make peace between Alfonso king of Arragon, and Philip le Bel king of France, who had a difference about the kingdom of Sicily. He succeeded in his negotiations; but, staying abroad three years, he found that many disorders had been introduced in his absence. Many instances of robbery and violence had broke out in all parts of England; but the corruption of the judges, by which the fountains of justice were poisoned, was of still more dangerous consequence. Edward, in order to remedy this prevailing abuse, summoned a parliament, and brought the judges to a trial; where all of them except two, who were clergymen, were convicted of this flagrant iniquity, were fined, and deposed from their office. The amount of the fines levied upon them is of itself a sufficient proof of their guilt, being above 100,000 marks; an immense sum in those days, sufficient to defray the expences of a war betwixt two great nations. The king afterwards made all the new judges swear that they would take no bribes; but the deposing and fining the old ones was the more effectual remedy.

161
Attempts the conquest of Scotland.

In 1291, king Edward began to meditate the conquest of Scotland, which employed him during the rest of his life; but which, though that kingdom was by him reduced to the greatest distress, he was never able to accomplish*. At the same time, he was engaged in expensive contests with France; and these

* See Scotland.

multiplied wars and preparations for war, by obliging him to have frequent recourse to parliamentary supplies, became the remote causes of great and important changes in the government. The parliament was modelled into the form which has continued ever since. As a great part of the property of the kingdom, by the introduction of commerce and improvements in agriculture, was transferred from the barons to the lower class of people, for their consent was thought necessary for raising the supplies. For this reason, the king issued writs to the sheriffs, enjoining them to send to parliament, along with two knights of the shire, two deputies from each borough within their county; and these provided with sufficient powers from their constituents to grant such demands as they should think reasonable for the safety of the state. The charges of these deputies were to be borne by the boroughs which sent them; and so far were they from considering this deputation as an honour, that nothing could be more displeasing to any borough than to be thus obliged to send a deputy, or to any individual than to be thus chosen. The authority of these commoners, however, increased through time. Their union gave them weight; and it became customary among them, in return for the supplies which they granted, to prefer petitions to the crown for the redress of those grievances under which the nation was supposed to labour. The more the king's necessities increased, the more he found it necessary to give them an early redress; till, from requesting, the commons proceeded to requiring; and having all the property of the nation, they by degrees began also to be possessed of the power.

Edward I. died of a dysentery at Carlisle on the 7th of July 1307, as he was leading a great army into Scotland, against the inhabitants of which he had vowed the most dreadful vengeance. He was succeeded by his son Edward II. whom he had charged with his dying breath to prosecute the war against Scotland, and never to desist till he had finally subdued the kingdom. But the new king was of a very different disposition from his father. The Scots gradually recovered their power; and in 1314 gave the English such a terrible defeat at Bannockburn, that for many years no superiority of numbers could encourage them to look the Scots in the face. See SCOTLAND.

The reign of Edward II. affords no particulars of great moment. Being a prince of a weak understanding, though endowed with no remarkable bad qualities, of his father's reign was one continued series of quarrels with his turbulent subjects. His favourites were the most general causes of discontent. The first of these was one Piers Gavaston, the son of a Gascon knight of some distinction, who had honourably served the late king, and who, in reward for his services, had obtained an establishment for his son in the family of the prince of Wales.—To be the favourite of any king whatever, is no doubt in itself a sufficient offence to the rest of the courtiers. Numberless faults were therefore found with Gavaston by the English barons. When the king went over to France to espouse the princess Isabella, to whom he had been long contracted, Gavaston was left guardian of the realm, with more ample powers than had usually been conferred in such a case. But when the queen, who was of an imperious and intriguing spirit, arrived, Gavaston had the misfortune

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Dies, and is succeeded by Edward II.

164
Discontented of his subjects.

England.

England.

to fall under her displeasure also, on account of the ascendancy he had acquired over the king. A conspiracy was therefore soon formed against the favourite; at the head of which were, the queen, and the earl of Lancaster cousin-german to the king, and the most opulent and powerful nobleman in England. The king, unable to resist such a combination, was at last obliged to banish Gavaston; but recalled him some time after. This was sufficient to spread an alarm over the whole kingdom: a civil war ensued; and the nobility having got Gavaston into their hands, soon freed themselves of any further apprehensions from him, by putting him to death.

After the unfortunate defeat at Bannockburn, king Edward chose a new favourite named *Hugh Le Despenser*. He was a young man of a noble English family, some merit, and very engaging accomplishments. His father was a person of a much more respectable character than the son; but the being admitted to a share of king Edward's favour was a sufficient crime. The king imprudently disposed of some lords of their estates, in order to bestow them upon this favourite; and this was a sufficient pretence for openly attacking both the father and son. The earls of Lancaster and Hereford flew to arms. Sentence was procured from parliament of perpetual exile against the two Spensers, with a forfeiture of all their estates. At last the king took the field at the head of 30,000 men, and pressed the earl of Lancaster so closely, that he had not time to collect his forces together; and, flying from one place to another, he was at last stopped in his way towards Scotland, and made prisoner. He was immediately condemned by a court-martial; and executed on an eminence near Pomfret, with circumstances of the greatest indignity.

Spenser now triumphed for some time over his enemies; most of the forfeitures were seized for his use, and he is said to have been guilty of many acts of rapine and injustice. But he was soon opposed by a more formidable enemy. Queen Isabella fled to France, and refused to return to England till Spenser was removed from the royal presence, and banished the kingdom. Thus he made herself popular in England, where Spenser was universally disliked; and she had the pleasure of enjoying the company of a young nobleman named *Mortimer*, upon whom she had lately placed her affections. The queen's court, therefore, became a sanctuary for all the malcontents who were banished their own country, or who chose to come over. When the thought matters were ripe for her purpose, she set sail from Dort harbour, accompanied by 3000 armed men. She landed without opposition, on the coast of Suffolk, on the 24th of September 1326; and she no sooner appeared, than there seemed to be a general revolt in her favour. The unfortunate king found the spirit of dissolity spread over the whole kingdom. He had placed some dependence on the garrison of Bristol, which was under the command of the elder Spenser; but they mutinied against their governor; and that unfortunate favourite was delivered up, and condemned by the tumultuous barons to the most ignominious death. He was hanged on a gibbet in his armour; his body was cut in pieces and thrown to the dogs; and his head was sent to Winchester, where it was set on a pole, and exposed to the insults of the populace.

Young Spenser did not long survive his father. He was taken, with some others who had followed the fortunes of the wretched king, in an obscure convent in Wales. The queen had not patience to wait the formality of a trial; but ordered him to be immediately led forth before the insulting populace, and seemed to take a savage pleasure in beholding his distress. He was executed on a gibbet 50 feet high; his head was sent to London, where it was received by the citizens with brutal triumph, and fixed on the bridge.

In the mean time the king, who hoped to find refuge in Wales, was quickly discovered, and delivered up to his adversaries, who insulted him in the grossist manner. He was conducted to the capital amidst the insults and reproaches of the people, and confined in the tower. A charge was soon exhibited against him; in which no other crimes but his incapacity to govern, his indolence, his love of pleasure, and his being swayed by evil counsellors, were objected against him. His deposition, however, was quickly voted by parliament; he was assigned a pension for his support; his son Edward, a youth of 14, was chosen to succeed him, and the queen was appointed regent during the minority. The deposed monarch did not long survive the loss of his crown. He was at first consigned to the custody of the earl of Lancaster; but this nobleman shewing some marks of respect and pity, he was taken out of his hands, and delivered over to the Lords Berkeley, Mautravers, and Gournay, who were entrusted alternately, each for a month, with the charge of guarding him. While he was in Berkeley's custody he was still used with some degree of humanity; but when the turn of Mautravers and Gournay came, every species of indignity was practised upon him, as if they had designed to accelerate his death by the bitterness of his sufferings. It is reported, that one day when Edward was to be shaved, they ordered cold and dirty water to be brought from a ditch for that purpose; and when he desired it to be changed, and was still denied his request, he burst into tears, and exclaimed, That in spite of their insolence he would be shaved with clean and warm water. As his persecutors, however, saw that his death might not arrive, even under every cruelty they could practise, and were daily afraid of a revolution in his favour, they determined to rid themselves of their fears by destroying him at once. Mortimer, therefore, secretly gave orders to the two keepers, who were at his devotion, instantly to dispatch the king; and these ruffians contrived to make the manner of his death as cruel and barbarous as possible. Taking advantage of Berkeley's sickness, in whose custody he then was, and who was thereby incapacitated from attending his charge, they came to Berkeley-castle, and put themselves in possession of the king's person. They threw him on a bed, and held him down with a table which they had placed over him. They then ran a horn pipe up his body, through which they conveyed a red-hot iron; and thus burnt his bowels without disfiguring his body. By this infernal contrivance they expected to have their crime concealed: but the horrid shrieks of the king, which were heard at a distance from the castle, gave a suspicion of the murder; and the whole was soon after divulged by the confession of one of the accomplices. Gournay and Mautravers were held in detestation by all mankind; and

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Insurrection against him by the queen.

Edward deposed.

167
And cruelly murdered.

England. and when the ensuing revolution deprived their protectors of power, they found it necessary to fly the kingdom. Gournay was afterwards seized at Marseilles, delivered over to the seneschal of Guienne, and put on board a ship with a view of carrying him over to England; but he was beheaded at sea, by secret orders, as was supposed, of some nobles and prelates in England, anxious to prevent any discovery which he might make of his accomplices. Mautravers concealed himself for some years in Germany; but having found means of rendering some services to Edward III. he ventured to approach his person, threw himself on his knees before him, and received a pardon.

By the death of Edward II. the government fell entirely into the hands of the queen and her paramour Mortimer. The parliament, which raised young Edward to the throne, had indeed appointed 12 persons as his privy-council, to direct the operations of government. Mortimer excluded himself, under a shew of moderation; but at the same time secretly influenced all the measures that came under their deliberation. As this influence began very soon to be perceived, and the queen's criminal attachment to Mortimer was universally known, these governors soon became very obnoxious to the people. The first stroke given to Mortimer's power was during an irruption of the Scots, when the favourite prevented the young king from attacking the enemy. Though it is very probable that the English army would have been destroyed by making an attack on an army situated in such an advantageous post as the Scots at that time occupied, Mortimer incurred great blame on that account. He was accused of having allowed the Scots to make their escape; and the general disgust on this account was increased by his concluding a peace with that kingdom, wherein the English renounced all title to the sovereignty of Scotland for the sum of 30,000 merks. Soon after Mortimer seized and executed the earl of Kent, brother to the late king; who, supposing Edward II. to be still alive, had formed a design of reinstating him in his kingdom. The execution was so sudden, that the young king had not time even to interpose in his behalf; and Mortimer soon after seized this nobleman's estate for his own use, as he did also the immense fortunes of the Spensers.

Edward, finding the power of Mortimer a continual restraint upon himself, resolved to shake off an authority that was likewise grown odious to the whole nation. The queen and Mortimer had for some time chosen the castle of Nottingham for their residence. It was strictly guarded, the gates were locked every night, and the keys carried to the queen. It was therefore agreed between the king and some of the barons, who secretly entered into his designs, to seize upon them in this fortress. Sir William Eland the governor was induced to admit them through a subterraneous passage, which had been formerly contrived for an outlet, but was now clogged up with rubbish, and known only to one or two. Through this passage the noblemen in the king's interest entered the castle in the night-time; and Mortimer, without having it in his power to make any resistance, was seized in an apartment adjoining to that of the queen. The parliament, which was then sitting, condemned him, without either permitting him to make his defence, or examining a single witness against

him. He was hanged on a gibbet at a place called *Elmes*, about a mile from London. A similar sentence was passed against some of his adherents, particularly Gournay and Mautravers, who found an opportunity of escaping as above-mentioned. The queen, who was perhaps the most culpable of the whole, was screened by the dignity of her station. She was, however, deposed from all share of power; and confined for life to the castle of Rising, with a pension of 3000 pounds a-year. From this confinement she was never let free, tho' the king paid her an annual visit of ceremony. She lived 25 years after her deposition.

Edward III. proved the greatest warrior that ever sat on the English throne. He first attempted to raise Edward Baliol to the sovereignty of Scotland; but this he found impossible fully to accomplish. He next invaded France, where he gained great advantages. In his absence the Scots invaded England; but were entirely defeated at Durham, and their king himself taken prisoner. The English king in the mean time continued his victories on the continent; in which he was greatly assisted by Edward furnished the *Black Prince*, the greatest hero recorded in the English annals. But for the wars of Edward III. and the exploits of this famous prince, see the articles *SCOTLAND* and *FRANCE*. The Black Prince died on the 8th of June 1376, and the king survived only about a year. He expired on the 21st of June 1377, and was succeeded by his son Richard II.

As the new king was only eleven years old when he ascended the throne, the government was vested in the hands of his three uncles the dukes of Lancaster, York, and Gloucester. The different dispositions of these noblemen, it was thought, would cause them check the designs of each other. Lancaster was neither popular nor enterprising; York was indolent and weak; and Gloucester turbulent, popular, and ambitious. Discontents first arose among the common people. They had now acquired a share of liberty sufficient to inspire them with a desire for more, and this desire was greatly increased by the discourses of one John Ball a seditious preacher. He went about the country, and inculcated on his audience, that mankind were all derived from one common stock; and that all of them had equal right to liberty and the goods of nature, of which they had been deprived by the ambition of a few insolent rulers.

These doctrines were greedily swallowed by the populace, who were farther inflamed by a new imposition of three groats a-head upon every person in the kingdom above 15 years of age. This had been granted as a supply by parliament, and was no doubt necessary on account of the many expensive wars in which the kingdom was engaged; but its apparent injustice, in laying no more burden upon the rich than the poor, excited the utmost resentment of the people. The manner, too, of collecting this tax, soon furnished them with an occasion of revolt. It began in Essex, where a report was industriously spread that the peasants were to be destroyed, their houses burned, and their farms plundered. A blacksmith, well known by the name of *Wat Tyler*, was the first that excited them to arms. The tax-gatherers coming to this man's house while by *Wat Tyler* he was at work, demanded payment for his daughter. This he refused, alleging that she was under the age

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Mortimer
executed.276
Richard II.277
Dangerous
insurrection
by *Wat Tyler*.

England.

mentioned in the act. One of these fellows offered to produce a very indubitable proof to the contrary, and at the same time laid hold of the maid. This the father resenting, immediately knocked out the ruffian's brains with his hammer. The bystanders applauded the action; and exclaimed that it was high time for the people to take vengeance on their tyrants, and to vindicate their native liberty. The whole country immediately took arms, and the insurgents soon amounted to above 100,000 men. They advanced to Blackheath, where they sent a message to the king who had taken shelter in the tower, desiring a conference with him. The king was desirous of complying with their demands, but was intimidated by their fierce behaviour. In the mean time they entered the city, burning and plundering the houses of such as were obnoxious for their power or riches. Their animosity was particularly levelled against the lawyers, to whom they shewed no mercy. The king at last, knowing that the tower was not able to resist their assaults, went out among them, and desired to know their demands. To this they made a very humble remonstrance; requiring a general pardon, the abolition of slavery, freedom of commerce in the market-towns, and a fixed rent instead of those services required by the tenure of villenage. The king granted all these requests; and charters were made out by which the grant was ratified. In the mean time, however, another body of these insurgents had broke into the tower, and murdered the chancellor, the primate, and the treasurer, with some other officers of distinction. They then divided themselves into bodies, and took up their quarters in different parts of the city. At the head of one of these was Wat Tyler, who led his men into Smithfield, where he was met by the king, who invited him to a conference under pretence of hearing and redressing his grievances. Tyler ordered his companions to retire till he should give them a signal, and boldly ventured to begin a conference with the king in the midst of his retinue. His demands were, That all slaves should be set free; that all commonages should be open to the poor as well as to the rich; and that a general pardon should be passed for the late outrages. Whilst he made these demands, he now and then lifted up his sword in a menacing manner: which insolence so raised the indignation of William Walworth lord mayor of London, that, without considering the danger to which he exposed his majesty, he stunned Tyler with a blow of his mace; while one of the king's knights riding up, dispatched him with his sword. The mutineers, seeing their leader fall, prepared themselves to take revenge. Their bows were already bent for execution; when Richard, though not yet 16 years of age, rode up to the rebels, and with admirable presence of mind cried out: "What, my people, will you kill your king? Be not concerned for the loss of your leader. I myself will now be your general. Follow me into the field, and you shall have whatever you desire." The multitude immediately desisted, and followed the king into the fields, where he granted them the same charters that he had before granted to their companions. These charters, however, were soon after revoked, and the common people reduced to the same situation in which they had formerly been.

The courage, address, and presence of mind, which

the king had discovered in quelling such a dangerous tumult, gave great hopes to the nation: but, in proportion as Richard advanced in years, these hopes were blasted; and his want of capacity, or at least of solid judgment, appeared in every enterprise he attempted. Weak princes are never without favourites, by whom they are governed; and these favourites most certainly become obnoxious to the rest of the courtiers. Richard's first favourite was Robert Vere earl of Oxford, and an association against him was soon formed by the rest of the nobility. At the head of it were Mowbray earl of Nottingham, Fitz Alan earl of Arundel, Percy earl of Northumberland, Montacute earl of Salisbury, and Beauchamp earl of Warwick. Vere was impeached in parliament; and though nothing of moment was even alleged against him, he was condemned and deprived of his office. They next proceeded to attack the royal authority itself. Under pretence that the king was yet unable to govern the kingdom, tho' at that time 21 years of age, they appointed a commission of 14 persons to whom the sovereignty was to be transferred for a year. This measure was driven forward by the duke of Gloucester, and none but his own faction were admitted as members of the committee. The king could not without regret perceive himself thus totally deprived of authority. He first endeavoured to gain over the parliament to his interests, by influencing the sheriffs of each county, who were then the only returning officers. This measure failing, he next applied to the judges. They declared, that the commission which had deprived the king of his authority was unlawful, and that those who procured or advised it were punishable with death. Their sentence was quickly opposed by declarations from the lords. The duke of Gloucester armed his partisans; and appeared at Haringay park near Highgate, at the head of a body of men sufficient to intimidate the king and all his adherents. These insurgents, sensible of their own power, began by demanding of the king the names of those who had advised him to his late rash measures. A few days afterwards they appeared armed in his presence, and accused by name the archbishop of York, the duke of Ireland, the earl of Suffolk, and Sir Robert Tresilian, one of the judges who had declared in his favour, together with Sir Nicholas Bember, as public and dangerous enemies to the state. The duke of Ireland fled into Cheshire, where he attempted to raise a body of forces; but was quickly obliged to fly into Flanders, on the arrival of the duke of Gloucester with a superior army. Soon after, the king was obliged to summon a parliament, where an accusation was drawn up against five of his counsellors. Of these only Sir Nicholas Bember was present; and he was quickly found guilty, condemned, and executed, together with Sir Robert Tresilian, who had been discovered and taken during the interval. Lord Beauchamp of Holt was soon after condemned and executed; and Sir Simon Burley, who had been appointed the king's governor, shared the same fate, tho' the queen continued for three hours on her knees before the duke of Gloucester, imploring his pardon.

Such unparalleled insolence and barbarity in a subject could not go unpunished. In 1389, the king, at an extraordinary council of the nobility assembled after Easter, to the astonishment of all present, desired to know

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Cahals and
insolence of
the nobles

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He is killed.

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175
The king
takes the
power into
his own
hands.

know his age. Being told that he was turned off two and twenty, he alleged that it was then time for him to govern without help; and that there was no reason why he should be deprived of those rights which the meanness of his subjects enjoyed. The lords answered in some confusion, that he had certainly an undisputed right to take upon himself the government of the kingdom. "Yes," (replied the king,) I have long been under the government of tutors; and I will now first shew my right to power by their removal. He then ordered Thomas Arundel, whom the commissioners had lately appointed chancellor, to give up the seals; which he next day delivered to William Wickham, bishop of Winchester. He next removed the duke of Gloucester, the earl of Warwick, and other lords of the opposition, from the council; and all the great officers of the household, as well as the judges, were changed.

The king being thus left at liberty to govern as he thought proper, for some time behaved in such a manner as to gain the affections of the people. It doth not appear indeed that he ever gave much cause of complaint; but it was impossible for any prince in those days to keep himself secure on the throne but by a very severe and vigorous administration. The duke of Gloucester, perceiving that Richard was not of a warlike disposition, frequently spoke with contempt of his person and government, and deliberated concerning the lawfulness of throwing off all allegiance to him. The king being informed of his conduct by spies appointed for that purpose, at last formed a resolution of ridding himself of Gloucester and his faction at once. He therefore ordered that nobleman to be immediately arrested and sent over to Calais, where there was no danger of his being rescued by his numerous adherents. The earls of Arundel and Warwick were seized at the same time; and a new parliament, which the king knew would be perfectly obedient to his will, was summoned to Westminster. Here the commission of 14, who had usurped on the royal authority, was annulled for ever; all those acts which had condemned his former ministers were repealed; and the general pardon which the king had formerly given when he assumed the government into his own hands, was revoked. Several of Gloucester's party were condemned and executed, and at last that nobleman himself was called for to take his trial as well as the rest; but he had before been privately dispatched in prison.

After the destruction of the duke of Gloucester and the heads of his party, a misunderstanding arose among the noblemen who had joined in the prosecution. The duke of Hereford appeared in parliament, and accused the duke of Norfolk of having spoken seditious words against his majesty in a private conversation. Norfolk denied the charge, gave Hereford the lie, and offered to prove his innocence by single combat. The challenge was accepted; but on the day appointed for the duel, the king would not suffer the combatants to engage, but commanded both of them to leave the kingdom. The duke of Norfolk he banished for life, but the duke of Hereford only for ten years. The former retired to Venice, where in a short time he died of a broken heart. Hereford behaved in a resigned and submissive manner; which so pleased the king, that he consented to shorten the time of his banishment four years: he also granted him letters patent, ensuring

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Duke of
Gloucester
murdered.

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Dukes of
Hereford
and Nor-
folk banish-
ed.

him of the enjoyment of any inheritance which should fall to him during his absence; but upon the death of his father the duke of Lancaster, which happened shortly after, Richard revoked those letters, and kept the estate to himself.

This last injury inflamed the resentment of Hereford to such a degree, that he formed a design of dethroning the king. He was a great favourite both with the army and people; he was immensely rich, and connected by blood or alliance with all the great families of the nation. The king, at the same time, it is said, gave himself up to an idle, effeminate life; and his ministers following his example, the national honour was lost. The number of malcontents daily increased, and only waited for the absence of the king, in order to put their schemes in execution; and this opportunity soon offered.

The earl of March presumptive heir to the crown, having been appointed the king's lieutenant in Ireland, was slain in a skirmish with the natives of that country; which so incensed Richard, that, unmindful of his precarious situation at home, he went over to Ireland with a considerable army, in order to revenge his death in person. The duke of Lancaster (for that was the title which Hereford assumed on the death of his father) hearing of the king's absence, instantly embarked at Nantz; and with a retinue only of 60 persons in three small vessels, landed at Ravenspur in Yorkshire. The earl of Northumberland, who had long been a malcontent, together with Henry Percy his son, who from his ardent valour was surnamed *Hopspur*, immediately joined him with their forces; and the people flocked to him in such numbers, that in a few days his army amounted to 60,000 men.

Richard, in the mean time, continued in perfect security in Ireland for some time. Contrary winds for three weeks together prevented his receiving any news of the rebellion which was begun in his native dominions. He landed therefore at Milford Haven without suspicion, attended by a body of 20,000 men; but immediately found himself opposed by a power which he could by no means resist. His army gradually deserted him, till at last he was obliged to acquiesce in the duke, that he would submit to whatever terms he pleased to prescribe. The duke did not think proper to enter into any treaty with the king; but carried him to London, where he was confined close prisoner in the tower, formally deposed by parliament, or rather by the duke of Lancaster, and at last put to death. The manner of his death is variously related. According to some, eight or nine ruffians were sent to the castle of Pomfret, whither the unhappy prince had been removed, in order to dispatch him. They rushed unexpectedly into his apartment; but Richard, knowing their design, resolved to sell his life as dear as possible. He wrested a pole-ax from one of the murderers, with which he killed four of them; but was at length overpowered and killed. Others relate that he was starved in prison; and that after he was denied all nourishment, he prolonged his life 14 days, by feeding on the flocks of his bed. He died in the year 1399, in the 34th year of his age, and 23d of his reign.—It was during the reign of Richard II. that Wickliff, the noted reformer, published his doctrines in England. See WICKLIFF.

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Hereford
forms a
scheme of
dethroning
the king.

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Richard de-
posed and
murdered.

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Duke of
Lancaster's
claim to the
crown.

After sentence of deposition had been pronounced on Richard by both houses of parliament, the throne being then vacant, the duke of Lancaster stepped forth; and having crossed himself on the forehead and on the breast, and called on the name of Christ, gave in his claim to the throne in the following words, which we shall give in the original language. "In the name of Father, Son, and Holy Ghost, I Henry of Lancaster, challenge this realm of Ynglond, and the crown, with all the members and the appurtenances; als I that am descendit by right line of the blode, coming from the gude king Henry therde, and throge that right that God of his grace hath sent me, with help of kyn, and of my frendes to recover it; the which realm was in poynt to be ondene by default of governance, and ondoing of the gude laws."

The right which the duke here claimed by descent from Henry III. proceeded on a false story that Edmond earl of Lancaster, son of Henry III. was really the elder brother of Edward I.; but that, by reason of some deformity in his person, he had been postponed in the succession, and Edward the younger brother imposed on the nation in his stead. The present duke of Lancaster inherited from Edmund, by his mother, the right which he now pretended to the crown; though the falsehood of the story was so generally known, that he thought proper to mention it only in general terms.—No opposition, however, was made to the validity of this title in parliament; and thus commenced the differences between the houses of York and Lancaster, which were not terminated but by many bloody and ruinous wars.

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Henry IV.

The reign of Henry IV. was little else than a continued series of insurrections. In the very first parliament he called, no fewer than 40 challenges were given and accepted by different barons; and though Henry had ability and address enough to prevent these duels from being fought, it was not in his power to prevent continual insurrections and combinations against himself. The most formidable one was conducted by the earl of Northumberland, and commenced A. D. 1402. The occasion of it was, that Henry denied the earl liberty to ransom some Scots prisoners which had been taken in a skirmish with that nation. The king was desirous of detaining them in order to increase his demands upon Scotland in making peace; but, as the ransom of prisoners was in that age looked upon as a right belonging to those who had taken them, the earl thought himself grievously injured. The injury appeared still the greater, because Northumberland considered the king as indebted to him both for his life and crown. He resolved therefore to dethrone Henry; and to raise to the throne young Mortimer, who was the true heir to the crown, as being the son of Roger Mortimer earl of Marche, whom Richard II. had declared his successor. For this purpose he entered into an alliance with the Scots and Welsh, who were to make an irruption into England at the same time that he himself was to raise what forces he could in order to join them. But when all things were prepared for this insurrection, the earl found himself unable to lead on the troops, by a sudden fit of illness with which he was seized at Berwick. On this, young Piercy (surnamed *Hotspur*) took the command; and marched towards Shrewsbury, in order to join the

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Insurrection
of the earl
of North-
umberland.

Welsh. But the king had happily a small army with which he intended to have acted against the Scots; and knowing the importance of celerity in civil wars, instantly hurried down, that he might give battle to the rebels. He approached Shrewsbury before a junction with the Welsh could be effected; and the impatience of Piercy urged him to an engagement, which at that time he ought to have declined. The evening before the battle, he sent a manifesto to Henry; in which he renounced his allegiance, set the king at defiance, and enumerated all the grievances of which he imagined the nation might justly complain. He reproached him (and very justly) with his perjury; for Henry, on his first landing in England, had sworn upon the gospels, before the earl of Northumberland, that he had no other intention but to recover possession of the duchy of Lancaster, and that he would ever remain a faithful subject to king Richard. He aggravated his guilt, in first dethroning and then murdering that prince; and in usurping on the title of the house of Mortimer, to whom, both by lineal succession, and by declarations of parliament, the throne, then vacant by Richard's death, did of right belong. Several other heavy charges were brought against him; which, at that time, could be productive of no other effect than to irritate the king and his adherents to the utmost.

The armies on each side were in number about 12,000; so that they were not unmanageable by their commanders; and as both leaders were men of known bravery, an oblique engagement was expected. The battle was fought on the 20th of July 1403; and we can scarce find in those ages any other in which the shock was so terrible and constant. At last Piercy being killed by an unknown hand, the victory was decided in favour of the royalists. There are said to have fallen on that day near 2300 gentlemen, and 6000 private men, of whom near two thirds were of Piercy's army.

The earl of Northumberland having recovered from his sickness, and levied an army, was on his march to join his son; but being opposed by the earl of Westmoreland, and hearing of the defeat at Shrewsbury, he dismissed his forces, and came with a small retinue to the king at York. He pretended that his sole intention was to mediate between the contending parties; and the king thought proper to accept of his apology, and grant him a pardon for his offence. The other rebels were treated with equal lenity; and none of them, except the earl of Worcester and Sir Richard Vernon, who were regarded as the chief authors of the insurrection, perished by the hands of the executioner. This lenity, however, was not sufficient to keep the kingdom quiet; one insurrection followed another almost during the whole of this reign; but either through Henry's vigilance, or the bad management of the conspirators, they never could unite their forces in such a manner as was necessary for bringing their projects to bear.

This reign is remarkable for the first capital punishment inflicted on a clergyman of high rank. The archbishop of York having been concerned in an insurrection against the king, and happening to be taken prisoner, was beheaded without either indictment, trial, or defence; nor was any disturbance occasioned by this

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His son de-
feated and
killed at
Shrewsbury

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Archbishop
of York ex-
ecuted.

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Burning of
heretics in-
troduced.

this summary execution. But, the most remarkable transaction of this reign was, the introduction of that absurd and cruel practice of burning people on account of their religion. Henry, while a subject, was thought to have been very favourable to the doctrines of Wickliffe; but when he came to the throne, finding his possession of it very insecure, he thought superstition a necessary implement of his authority, and therefore determined by all means to pay court to the clergy. There were hitherto no penal laws against heresy; not indeed through the toleration of the court of Rome, but through the stupidity of the people, who could not perceive the absurdities of the established religion. But when the learning and genius of Wickliffe had once broken the fetters of prejudice, the ecclesiastics called aloud for the punishment of his disciples; and Henry, who was very little scrupulous in his conduct, resolved to gratify them. He engaged parliament to pass a law for this purpose: it was enacted, that when any heretic, who relapsed, or refused to abjure his opinions, was delivered over to the secular arm by the bishop or his commissaries, he should be committed to the flames before the whole people. This weapon did not remain long unemployed in the hands of the clergy. William Sautré, rector of St Olives in London, had been condemned by the convocation of Canterbury; his sentence was ratified by the house of Peers; the king issued his writ for the execution; and the unhappy man was burnt alive in the year 1401. The doctrines of Wickliffe, however, seem to have already gained ground very considerably in England. In 1405, the commons, who had been required to grant supplies, proposed in plain terms to the king to seize all the temporalities of the church, and employ them as a perpetual fund to serve the exigencies of the state. They insisted that the clergy possessed a third of the lands of the kingdom; that they contributed nothing to the public burdens; and that their exorbitant riches tended only to disqualify them from performing their ministerial functions with proper zeal and attention. When this address was presented, the archbishop of Canterbury, who then attended the king, objected that the clergy, tho' they went not in person to the wars, sent their vassals and tenants in all cases of necessity; while at the same time, they themselves who staid at home were employed night and day in offering up their prayers for the happiness and prosperity of the state. The speaker answered with a smile, that he thought the prayers of the church but a very slender supply. The archbishop, however, prevailed in the dispute; the king discouraged the application of the commons; and the lords rejected the bill which the lower house had framed for despoiling the church of her revenues. The commons were not discouraged by this repulse. In 1410, they returned to the charge with more zeal than before. They made a calculation of all the ecclesiastical revenues, which, by their account, amounted to 485,000 marks a-year, and included 18,400 ploughs of land. They proposed to divide this property among 15 new earls, 1500 knights, 6000 esquires, and 100 hospitals; besides 20,000 pounds a-year, which the king might keep for his own use: and they insisted that the clerical functions would be better performed than at present, by 15,000 parish-priests, at the rate of 7 marks a-piece of yearly stipend. This application was ac-

companied with an address for mitigating the statutes enacted against the Wickliffites or Lollards, so that the king knew very well from what source it came. He gave the commons, however, a severe reply; and further to satisfy the church that he was in earnest, ordered a Lollard to be burnt before the dissolution of parliament.

The king had been for some time subject to fits, which continued to increase, and gradually brought him to his end. He expired at Westminster in 1413, in the 46th year of his age, and the 13th of his reign. He was succeeded by his son Henry V. whose martial talents and character had at first occasioned unreasonable jealousies in the mind of his father, so that he thought proper to exclude him from all share of public business. The active spirit of Henry being thus restrained from its proper exercise, broke out in every kind of extravagance and dissipation. It is even reported, that, when heated with liquor, he scrupled not to accompany his riotous associates in attacking the passengers on the streets and highways, and robbing them of their goods. No sooner, however, did he ascend the throne, than he called together his former companions, acquainted them with his intended reformation, exhorted them to imitate his example; but strictly prohibited them, till they had given proofs of their sincerity in this particular, to appear any more in his presence: after which, he dismissed them with liberal presents. His father's wife ministers, who had checked his riots, found that they had, unknown to themselves, been paying the highest court to their sovereign; and were received with all the marks of favour and confidence. The chief justice, who had formerly imprisoned the prince himself, and therefore trembled to approach the royal presence, met with praises instead of reproaches for his past conduct, and was exhorted to persevere in the same rigorous and impartial execution of the laws. The king was not only anxious to repair his own misconduct, but also to make amends for these iniquities into which policy or necessity of affairs had betrayed his father. He expressed the deepest sorrow for the fate of the unhappy king Richard, and even performed his funeral obsequies with pomp and solemnity, and heaped favours upon all those who had shewn themselves attached to him. He took into favour the young earl of March, though his competitor for the throne; and gained so far on his gentle and unambitious nature, that he remained ever after sincerely attached to him. The family of Piercy was restored to its fortune and honours; and the king seemed desirous to bury all distinctions in oblivion. Men of merit were preferred, whatever party they had been of; all men were unanimous in their attachment to Henry; and the defects of his title were forgot amidst the personal regard which was universally paid him.

The only party which Henry was not able to overcome was the new sect of Lollards, or reformers of religion. These were now gaining such ground in England, that the Romish clergy were greatly alarmed, and Henry was determined to execute the laws upon them; The head of that party at present was Sir John Oldcastle, Lord Cobham; a nobleman who had distinguished himself by his valour and military talents on many occasions, and acquired the esteem both of the
late

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Henry V.186
Enforces
the laws a-
gainst here-
tics.

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late and present king. His high character and zeal for the new sect pointed him out to Arundel archbishop of Canterbury as a proper object of ecclesiastical fury, and therefore he applied to Henry for permission to indict him. The king desired him first to try gentle methods, and undertook to converse with lord Cobham himself upon religious subjects. He did so, but could not prevail, and therefore abandoned Cobham to his enemies. He was immediately condemned to the flames: but having found means to make his escape, he raised an insurrection; which was soon suppressed, without any other consequence than that of bringing a stain on the sect to which he belonged. Cobham himself made his escape, but four years afterwards was taken and executed as a traitor. Immediately after, the most severe laws were enacted against the Lollards. It was enacted, that whoever was convicted of Lollardy, besides suffering capital punishment according to the laws formerly established, should also forfeit his lands and goods to the king; and that the chancellor, treasurer, justices of the two benches, sheriffs, justices of the peace, and all the chief magistrates in every city and borough, should take an oath to use their utmost endeavours for the extirpation of heresy.

Notwithstanding these terrible laws, the very parliament which enacted them, namely that of 1414, when the king demanded a supply, renewed the offer formerly pressed upon Henry IV. and intrested the king to seize all the ecclesiastical revenues, and convert them to the use of the crown. The clergy were greatly alarmed. They could offer the king nothing of equal value. They agreed, however, to confer on him all the priories alien, which depended on capital abbeys in Normandy, and which had been bequeathed to them when that province was united to England. The most effectual method, however, of warding off the blow at present was by persuading the king to undertake a war with France, in order to recover the provinces in that kingdom which had formerly belonged to England. This was agreeable to the dying injunction of Henry IV. He advised his son never to let the English remain long in peace, which was apt to breed intestine commotions; but to employ them in foreign expeditions, by which the prince might acquire honour, the nobility in sharing his dangers might attach themselves to his person, and all the restless spirits find occupation for their inquietude. The natural disposition of Henry sufficiently inclined him to follow this advice, and the civil disorders of France gave him the fairest prospect of success. Accordingly, in 1415, the king invaded France at the head of 30,000 men. The great progress he made there is related at length under the article FRANCE. He had espoused the king's daughter, and conquered the greatest part of the kingdom. His queen was delivered of a son named Henry, whose birth was celebrated by the greatest rejoicings both at London and Paris; and the infant prince seemed to be universally regarded as heir to both monarchies. But Henry's glory, when it seemed to be approaching the summit, was blasted at once by death, and all his mighty projects vanished. He was seized with a fistula, a distemper which at that time the physicians had not skill enough to cure; and he expired on the 31st of August 1422, in the 34th year of his age, and the

10th of his reign.

Henry VI. succeeded to the throne before he was quite a year old, and his reign affords only the most dismal accounts of misfortunes and civil wars. His relations very soon began to dispute about the administration during the minority. The duke of Bedford, one of the most accomplished princes of the age, was appointed by parliament protector of England, defender of the church, and first counsellor to the king. His brother, the duke of Gloucester, was fixed upon to govern in his absence, while he conducted the war in France; and, in order to limit the power of both brothers, a council was named, without whose advice and approbation no measure could be carried into execution.

The kingdom of France was now in the most desperate situation. The English were masters of almost the whole of it. Henry VI. though but an infant, was solemnly invested with regal power by legates from Paris; so that Charles VII. of France succeeded only to a nominal kingdom. With all these great advantages, however, the English daily lost ground; and, in the year 1450, were totally expelled from France*. It may easily be imagined, that such a train of bad success would produce discontent among the rulers at home. The duke of Gloucester was envied by many on account of his high station. Among these was Henry Beaufort, bishop of Winchester, great uncle to the king, and the legitimate son of John of Gaunt brother to Richard II. The prelate, to whom the care of the king's education had been committed, was a man of great capacity and experience, but of an intriguing and dangerous disposition. He had frequent disputes with the duke of Gloucester, over whom he gained several advantages on account of his open temper. The duke of Bedford employed both his own authority and that of parliament to reconcile them, but in vain; their mutual animosities served for several years to embarrass government, and to give its enemies every advantage. The sentiments of the two leaders were particularly divided with regard to France. The bishop laid hold of every prospect of accommodation with that country; and the duke of Gloucester was for maintaining the honour of the English arms, and regaining whatever had been lost by defeats or delay. Both parties called in all the auxiliaries they could. The bishop resolved to strengthen himself by procuring a proper match for Henry, at that time 23 years old; and then bringing over the queen to his interests. Accordingly, the earl of Suffolk, a nobleman whom he knew to be steadfast in his attachments, was sent over to France, apparently to settle the terms of a truce which had then been begun, but in reality to procure a suitable match for the king.

The bishop and his friends had cast their eye on Margaret of Anjou, daughter of Regnier, titular king of Sicily, Naples, and Jerusalem; but without either real power or possessions. She was considered as the most accomplished princess of the age; both in mind and person; and it was thought would, by her own abilities, be able to supply the defects of her husband, who appeared weak, timid, and superstitious. The treaty was therefore hastened on by Suffolk, and soon after ratified in England. The queen came immediately into the bishop's measures: Gloucester was deprived

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France invaded.188
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Henry V.190
Married
Margaret
Anjou.

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ved of all real power, and every method taken to render him odious to the public. One step taken for this purpose was to accuse his duchess of witchcraft. She was charged with conversing with one Roger Bolingbroke, a priest and reputed necromancer; and also with one Mary Gourdeman, who was said to be a witch. It was asserted that these three in conjunction had made an image of the king in wax, which was placed before a gentle fire; and as the wax dissolved, the king's strength was expected to waver; and upon its total dissolution, his life was to be at an end. This accusation was readily believed in that superstitious age. The prisoners were pronounced guilty; the duchess was condemned to do penance and suffer perpetual imprisonment; Bolingbroke the priest was hanged, and the woman burnt in Smithfield.

The bishop, called also the cardinal, of Winchester, was resolved to carry his resentment against Gloucester to the utmost. He procured a parliament to be summoned, not at London, which was too well affected to the duke, but at St Edmundsbury, where his adherents were sufficiently numerous to overawe every opponent. As soon as Gloucester appeared, he was accused of treason and thrown into prison; and on the day upon which he was to make his defence, he was found dead in his bed, though without any signs of violence upon his body.

The death of the duke of Gloucester was universally ascribed to the cardinal of Winchester, who himself died six weeks after, testifying the utmost remorse for the bloody scene he had acted. What share the queen had in this transaction, is uncertain; but most people believed that without her knowledge the duke's enemies durst not have ventured to take away his life. The king himself shared in the general ill-will, and he never had the art to remove the suspicion. His incapacity also began every day to appear more clearly, and a pretender to the throne soon made his appearance.

In the year 1450, Richard duke of York began to think of preferring his claims to the crown. All the males of the house of Mortimer were extinct; but Anne, the sister of the last earl of Marche, having espoused the earl of Cambridge, who had been beheaded for treason in the reign of Henry V. had transmitted her latent, but not yet forgotten claim, to her son Richard. This prince, defended by his mother from Philippa only daughter of the duke of Clarence, second son of Edward III. stood plainly in order of succession before the king; who derived his descent from the duke of Lancaster, third son of that monarch. The duke was a man of valour and abilities, as well as of some ambition; and he thought the weakness and unpopularity of the present reign afforded a favourable opportunity to assert his title. The ensign of Richard was a white rose, that of Henry a red one; and this gave names to the two factions, who were now about to drench the kingdom in blood.

After the cardinal of Winchester's death, the duke of Suffolk, who also had been concerned in the assassination of Gloucester, governed every thing with uncontrollable sway. His conduct soon excited the jealousy of the other nobility, and every odious or unsuccessful measure was attributed to him. The duke, however, imagining that his crimes were of such a nature as could

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not be proved, boldly called upon his enemies to shew an instance of his guilt. The house of commons immediately opened against him a charge of corruption, tyranny, and treason. He was accused of being the cause of the loss of France; of persuading the French king, with an armed force, to invade England; and of betraying the secrets of state. The popular resentment against him was so strong, that Henry, in order to secure him as much as possible, sentenced him to five years banishment. This was considered by his enemies as an escape from justice. The captain of a ship was therefore employed to intercept him in his passage to France. He was seized near Dover, his head struck off on the side of a long-boat, and his body thrown into the sea.

The complaints against Henry's government were heightened by an insurrection headed by one John Cade, a native of Ireland. He had been obliged to fly into France for his crimes: but, on his return, seeing the people prepared for violent measures, he assumed the name of *Mortimer*; and, at the head of 20,000 Kentish men, advanced towards Blackheath. The king sent a message to demand the cause of their rising in arms. Cade in the name of the community answered, That their only aim was to punish evil ministers, and procure a redress of grievances for the people. On this a body of 15,000 troops were levied, and Henry marched with them in person against Cade, who retired on his approach, as if he had been afraid of coming to an engagement. He lay in ambush, however, in a wood; not doubting but he should be pursued by the king's whole army: but Henry was content with sending a detachment after the fugitives, and returning to London himself; upon which Cade issued from his ambushade, and cut the detachment in pieces. Soon after, the citizens of London opened their gates to the victor; and Cade, for some time, maintained great order and regularity among his followers. He always led them out into the fields in the night-time, and published severe edicts against plunder and violence of any kind. He was not, however, long able to keep his people in subjection. He beheaded the treasurer Lord Say, without any trial; and soon after, his troops committing some irregularities, the citizens resolved to shut their gates against him. Cade endeavouring to force his way, a battle ensued, which lasted all day, and was ended only by the approach of night. The archbishop of Canterbury, and the chancellor, who had taken refuge in the tower, being informed of the situation of affairs, drew up, during the night, an act of amnesty, which was privately dispersed among the rebels. This had such an effect, that in the morning Cade found himself abandoned by his followers; and retreating to Rochester, was obliged to fly alone into the woods. A price being set on his head by proclamation, he was discovered and slain by one Alexander Eden; who, in recompence for this service, was made governor of Dover castle.

The duke of York was well pleased to see these insurrections and discontents, which he resolved to encourage to the utmost of his power. Though he aspired to the crown, he did not yet think it proper to assert his right by force of arms; but he was at last put into a situation favourable to the accomplishment of his wishes by an unexpected accident. The king fell into

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a lethargic disorder, which increased his natural imbecility to such a degree that he could not maintain even the appearance of royalty any longer. The duke of York was then appointed lieutenant and protector of the kingdom, with powers to hold parliaments at pleasure. Upon this all the adherents of the house of Lancaster were immediately dismissed from court, and some of them imprisoned: the duke for some time continued peaceably in the enjoyment of his power; but at length the king recovering from his lethargic complaint, and surprised to find himself totally deprived of his authority, was persuaded by the queen to depose the duke of York. The latter had instantly recourse to arms; and Henry, though fore against his will, was obliged to face him in the field. A battle ensued at St Alban's; in which the royalists were defeated, and the duke of Somerset, the chief partisan of their cause, killed in the action. The king himself was wounded, and took shelter in a cottage near the field of battle; where he was taken prisoner, but was afterwards treated with great respect and kindness by the duke of York.

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tween Hen-
ry and the
duke of
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Henry, though he was now only a prisoner treated with the forms of royalty, was nevertheless pleased with his situation; but his queen, a woman of a bold and masculine spirit, could not bear to have only the appearance of authority, while others enjoyed all the real power. She therefore excited the king once more to assert his right by force of arms; and the duke of York was obliged to retire from court. A negotiation for peace was at first set on foot, but the mutual distrusts of both parties soon broke it off. The armies met at Bloreheath on the borders of Staffordshire, on the 23d of September 1459; and the Yorkists at first gained some advantages. But when a more general engagement was about to ensue, a body of veterans who served under the duke of York, deserted to the king; and this so intimidated the duke's party, that they separated the next day without striking a blow. The duke of York fled to Ireland; and the earl of Warwick, one of his ablest and best supporters, escaped to Calais, with the government of which he had been entrusted during the late protectorship.

The York party, though thus in appearance suppressed, only waited a favourable opportunity of retrieving their affairs. Nor was this opportunity long wanting. Warwick having met with some successes at sea, landed in Kent; and being there joined by other barons, marched up to London amidst the acclamations of the people. The city immediately opened its gates to him, and he soon found himself in a condition to face the royal army. An engagement ensued at Northampton on the 10th of July 1460; in which the royalists were entirely defeated, and the king again taken prisoner. The duke of York then openly laid claim to the crown; and on this occasion the first instance of a spirit of national liberty is said to have appeared in the house of lords. The cause of Henry and the duke of York was solemnly debated; and the latter, though a conqueror, did not absolutely gain his cause. It was determined that Henry should possess the throne during his life; and that the duke of York should be appointed his successor, to the utter exclusion of the prince of Wales, who was then a child.

Though the royal party now seemed destitute of e-

very resource, the queen still retained her intrepidity. She fled into Wales, where she endeavoured to raise another army. The northern barons, provoked at the southern ones for settling the government and succession to the crown without their consent, soon furnished her with an army of 20,000 men. Another battle was fought near Wakefield Green, on the 24th of December 1460. The Yorkists were defeated, and the duke himself was killed in the action. His head was afterwards cut off by the queen's orders, and fixed on one of the gates of York, with a paper-crown, in derision of his pretended title. His son the earl of Rutland, a youth of 17, was taken prisoner, and killed in cold blood by lord Clifford, in revenge for his father's death, who had fallen in the battle of St Alban's.

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Duke of
York kill-
ed.

After this victory, Margaret marched towards London, in order to set the king at liberty; but the earl of Warwick, who now put himself at the head of the Yorkists, led about the captive king, in order to give a sanction to his proceedings. He engaged the queen's forces at St Albans; but through the treachery of lord Lovelace, who deserted during the heat of the engagement with a considerable body of forces, Warwick was defeated, and the king fell once more into the hands of his own party.

The submission of the city of London seemed now to be the only thing wanting to complete the queen's success; but Warwick had secured it in his interests, and the citizens refused to open their gates to the queen. In the mean time, young Edward, eldest son of the late duke of York, put himself at the head of his father's party. He was now in the bloom of youth, remarkable for the beauty of his person and his bravery, and was a great favourite of the people. He defeated Jasper Tudor earl of Pembroke, at Mortimer's cross in Herefordshire. The earl himself was taken prisoner, and immediately beheaded by Edward's orders. After this, he advanced to London; and being joined by the remainder of Warwick's army, he soon obliged Margaret to retire, entered the city amidst the acclamations of the people, and was crowned king on the 5th of March 1461.

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Edward IV.

Notwithstanding all her misfortunes, however, Margaret still continued undaunted. She retired to the north, where she was soon joined by such numbers, that her army amounted to 60,000 men. She was opposed by young Edward and Warwick at the head of 40,000; and both armies met near Tooton in the county of York, on the 29th of March 1461. A bloody battle ensued, in which the queen's army was totally defeated; and as Edward, prompted by his natural cruelty, had ordered no quarter to be given, 40,000 of the Lancastrians were slain in the field or in the pursuit. After this disaster the queen fled to Scotland with her husband and son; and notwithstanding all the misfortunes she had already met with, resolved once more to enter England at the head of 5000 men granted her by the king of France. But even here she was attended by her usual bad fortune. Her little fleet was dispersed by a tempest, and she herself escaped with the utmost difficulty by entering the mouth of the Tweed. Soon after, a defeat, which her few forces sustained at Hexham, seemed to render her cause entirely desperate; and the cruelties practised upon all her adherents rendered it very dan-

dangerous to befriend her.

This last misfortune seemed to deprive the queen of every resource. She and her husband were obliged to seek for safety in a separate flight, without attendants, and even without the necessities of life. The unfortunate king imagined he could remain concealed in England; but in this he was deceived. He was taken prisoner, carried to the tower of London, and there ignominiously confined. The queen fled with her son into a forest; where, during the night, she was set upon by robbers, who deploiled her of her rings and jewels, and treated her with the utmost indignity. One of these robbers, however, more compassionate than the rest, conducted her to the sea-coast; whence she made her escape to Flanders, where her father, though very poor, entertained her as well as he was able. To the same courts retired the dukes of Somerset and Exeter; and both of them suffered the greatest degree of misery and want. Philip de Comines, the French historian, says, that he saw the duke of Exeter following the duke of Burgundy's equipage barefooted, and serving for his livelihood as a footman.

Edward being now securely fixed on the throne, began to give a loose to his favourite passions, which were cruelty and an immoderate love of women. Warwick, in order to divert him from the last of these, advised him to marry, and with his consent went over to France in order to conclude a match with Bona princess of Savoy. Warwick succeeded in his negotiation; but in the mean time king Edward had privately married Elizabeth Woodville, daughter of Sir Philip Woodville who had espoused the duchess of Bedford after her first husband's death. This incident exceedingly disgusted Warwick; and as the king took every occasion of widening the breach, an open rupture soon took place.

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Edward
sought to
gain him
by War-
wick.

After some unsuccessful attempts in England, Warwick, together with the duke of Clarence the king's brother, whom he had drawn into his schemes, left the kingdom. They embarked for Calais, and seized upon some Flemish vessels which they found lying along that coast. With these they entered one of the ports of France, and formed an alliance with Margaret the exiled queen. Lewis king of France prepared a fleet to reconduct them to England; and seizing a proper opportunity, they landed at Dartmouth with a small body of troops, while Edward was in the north suppressing an insurrection which had lately appeared there. Warwick was attended with astonishing success on his arrival in England, and in less than six days saw himself at the head of 60,000 men. Edward was now obliged in his turn to fly the kingdom. Having narrowly escaped an attempt made upon his person by the marquis of Montague, he embarked on board a small fleet which lay off Lynn in Norfolk. While at sea he, was chased by some ships belonging to the Hanse towns that were then at war both with France and England; but at length, having escaped all dangers, Edward landed safely in Holland, where he met with but an indifferent reception from the duke of Burgundy, with whom he had lately entered into an alliance.

Warwick in the mean time advanced to London, and once more related and placed on the throne the miserable king Henry VI. A parliament was called,

which very solemnly confirmed Henry's title to the throne, and Warwick himself was dignified by the people with the title of the *king-maker*. All the attainders of the Lancastrians were reversed; and every one was restored who had lost either honours or fortune by his former adherence to Henry's cause. All the adherents of Edward fled to the continent, or took shelter in monasteries, where they were protected by the ecclesiastical privileges. But Edward's party was not yet destroyed. After an absence of nine months, being seconded by a small body of troops granted him by the duke of Burgundy, he made a descent at Ravenpur in Yorkshire. At first he met with an indifferent reception; but his army increasing on his march, he was soon in a condition to appear before the capital, which immediately opened its gates.

The unfortunate Henry was thus again plucked from the throne; and the hopes of Warwick were almost totally blasted by the defection of Clarence, Edward's brother. Nothing now remained but to come to an engagement as soon as possible. Warwick knew his forces to be inferior to those of Edward, but placed great dependence on his own generalship. He therefore advanced to Barnet, within ten miles of London, where he resolved to wait the coming of Edward. The latter soon came up with him, and on the 14th of April 1471, a most obdurate and bloody battle was fought. Edward, according to custom, had ordered no quarter to be given; and obtained the victory through a mistake of a body of Warwick's forces, who fell with fury on their own party instead of the enemy. The earl himself was slain, together with his brother, and 10,000 of his bravest followers.

The queen was just then returned with her son from France, where she had been soliciting supplies. She had scarce time to refresh herself from the fatigues of the voyage, when she received the fatal news of the death of Warwick, and the total destruction of her party. All her resolution was not able to support her under such a terrible disaster. Her grief now for the first time, it is said, manifested itself by her tears; and she immediately took sanctuary in the abbey of Beaulieu in Hampshire. Here she still found some friends willing to assist her. Tudor earl of Pembroke, Courtney earl of Devonshire, the lords Wenlock and St John, with some other men of rank, encouraged her yet to hope for success, and promised to stand by her to the last. On this assurance, she resumed her courage; and advancing through the counties of Devon, Somerset, and Gloucester, increased her army every day. At last, however, she was overtaken by Edward with his victorious army at Tewkesbury, on the banks of the Severne. The queen's army was totally defeated; the

earl of Devonshire and lord Wenlock were killed in the field; the duke of Somerset, and about 20 other persons of distinction, who had taken shelter in a church, were surrounded, dragged out, and immediately beheaded; about 3000 of their party fell in battle, and the army was entirely dispersed. Queen Margaret and her son were taken prisoners, and brought to the king, who asked the prince in an insulting manner, how he dared to invade his dominions? The young prince replied, that he came thither to claim his just inheritance; upon which Edward struck him on the face with his gauntlet. The dukes of Clarence and Gloucester, lord Ha-

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Total de-
struction of
the queen's
party.

England.

England.

flings, and Sir Thomas Grey, taking this blow as a signal for farther violence, hurried the prince into the next apartment, and there dispatched him with their daggers. Margaret was thrown into the tower along with her husband Henry, who expired in that confinement a few days after. It was universally believed that he was murdered by the duke of Gloucester, though of this there was no direct evidence. Margaret was ransomed by the king of France for 50,000 crowns, and died a few years after in a most miserable situation.

Edward being now freed from all his enemies, began to inflict punishment on those who had formerly appeared against him. Among the cruelties he committed, that on his brother the duke of Clarence was the most remarkable. The king happening to be one day hunting in the park of Thomas Burdet, a servant of the duke, killed a white buck, which was a great favourite of the owner. Burdet, vexed at the loss, broke out into a passion, and wished the horns of the deer in the belly of the person who advised the king to that insult. For this exclamation Burdet was tried for his life, and executed at Tyburn. The duke of Clarence exclaimed against the iniquity of this sentence; upon which he was arraigned before the house of peers, found guilty, and condemned to death. The only favour granted him was to have the choice of his death; and his choice was a very singular one, namely, to be drowned in a butt of malmsey wine, which was accordingly done.—The rest of this reign affords little else than an history of the king's amours. Among his many mistresses, Jane Shore was the most remarkable. She was the wife of a merchant in the city, and a woman of exquisite good sense and beauty; but she had not virtue sufficient to resist the solicitations of a handsome man and a monarch.—The king died on the 9th of April 1482, in the 42d year of his age, and 21st of his reign, counting from his first assuming the crown. Besides five daughters, he left two sons; Edward prince of Wales, his successor, then in his 13th year; and Richard duke of York in his ninth.

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Edward V.

On the death of Edward IV. the kingdom was divided into two new factions. The queen's family, which, during the last reign, had come into power, was become obnoxious to the old nobility, who considered them as their inferiors. The king had endeavoured to prevent these animosities from coming to a height, by desiring, on his death-bed, that his brother Richard duke of Gloucester should be entrusted with the regency; and recommended peace and unanimity during the minority of his son. But the king was no sooner dead, than the former resentment between these parties broke out with violence; and the duke of Gloucester, who was endued with almost every bad quality, resolved to profit by their contentions. His first step was to get himself declared protector of the realm; and having arrested the earl of Rivers, the king's uncle and guardian, he met young Edward in his way from Ludlow castle, where the late king had resided during the latter part of his reign, and respectfully offered to conduct him to London. Having thus secured the person of the king, he next got possession of his brother's person also. The queen had retired with this child into Westminster Abbey; and it was not without extreme regret that she delivered him up at the intercession of the primate and archbishop of York.

In a few days after Gloucester had made himself master of the persons of the two princes, he had them confined in the tower, under pretence of guarding them from danger; and soon after spread reports of their illegitimacy, and by pretended obstacles put off the young king's coronation. Lord Stanley first began to suspect his designs; and communicated his suspicions to lord Hastings, who had long been firmly attached to the king's family. Lord Hastings would not at first give credit to this surmise; but he very soon had a fatal proof of the truth of what had been communicated to him. On the 13th of June 1483, he was hurried out of the council-room in the tower by Gloucester's order, and beheaded on a log of timber. The soldiers who carried him off made a bustle as though an attempt had been made to rescue him, and one of them discharged a blow at lord Stanley's head with a pole-ax; but he happily escaped it by shrinking under the table. The same day were executed the earl Rivers, and some others, who had committed no other crime than being faithful to the young king. To ingratiate himself with the populace, Gloucester next accused the late king's mistress, Jane Shore, of witchcraft; but, as nobody would give credit to this charge, he had her prosecuted for incontinency, and deserting her husband to live in adultery with another man. To this accusation she pleaded guilty; and was condemned to walk bare-foot through the city, and to do penance in St Paul's church in a white sheet, with a wax taper in her hand, before thousands of spectators. She lived about 40 years after this sentence, reduced to the most extreme wretchedness; and Sir Thomas More assures us, that he saw her gathering herbs for food in a field near the city.

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Punishment of
Jane Shore.

The protector now thought he might with safety lay claim to the throne. He had previously gained over the duke of Buckingham, a nobleman of great influence among the people. He used his utmost endeavours to inspire the people with a notion of the illegitimate birth of the late king, and consequently of his children. Dr Shaw, a popular preacher, was also hired to harangue the people to the same purpose from St Paul's cross. Having expatiated on the incontinency of the queen, and the illegality of the young king's title, he then made a panegyric on the virtues of the protector. "It is the protector, (continued he,) who carries in his face the image of virtue, and the marks of a true descent. He alone can restore the lost glory and honour of the nation." It was hoped, that, upon this occasion, some of the populace would have cried out, "Long live king Richard!" but the audience remaining silent, the duke of Buckingham undertook in his turn to persuade them. Having expatiated on the calamities of the last reign, and the illegitimacy of the present race, he told the people, that he saw only one method of warding off the miseries which threatened the state, which was by electing the protector; but he seemed apprehensive that he would never be prevailed upon to accept a crown accompanied with such difficulty and danger. He next asked his auditors, whether they would have the protector for their king; but was mortified to find that a total silence ensued. The mayor, who was in the secret, willing to relieve him in this embarrassed situation, observed, that the citizens were not accustomed to be harangued by a man
of.

England. of his quality, and would only give an answer to their recorder. This officer, therefore, repeated the duke's speech; but the people continuing still silent, "This is strange obduracy, (cried the duke): we only require of you, in plain terms, to declare, whether or not you will have the duke of Gloucester for your king; as the lords and commons have sufficient power without your concurrence." At this, some of the meaner apprentices, incited by the servants of the protector and Buckingham, raised a feeble cry of "God save king Richard!" The mob at the door repeated the cry; and throwing up their caps into the air, cried out, "A Richard! A Richard!" After this farce was acted, Buckingham, on the 24th of June 1483, waited on Richard with offers of the crown: but the protector, with hypocritical modesty, at first declined the offer; till being told that the people, in case of his refusal, must look out for one that would be more compliant, he accepted the government of England and France, with a resolution, as he said, to defend the one and subdue the other.

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Richard III.

202
Edward V.
his brother
murdered.

The first step taken by the new king was to send orders to Sir Robert Brackenbury governor of the tower, to put the young princes to death. But this he refused; and submissively answered, that he knew not how to embroil his hands in innocent blood. A fit instrument for this purpose, however, was not long wanting. Sir James Tyrrel readily undertook the office; and Brackenbury was ordered to resign the keys to him for one night. Tyrrel choosing three associates, Slater, Deighton, and Foresty, came in the night-time to the door of the chamber where the princes were lodged; and sending in the assassins, bid them execute their commission, while he himself staid without. They found the young princes in bed, and fallen into a sound sleep. The assassins smothered them with the bolster and pillows; after which they shewed their naked bodies to Tyrrel, who ordered them to be buried at the stair-foot under an heap of stones.

Richard having thus secured himself on the throne by the most iniquitous methods, attempted to strengthen his interest by foreign alliances, and procuring the favour of the clergy at home by great indulgences; but he found his power threatened from a quarter where he least expected an attack. The duke of Buckingham, who had been so instrumental in raising him to the throne, did not think himself properly rewarded. He made a demand of some confiscated lands in Hereford, to which his family had an ancient claim. Richard either reluctantly complied with his request, or only granted it in part; so that a coolness soon ensued between them, and in a little time Buckingham came to a resolution of dethroning the monarch whom he had just raised. For some time he remained in doubt, whether he should assume the crown himself, or set up another. At length he determined on the latter; and resolved to declare for Henry earl of Richmond, who was at that time an exile in Brittany, and was considered as the only surviving branch of the house of Lancaster. He was one of those who had the good fortune to escape the numerous massacres of the former reigns; but, as he was a descendant of John of Gaunt by the female line, he was for that reason obnoxious to those in power. He had long lived in exile, and was once delivered over to the ambassadors

of Edward IV. who were preparing to carry him over to England; when the duke of Brittany who delivered him, repented of what he had done, and took him from the ambassadors just as they were carrying him on ship-board. Between him and Buckingham a negotiation was soon begun; and, in order to strengthen Henry's title, a marriage was projected between him and the princess Elizabeth, eldest daughter of the late king; and the queen dowager was prevailed on to accede to the measure.

Richard, in the mean time, beginning to suspect Buckingham's fidelity, sent for him to court; but he, instead of obeying the summons, fled into Wales, where he raised a considerable army: Richard immediately put himself in a posture of defence, by levying some troops in the north, with whom he marched against the insurgents. In the mean time, however, Buckingham's forces being stopped by an inundation of the Severn, and finding it impossible to subsist on their own side of that river, dispersed themselves, notwithstanding the duke's utmost efforts to keep them together. The duke took refuge in the house of one of his old servants; by whom he was betrayed to the sheriff of Shropshire, and instantly condemned and executed.—The earl of Richmond, who had by this time landed in England, finding his hopes frustrated by the failure of Buckingham, hastily set sail again, and safely landed in Brittany. Richard sent ambassadors to Landais the duke of Brittany's minister, to treat about delivering up Henry to him. The minister entered into the negotiation; but Richmond having got notice of their intentions, fled into France, and reached the confines of that country when he was on the point of being overtaken by his enemies.

England.

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Insurrection
of the
Duke of Buck-
ingham for the
earl of Richmond.

204
Buckingham
executed.

205
Richmond
invades
England.

It was not long, however, before Richard heard that the earl of Richmond was making new preparations for the invasion of England. As the king knew not in what quarter to expect the invader, he took post at Nottingham, in the centre of the kingdom; and he had given commission to several of his officers to oppose the enemy wherever he should land. Richmond, in the mean time, set out from Harfleur in Normandy, with a retinue of about 2000 persons; and, after a navigation of six days, landed without opposition at Milford Haven in Wales, on the 7th of August 1485. Sir Rice ap Thomas, and Sir Walter Herbert, who were entrusted by Richard to oppose him in Wales, were both in his interest. The one deserted to him on his first appearance, and the other made but a very feeble resistance. On the news of this descent, Richard instantly resolved to meet his antagonist, and decide their mutual pretensions by a battle. Richmond, on the other hand, being reinforced by Sir Thomas Bourchier, Sir Walter Hungerford, and others, to the number of about 6000, boldly advanced with the same intention. In a few days both armies approached each other at Bosworth field near Leicester. The engagement began on the 22d of August 1485. Henry had about 6000 men, and Richard more than double that number; but lord Stanley, who commanded upwards of 7000 men for Richard, had made such a disposition as enabled him on occasion to join either party. Richard easily knew his intentions, but concealed them from his own men for fear of discouraging them; but, soon after the battle began, lord Stanley, by joining the earl

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England.

earl of Richmond's party, determined the victory in his favour. The tyrant perceiving his situation to be quite desperate, and seeing his rival at no great distance from him, drove up against him with fury, in hopes that either Henry's death or his own would decide the victory between them. He killed Sir William Brandon the earl's standard-bearer; he dismounted Sir John Cheyne; and was within reach of Richmond, when Sir William Stanley breaking in with his troops, Richard was surrounded and overwhelmed by numbers. His body was found in the field, covered with dead enemies, and besmeared with blood. It was thrown carelessly across a horse, carried to Leicester amidst the shouts of insulting spectators, and interred in the Gray-Friar's church of that place.

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Richard de-
feated and
killed.

The usurper's crown being found on the field of battle, was placed on the head of the conqueror, while the whole army cried out, "Long live king Henry!" Two days after the battle, Henry gave orders to confine Edward Plantagenet earl of Warwick, and son of the unfortunate duke of Clarence; and to release the prince Elizabeth, who had been confined in the tower. He then advanced by slow and gradual marches to the city of London, where he was received with the greatest demonstrations of joy. He was crowned king of England on the 30th of October 1485; and, to heighten the splendor on that occasion, he bestowed the rank of knights-banquet on 12 persons, and conferred peerages on three. Jasper earl of Pembroke, his uncle, he created duke of Bedford; Thomas lord Stanley his father-in-law, earl of Derby; and Edward Courtenay, earl of Devonshire. At the coronation likewise appeared a new institution, which the king had established for personal security as well as pomp; a band of 50 archers, who were denominated yeomen of the guard. But lest the people should take umbrage at this step, as if it implied a diffidence of his subjects, he declared the institution to be perpetual. The ceremony of the coronation was performed by cardinal Bourchier archbishop of Canterbury.—On the 18th of January 1486, he was married to the prince Elizabeth; and his marriage was celebrated at London with greater appearance of joy than either his first entry or his coronation had been. Henry remarked, with much displeasure, this general favour borne to the house of York; and the suspicions arising from it, not only disturbed his tranquillity during the whole of his reign, but bred disgust towards his consort herself, and poisoned all his domestic enjoyments.

The reign of Henry VII. was for several years disturbed by plots and insurrections. The people, by a long course of civil war, had become so turbulent and factious, that no governor could rule, nor could any king please them. One rebellion seemed extinguished only to give rise to another. The king at the beginning of his reign had given orders for the confinement of the duke of Clarence's son, as already mentioned. This unfortunate youth, who had the title of earl of Warwick, was, thro' long confinement, quite unacquainted with the world, and ignorant of the most common affairs of life. Harmless as he was, however, he was made an instrument to deceive the people. One Richard Simon, who lived in Oxford, trained up a baker's son named *Lambert Simnel*, to counterfeit the person of the earl of Warwick. He was instructed by

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Imposture
of Lambert
Simnel.

his tutor to talk of many facts and occurrences which had happened to him in the court of Edward. But as this imposture could not bear a close inspection, it was thought proper that he should first make his appearance in Ireland. Here he was received with the utmost joy. He was proclaimed king of Ireland; and conducted by the magistrates and populace of Dublin with great pomp to the castle, where he was treated conformably to his supposed birth and distinction. Henry easily perceived that his mother-in-law, disgusted with the severe treatment he gave her daughter, was at the bottom of this imposture. He therefore, by the advice of his council, confined her in a monastery, where she remained as long as she lived.—The next measure was to shew Warwick to the people. He was taken from the tower, and led through the principal streets of London; after which he was conducted in solemn procession to St Paul's, where great numbers were assembled to see him. Still, however, they proceeded in Dublin to honour their pretended monarch; and he was crowned with great solemnity in the presence of the earl of Kildare, the chancellor, and the other officers of state. At last, being furnished by the dukes of Burgundy with a body of 2000 veteran Germans under the command of Martin Swart, a brave and experienced officer, he resolved to invade England. He landed in Lancashire, from whence he marched to York, expecting that the country-people would rise and join him on his march. But in this he was deceived: the people were unwilling to join a body of foreigners; and were besides kept in awe by the great reputation of Henry. Lord Lincoln, therefore, who commanded the rebel army, determined to bring the matter to a speedy issue. Accordingly he met the royal army at Stoke in the county of Nottingham. An obstinate engagement ensued, but at length king Henry obtained a complete victory. Lord Lincoln, with 4000 private men, perished in the battle; and Simnel with his tutor Simon were taken prisoners. Simon being a priest, could not be tried by the civil power, and was only committed to close confinement. Simnel was pardoned, and made a scullion in the king's kitchen, whence he was afterwards advanced to the rank of falconer, in which employment he died.

The bad success of Simnel did not deter another from embarking in a similar imposture some years after. In 1492, the dukes of Burgundy caused a report to be spread, that the young duke of York, Edward V's brother, was still alive; and finding the rumour greedily received, he soon found a young man who assumed both his name and character. The person chosen to act this part was the son of one Osbeck, or Warbeck, a converted Jew, who had been in England during the reign of Edward IV. His name was *Peter*; but it had been corrupted after the Flemish manner into *Peterkin*, or *Perkin*. It was by some believed, that Edward, among his other amorous adventures, had a secret correspondence with Warbeck's wife, which might account for the great similarity of features observed between Perkin and that monarch. The dukes of Burgundy found this youth entirely suited to her purposes. The lessons he gave him were easily learned and strongly retained. His graceful air, his courtly address, his easy manners, and elegant conversation, were capable of imposing upon all but those who were conscious of the

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Of some
Warbeck.

England. the imposture. The kingdom of Ireland was pitched upon for Perkin's first appearance, as it had been before for that of Simnel. He landed at Cork, and immediately assuming the name of *Richard Plantagenet*, was followed by great numbers of credulous people. He wrote letters to the earls of Desmond and Kildare, inviting them to join his party; he dispersed every where the strange intelligence of his escape from his uncle Richard's cruelty; and, his story meeting with general credit, he soon became an object of the public favour. All those who were disgusted with the king, prepared to join Perkin; but particularly those who formerly were Henry's favourites, and had contributed to place him on the throne. These, thinking their services had not been sufficiently repaid, now became heads of the conspiracy. Their attempts, however, were all frustrated by the vigilance of the king, and most of the conspirators of any note were publicly executed.

Perkin finding it was in vain to attempt any thing in England, went to the court of James IV. of Scotland. Here he was received with great cordiality; and James carried his confidence in him so far, that he even gave him in marriage lady Catharine Gordon daughter to the earl of Huntley, and a near kinswoman of his own. But when he attempted to set him on the throne of England, he found himself totally disappointed; and on the conclusion of peace between the two kingdoms, Perkin was obliged to leave Scotland. From thence he went to Flanders; and meeting with but a cool reception there, he resolved to try the affections of the people of Cornwall, who had lately risen against the king on account of a new tax which had been levied upon them. On his first appearance Perkin was joined by about 3000 of these people, with which force he laid siege to Exeter. Henry, however, having marched against him with a considerable army, Perkin's heart failed him, though his followers now amounted to 7000; and he took shelter in a monastery. His wife fell into the conqueror's hands; who placed her in a respectable situation near the queen's person, with a suitable pension, which she enjoyed till her death. Perkin being persuaded to deliver himself into the king's hands, was compelled to sign a confession of his former life and conduct; but this was so defective and contradictory, that very little regard was paid to it. His life was granted him; though he was still detained in custody, and keepers were appointed to watch his conduct. From thence, however, he broke loose; and flying to the sanctuary of Shyne, put himself into the prior's hands. He was once more prevailed upon to trust himself in the king's hands, and was committed to the tower; but having here entered into a correspondence with the earl of Warwick in order to make their escape, both of them were condemned and executed.

To Henry VII. in a great measure is owing the present civilized state of the English nation. He had all along two points principally in view; the one to depress the nobility and clergy, and the other to exalt and humanize the populace. In the feudal times every nobleman was possessed of a certain number of vassals, over whom he had, by various methods, acquired an almost absolute power; and, therefore, upon every slight disgust, he was able to influence them to join him in his revolt or disobedience. Henry considered,

that the giving of his barons a power to sell their estates, which were before unalienable, must greatly weaken their interest. This liberty therefore he gave them; and it proved highly pleasing to the commons, nor was it disagreeable to the nobles themselves. His next scheme was to prevent their giving liveries to many hundreds of their dependents, who were thus kept like the soldiers of a standing army to be ready at the command of their lord. By an act passed in this reign, none but menial servants were allowed to wear a livery; and this law was enforced under severe penalties.

With the clergy, Henry was not so successful. The number of criminals of all kinds who found protection in monasteries and other places appointed for religious worship, seemed to indicate little less than an absolute toleration of all kinds of vice. Henry used all his interest with the pope to get these sanctuaries abolished, but to no purpose. All that he could procure was, that if thieves, murderers, or robbers, registered as sanctuary men, should fall out and commit fresh offences, and retreat again, in such cases they might be taken out of the sanctuary and delivered up to justice.

In 1500, the king's eldest son Arthur was married to the Infanta Catharine of Spain, which marriage had been projected and negotiated seven years. But the prince dying in a few months after marriage, the princeps was obliged to marry his younger brother Henry, who was created prince of Wales in his room. Henry himself made all the opposition which a youth of 12 years of age is capable of; but as the king persisted in his resolution, the marriage was by the pope's dispensation shortly after solemnized.—In the latter part of this king's reign, his economy, which had always been exact, degenerated into avarice, and he oppressed the people in a very arbitrary manner. He had two ministers, Empson and Dudley, perfectly qualified to second his avaricious intentions. They were both lawyers, and usually committed to prison by indictment such persons as they intended to oppress; from whence they seldom got free but by paying heavy fines, which were called mitigations and compositions: but by degrees the very forms of law were omitted; and they determined in a summary way upon the properties of the subjects, and confiscated their effects to the royal treasury.—Henry VII. died of the gout in his stomach, in the year 1509, having lived 52 years, and reigned 23; and was succeeded by his son Henry VIII. In Henry VII.'s reign was built a large ship of war called the *Great Harry*, which cost 14,000 pounds. This was, properly speaking, the first ship in the English navy. Before this period, when the king wanted a fleet, he had no other expedient than to hire ships from the merchants.

Henry VIII. ascended the throne when he was about 18 years of age, and had almost every advantage which a prince can have on his accession. He had a well stored treasury, an undisputed title, and was at peace with all the powers in Europe. Commerce and arts had been some time introduced into England, where they met with a favourable reception. The young prince himself was beautiful in his person, expert in all polite exercises, open and liberal in his air, and loved by all his subjects. The old king, who was himself a scholar, had instructed him in all the

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learning of the times, so that he was an adept in school-divinity before the age of 18.

All these advantages, however, seemed to have been lost upon the new king. Being destitute of a good heart and solid understanding, he proved a tyrant. Being always actuated, not by reason, but the passion which happened to be uppermost in his mind, he behaved in the most absurd and contradictory manner; and however fortunate some of his measures proved at last, it is impossible that either his motives, or the means he took for the accomplishment of his purposes, can be approved of by any good man.

One of Henry's first actions in his royal capacity was to punish Empson and Dudley, who were obnoxious to the populace, on account of their having been the instruments of the late king's rapacity. As they could not be impeached merely on account of their having strictly executed the will of the king, they were accused of having entered into a treasonable conspiracy, and of having designed to seize by force the administration of government; and though nothing could be more improbable than such a charge, the general prejudice against them was so great, that they were both condemned and executed.

In 1510, the king entered into a league with pope Julius II. and Ferdinand king of Spain, against Lewis XII. of France. In this alliance Henry was the only disinterested person. He expected nothing besides the glory which he hoped would attend his arms, and the title of *Most Christian King*, which the pope assured him would soon be taken from the king of France to be conferred upon him. The pope was desirous of wresting from Lewis some valuable provinces which he possessed in Italy, and Ferdinand was desirous of sharing in the spoil. Henry summoned his parliament; who very readily granted him supplies, as he gave out that his design was to conquer the kingdom of France, and annex it to the crown of England. It was in vain that one of his old prudent counsellors objected, that conquests on the continent would only drain the kingdom without enriching it; and that England, from its situation, was not fitted to enjoy extensive empire. The young king, deaf to all remonstrances, and hurried away by his military ardour, resolved immediately to begin the war. But after several attempts, which were rendered unsuccessful only by the mismanagement of those who conducted them, a peace was concluded with France on the 7th of August 1514. See FRANCE.

Henry's arms were attended with more success in Scotland. King James IV. with the greatest part of the Scots nobility, and 10,000 of the common people, were cut off in the battle of Flodden, the greatest defeat the Scots had ever received from the English*. Henry in the mean time, puffed up with his imaginary successes against France, and his real ones against Scotland, continued to lavish his treasures by expensive pleasures, and no less expensive preparations for war. The old ministers who had been appointed by his father to direct him, were now disregarded; and the king's confidence was entirely placed in Thomas, afterwards cardinal Wolsey, who seconded him in all his favourite pursuits, and who, being the son of a private gentleman at Ipswich, had gradually raised himself to the first employments of the state*. He doth not seem to

have had many bad qualities besides his excessive pride, which disgusted all the nobility; but the great share he possessed in the favour of such an absolute prince as Henry VIII. put him quite out of the reach of his enemies.

The king having soon exhausted all the treasures left him by his father, as well as the supplies which he could by fair means obtain from his parliament, applied to Wolsey for new methods of replenishing his coffers. The minister's first scheme was to get a large sum from the people under the title of *benevolence*; though no title could be more improperly applied, as it was not granted without the greatest murmurings and complaints. Wolsey even met with opposition in the levying of it. In the first place, having exacted a considerable sum from the clergy, he next applied himself to the house of commons; but they only granted him half the sum he demanded. The minister at first was highly offended, and desired to be heard in the house; but they replied that none could be permitted to sit and argue there except such as were members. Soon after, the king having occasion for new supplies, by Wolsey's advice attempted to procure them by his prerogative alone, without consulting his parliament. He issued out commissions to all the counties of England for levying four shillings in the pound from the clergy, and three shillings and fourpence from the laity. This stretch of royal power was soon opposed by the people, and a general insurrection seemed ready to ensue. Henry endeavoured to pacify them by circular letters; in which he declared, that what he demanded was only by way of *benevolence*. The city of London, however, still hesitated on the demand; and in some parts of the country insurrections were actually begun. These were happily suppressed by the duke of Suffolk; but the cardinal lost somewhat of the king's favour on account of the improper advice he had given him. To reinstate himself in his good graces, Wolsey made the king a present of a noble palace called *Tork-place*, at Westminster, assuring him that from the first he had intended it for the king's use. In order to have a pretence for amassing more wealth, Wolsey next undertook to found two new colleges at Oxford; and for this purpose he received every day fresh grants from the pope and the king. The former imprudently gave him liberty to suppress some monasteries, and make use of their revenues for the erection of his new colleges; but this was a fatal precedent for the pontiff's interests, as it taught the king to seize on the monastic revenues whenever he stood in need of money.

The cardinal continued to enjoy full power at the court of Henry VIII. till the year 1527, when an event happened which produced the most remarkable alterations both in church and state. Henry had been 18 years married to Catharine of Arragon, who had before been married to his elder brother Arthur. But notwithstanding the submissive deference paid to the indulgence of the church, by which Henry had been allowed to marry his brother's widow, his marriage with this princess did not pass without scruple and hesitation. The prejudices of the people in general were bent against a conjugal union between such near relations; and it has been said, that the late king, though he had forced both parties to marry each other when his son was but 12 years of age, had given many intimations

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Arbitrary
behaviour
of the king.

* See Scotland.

113
Cardinal
Wolsey
minister.

* See Wolsey.

115

He desires
a divorce
from his
wife.

England.

England.

218
Trial of the
king and
queen be-
fore the
pope's le-
gate.

mations that he intended to annul the marriage at a proper opportunity. It is possible, that the king might now begin to entertain scruples about the legality of his marriage; but as he indulged himself without restraint in the pleasures of unlawful love, it seems much more probable, that the age and decay of the beauty of Catherine, who was six years older than himself, had prompted him to desire a dissolution of his marriage. He had lately fallen in love with Anna Bullen, or Boleyn, one of the maids of honour, and daughter of a gentleman of distinction, who was related to most of the nobility. She was a lady of great beauty and virtue; and as Henry found it impossible to make her comply with his criminal desires, he formed a design of divorcing queen Catherine, and marrying Anne Boleyn. For this purpose he applied to pope Clement VII. desiring him to dissolve the bull of his predecessor which had given him a dispensation to marry Catherine; and to declare that it was not in the power even of the holy see to dispense with a law so strictly enjoined in scripture.

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Applies to
the pope for
a dispensa-
tion.

By this requisition the pope was thrown into the greatest perplexity. Queen Catherine was aunt to the emperor who had lately made Clement himself a prisoner, and whose resentment he still dreaded: and besides, he could not with any degree of prudence declare the bull of the former pope illicit, as this would give a mortal blow to the doctrine of papal infallibility. On the other hand, Henry was his protector and friend; the dominions of England were the chief resource from whence his finances were supplied; and the king of France, some time before, had got a bull of divorce in circumstances nearly similar. In this exigence he thought the wisest method would be to spin out the affair by negotiation; and in the mean time he sent over a commission to Wolsey, in conjunction with the archbishop of Canterbury, or any other English prelate, to examine the validity of the king's marriage, and of the former dispensation; granting them also a provisional dispensation for the king's marriage with any other person.

The pope's message was laid before the council in England: but they considered, that an advice given by the pope in this secret manner, might very easily be disavowed in public; and that a clandestine marriage would totally invalidate the legitimacy of any issue the king might have by such a match. In consequence of this, fresh messengers were dispatched to Rome, and evasive answers returned; the pope never imagining that Henry's passion would hold out during the tedious course of an ecclesiastical controversy. But in this he was mistaken. The king of England had been taught to dispute as well as the pope, and valued himself not a little on his knowledge in theology; and to his arguments he added threats; telling him, that the English were but too well disposed to withdraw from the holy see; and that if he continued uncomplying, the whole country would readily follow the example of their monarch, who should always deny obedience to a pontiff that had treated him with such falsehood and duplicity. The king even proposed to his holiness, whether, if he were not permitted to divorce his present queen, he might not have a dispensation for having two wives at once?

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This contro-
versy with
the pope.

The pope, perceiving the king's eagerness, at last
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sent cardinal Campegio his legate to London; who, with Wolsey, opened a court for trying the legitimacy of the king's marriage with Catharine, and cited the king and queen to appear before them. The trial commenced the 31st of May 1529. Both parties presented themselves; and the king answered to his name when called: but the queen, instead of answering to hers, rose from her seat, and throwing herself at the king's feet, made a very pathetic harangue; which her dignity, her virtue, and misfortunes, rendered still more affecting. She told her husband, That she was a stranger in his dominions, without protection, without council, and without assistance; exposed to all the injustice which her enemies were pleased to impose upon her: That she had quitted her native country, without any other resource than her connections with him and his family; and that, instead of suffering thence any violence or iniquity, she had been assured of having in them a safeguard against every misfortune: That she had been his wife during 20 years; and would here appeal to himself, whether her affectionate submission to his will had not merited other treatment than to be thus, after so long a time, thrown from him with indignity: That she was conscious,—he himself was assured,—that her virgin honour was yet unstained when he received her into his bed; and that her connections with his brother had been carried no farther than the mere ceremony of marriage: That their parents, the kings of England and Spain, were esteemed the wisest princes of their time, and had undoubtedly acted by the best advice when they formed the agreement for that marriage, which was now represented as so criminal and unnatural: And that she acquiesced in their judgment, and would not submit her cause to be tried by a court whose dependance on her enemies was too visible ever to allow her any hopes of obtaining from them an equitable or impartial decision. Having spoken these words, the queen rose, and, making the king a low reverence, left the court, nor would she ever again appear in it.

The legate having again summoned the queen to appear before them, on her refusal, declared her contumacious, and the trial proceeded in her absence. But when the business seemed to be nearly decided, Campegio, on some very frivolous pretences, prorogued the court, and at last transferred the cause before the see of Rome. Wolsey, in the mean time, whom the king expected to have found a warm favourer and defender of his cause, was very irresolute, and seemed to be much in the same dilemma with the pope himself. He had determined to continue neuter in the dispute: but this gave great umbrage to the king; who happening about the same time to meet with Cranmer, a person of equal abilities with Wolsey, and of much less cunning, he resolved to make him supply the place of the latter. Crimes are easily found against a favourite in disgrace; and whatever errors Wolsey had committed, were repeated by the courtiers with all possible exaggerations, graced. On the 18th of October 1529, the dukes of Norfolk and Suffolk were sent to require the great seal from him; and, on his scrupling to deliver it without a more express warrant, the king wrote him a letter. Upon this it was immediately surrendered, and given by Henry to Sir Thomas More; a man who, besides the ornaments of elegant literature, possessed the highest virtue,

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Wolsey dis-
graced.

England. virtue, integrity, and capacity. Wolsey was ordered to depart from York-place palace, and all his furniture and plate were appropriated to the king's use. The inventory of his goods was found to exceed the most extravagant reports. Of fine holland alone, there were found 1000 pieces; the walls of his palace were covered with cloth of gold and silver; he had a cupboard of plate of massy gold; all the rest of his riches and furniture were in the same proportion. One disgrace followed another, and his fall was at length completed by a summons to London to answer a charge of high treason.

Wolsey at first refused to answer to this summons, as being a cardinal: but being at length persuaded, he set out on his journey; but was taken ill, and died by the way*. After his death, the king, by Cranmer's advice, had the legality of his marriage debated in all the universities of Europe. The votes of these were obtained in his favour by dint of money. The disbursements made on the occasion have even been preferred to this day. To a subdeacon he gave a crown, to a deacon two crowns, and so to the rest in proportion to the importance of their station or opinion.—Being thus fortified by the opinions of the universities, and even of the Jewish rabbies, (for them also he had consulted), Henry began to think he might safely oppose the pope himself. He began by reviving in parliament an old law against the clergy, by which all those who had submitted to the authority of the pope's legate were condemned to severe penalties. The clergy, to conciliate the king's favour, were obliged to pay a fine of 118,000 pounds. A confession was likewise extorted from them, that the king, and not the pope, was the supreme head of the church and clergy of England. An act was soon after passed against levying the first-fruits, or a year's rent of all the bishoprics that fell vacant. After this the king married his beloved Anne Boleyn; and she proving with child quickly after marriage, he publicly owned her for his wife, and passed with her through London, with a greater magnificence than had ever been known before. The streets were strewn with flowers, the walls of the houses hung with tapestry, and an universal joy seemed to be diffused among the people. The unfortunate queen Catherine, perceiving all further opposition to be vain, retired to Amphyll near Dunstable, where she continued the rest of her days in privacy and peace.

The pope was no sooner informed of these proceedings, than he passed a sentence, declaring Catherine to be the king's only lawful wife; requiring him to take her again, and denouncing his censures against him in case of a refusal. Henry, on the other hand, knowing that his subjects were entirely at his command, resolved to separate totally from the church of Rome. In the year 1534, he was declared head of the church by parliament; the authority of the pope was completely abolished in England; all tributes formerly paid to the holy see were declared illegal; and the king was entrusted with the collation to all ecclesiastical benefices. The nation came into the king's measures with joy, and took an oath called the *oath of supremacy*; all the credit which the popes had maintained over England for ages, was now overthrown at once; and none seemed to repine at the change, except those who were

immediately interested by their dependence on Rome. England.

But though the king thus separated from the church of Rome, he by no means adhered to the doctrines of Luther which had been lately published. He had wrote a book against this celebrated reformer, which the pope pretended greatly to admire; and honoured king Henry, on its account, with the title of "Defender of the Faith." This character he seemed to be determined to maintain, and therefore persecuted the reformers most violently. Many were burnt for denying the popish doctrines, and some also were executed for maintaining the supremacy of the pope. The courtiers knew not which side to take, as both the new and old religions were equally persecuted; and as both parties equally courted the favour of the king, he was by that means enabled to assume an absolute authority over the nation. As the monks had all along shewn the greatest resistance to Henry's ecclesiastical character, he resolved at once to deprive them of the power of injuring him. He accordingly empowered Cromwell, secretary of state, to send commissioners into the several counties of England to inspect the monasteries; and to report, with rigorous exactness, the conduct and deportment of such as were found there. This employment was readily undertaken by some creatures of the court, whose names were Layton, London, Price, Gage, Petre, and Belasis. They are said to have discovered monstrous disorders in many of the religious houses; whole convents of women abandoned to all manner of lewdness; friars accomplices in their crimes; pious frauds every where committed, to increase the devotion and liberality of the people; and cruel and inveterate factions maintained between the inhabitants. Thus a general horror was excited against these communities; and therefore the king, in 1536, suppressed the lesser monasteries, amounting to 376 in number. Their revenues, computed at 32,000 pounds a-year, were confiscated to the king's use; besides their plate and other goods, computed at 100,000 pounds more. In 1538, the greater monasteries also were demolished. The better to reconcile the people to this great innovation, stories were published, perhaps with aggravations, of the detestable lives which the friars led in their convents. The reliques also, and other objects of superstitious veneration, were now brought forth, and became objects of derision to the reformers. A great number of these are enumerated by Protestant writers; such as the parings of St Edmund's toes; some of the coals that roasted St Laurence; the girdle of the Virgin Mary, shewn in no fewer than eleven different places; two or three heads of St Ursula; the felt of St Thomas of Lancaster, an infallible cure for the head-ach; part of St Thomas of Canterbury's shirt, much revered among big-bellied women; some reliques, an excellent preservative against rain, others against weeds in corn; &c. Some impostures, however were discovered, which displayed a little more ingenuity in the contrivance. At Hales in the county of Gloucester had been shewn, during several ages, the blood of Christ brought from Jerusalem. The veneration for this precious relique may easily be imagined; but it was attended with a most remarkable circumstance not observed in any other reliques. The sacred blood was not visible to any one in mortal sin, even when set before him; nor could it be discovered till he

* See Wolsey.

220 Henry's final quarrel with the pope.

221 Is declared head of the church.

222 Suppression of the monasteries.

England.

had performed good works sufficient for his absolution. At the dissolution of the monastery, the whole contrivance was discovered. Two of the monks who were let into the secret, had taken the blood of a duck, which they renewed every week: they put it into a phial, one side of which was thin and transparent crystal, the other thick and opaque. When any rich pilgrim arrived, they were sure to shew him the dark side, till masses and offerings had expiated his offences; after which they made him happy, by turning the phial. — A miraculous crucifix had been kept at Boxley in Kent, and bore the appellation of the *rood of grace*. The lips, eyes, and head of the image, moved on the approach of its votaries. Helsey bishop of Rochester broke the crucifix at St Paul's cross, and shewed to all the people the springs and wheels by which it had been secretly moved. A great wooden idol, called *Darvel Gatherin*, was also brought to London and cut in pieces: and, by a cruel refinement of vengeance, it was employed as fuel to burn friar Forest; who was punished for denying the king's supremacy, and for some pretended heresies. A finger of St Andrew's, covered with a thin plate of silver, had been pawned for a debt of 40 pounds; but as the king's commissioners refused to release the pawn, people made themselves very merry with the poor creditor on account of his security. On this occasion also was demolished the noted shrine of Thomas a Becket, commonly called *St Thomas of Canterbury* *. The riches of it were inconceivable when broken down; the gold with which it was adorned, filled two large chests that eight strong men could scarce carry out of the church. The king, on the whole, suppressed 645 monasteries, of which 28 had abbots who enjoyed a seat in parliament. Ninety colleges were demolished in several counties; 2374 chantries and free chapels, and 110 hospitals. The whole revenue of these establishments amounted to 161,100 pounds.

It is easy to imagine the indignation which such an uninterrupted course of sacrilege and violence would occasion at Rome. In 1535, the king had executed bishop Fisher, who was created a cardinal while in prison, and Sir Thomas More, for denying or speaking ambiguously about his supremacy. When this was reported in Italy, numerous libels were published all over the country, comparing the king of England to Nero, Domitian, Caligula, and the most wicked tyrants of antiquity. Clement VII. died about six months after he had threatened the king with a sentence of excommunication; and Paul III. who succeeded him in the Papal throne, entertained some hopes of an accommodation. But Henry was so much accustomed to domineering, that the quarrel was soon rendered totally incurable. The execution of Fisher was reckoned such a capital injury, that at last the pope passed all his censures against the king, citing him and all his adherents to appear in Rome within 90 days, in order to answer for their crimes. If they failed, he excommunicated them; deprived the king of his realm; subjected the kingdom to an interdict; declared his issue by Ann Boleyn illegitimate; dissolved all leagues which any Catholic princes had made with him; gave his kingdom to any invader; commanded the nobility to take up arms against him; freed his subjects from all oaths of allegiance; cut off

their commerce with foreign states; and declared it lawful for any one to seize them, to make slaves of their persons, and to convert their effects to his own use. But though these censures were then passed, they were not openly denounced. The pope delayed the publication till he should find an agreement with England totally desperate, and till the emperor, who was then hard pressed by the Turks and the Protestant princes of Germany, should be in a condition to carry the sentence into execution. But in 1538, when news arrived at Rome that Henry had proceeded with the monasteries as above related, the pope was at last provoked to publish the censures against him. Libels were again dispersed, in which he was anew compared to the most furious persecutors of antiquity, and the preference was now given on their side. Henry, it was said, had declared war with the dead, whom the Pagans themselves respected; was at open enmity with heaven; and had engaged in professed hostility with all the saints and angels. Above all, he was reproached with his resemblance to the emperor Julian, whom (it was said) he imitated in his apostasy and learning, though he fell short of him in his morals. But these terrible fulminations had now lost their effect. Henry had long ago denied the supremacy of the pope, and therefore had appealed from him to a general council; but now when a general council was summoned at Mantua, he refused to be subject to it, because it was summoned by the pope, and lay entirely under subjection to that spiritual usurper. He engaged his clergy to make a declaration to the like purpose, and prescribed to them many other alterations with regard to their ancient tenets and practices. It was expected that the spirit of opposition to the church of Rome would have at last made him fall in with the doctrines of the reformed; but, tho' he had been gradually changing the theological system in which he was educated, ever since he came to the years of maturity, he was equally positive and dogmatical in the few articles he retained, as tho' the whole fabric had continued entire and unshaken: and though he stood alone in his opinion, the flattery of courtiers had so much inflamed his tyrannical arrogance, that he thought himself entitled to regulate by his own particular standard, the religious faith of the whole nation. The point on which he chiefly rested his orthodoxy was the most absurd in the whole Popish doctrine, namely, that of transubstantiation. All departure from this he held to be a damnable error; and nothing, he thought, could be more honourable for him, than, while he broke off all connexions with the Roman pontiff, to maintain, in this essential article, the purity of the Catholic faith.

In 1539, a parliament was called, which met on the 28th day of April. The chancellor opened this parliament by informing the house of lords, that it was his majesty's earnest desire to extirpate from his kingdom all diversity of opinions with regard to religion; and as this enterprize was, he owned, difficult and important, he desired them to chuse a committee from among themselves, who might frame certain articles, and communicate them afterwards to parliament. The lords named the vicar-general, Cromwel now created a peer, the archbishops of Canterbury and York, the bishops of Durham, Carlisle, Worcester, Bath and Wells, Bangor and Ely. This small committee itself

England.

224
His absurd
and tyrannical
conduct.

223
The king
excommunicated.

England.

225
Law of the
six articles
framed.

was agitated with such diversity of opinions, that it could come to no conclusion. The duke of Norfolk then moved, that since there was no hopes of having a report from the committee, the articles of faith proposed to be established should be reduced to six, and a new committee be appointed to frame an act with regard to them. As this peer was understood to speak the king's mind, his motion was immediately complied with; and after a short prorogation, the bill of the six articles, or the *bloody bill*, as the Protestants justly termed it, was introduced; and having passed the two houses, received the king's assent. By this law the doctrine of the real presence was established; the communion in one kind; the perpetual obligation of vows of chastity; the utility of private masses; the celebrity of the clergy; and the necessity of auricular confession. The denial of the real presence subjected the person to death by fire, and to the same forfeiture as in cases of treason; and admitted not the privilege of abjuring: an unheard of cruelty, unknown even to the inquisition itself. The denial of any of the other articles, even though recanted, was punishable by the forfeiture of goods and chattels, and imprisonment during the king's pleasure: an obstinate adherence to error, or a relapse, was adjudged to be felony, and punishable by death. The marriage of priests was subjected to the same punishment. Their commerce with women, was, for the first offence, forfeiture and imprisonment; and for the second, death. Abstaining from confession, and from receiving the eucharist at the accustomed times, subjected the person to fine, and to imprisonment during the king's pleasure; and if the criminal persevered after conviction, he was punishable by death and forfeiture, as in cases of felony. Commissioners were to be appointed by the king for inquiring into these heresies and irregular practices, and the criminals were to be tried by a jury.

The parliament having thus surrendered their ecclesiastical privileges, next proceeded to surrender their civil ones also. They gave to the king's proclamations the same force as to statutes enacted by parliament, and thus by one blow made a total subversion of the English constitution; and to render the matter worse, if possible, they framed this law as if it were only declaratory, and intended to explain the natural extent of the royal authority.—Notwithstanding this, however, they afterwards pretended to make some limitations in the regal power; and they enacted, that no proclamation should deprive any person of his lawful possessions, liberties, inheritances, &c. nor yet infringe any common law or laudable custom of the realm.

As soon as the act of the six articles had passed, the Catholics were extremely vigilant to inform against offenders; and, in a short time, no fewer than 500 persons were thrown into prison. But some of the chief officers of state remonstrating against the cruelty of punishing such a number of delinquents, they were all of them set at liberty; and soon after this, Henry, as if he had resolved to give each party the advantage by turns, granted every one permission to have a translation of the Bible, which had been newly made, in his family.

In 1540, the king again complained to parliament of the great diversity of religious tenets which still prevailed

among his subjects; a grievance, he affirmed, which ought the less to be endured, because the Scriptures were now published in England, and ought universally to be the standard of belief to mankind. But he had appointed, he said, some bishops and divines to draw up a list of tenets; and he was determined that Christ and the truth should have the victory. The king seems to have expected more from this new book of his doctors, than had ensued from the publication of the Scriptures. Cromwel, as vicar-general, also made a speech in the upper house; and the peers in return told him, that he deserved to be vicar-general to the universe: To such a degree of mean and servile submission was the English parliament at this time reduced.

This year also the king suppressed the only religious order remaining in England; namely, the knights of St John of Jerusalem, or the *knights of Malta*, as they are commonly called. This order had by their valour done great service to Christendom; and had very much retarded, at Jerusalem, Rhodes, and Malta, the rapid progress of the barbarians. During the general surrender of the religious houses in England, they had obstinately refused to give up their revenues to the king; and Henry, who would endure no society that professed obedience to the pope, was obliged to have recourse to parliament for the dissolution of this order. Their revenues were large, and formed a considerable addition to the acquisitions which the king had already made. But he had been such a bad economist, that, notwithstanding the immense plunder afforded him by the church, he now demanded from parliament a very considerable supply. The commons, however, though lavish of the blood of their fellow-subjects, were extremely frugal of their money; and it was not without murmuring that the grant could be obtained, even by this absolute and dreaded monarch.

The king all this time continued to punish with unrelenting severity the Protestants who offended against the law of the six articles, and the Papists who denied his supremacy. This gave occasion to a foreigner at that time to say, that those who were against the pope were burned, and those who were for him were hanged. The king even seemed to display in an ostentatious manner his tyrannical justice and impartiality which reduced both parties to subjection. This year he executed three Protestants and three Papists coupled together. The latter declared, that the most grievous part of their punishment was the being coupled to such heretical miscreants as suffered with them.

In 1542, Henry proceeded to the further dissolution of colleges, hospitals, and other foundations of that nature. The courtiers had been dealing with the presidents and governors to make a surrender of their revenues to the king; and they had succeeded with eight. But there was an obstacle to their farther progress: it had been provided by the local statutes of most of these foundations, that no president nor any fellows could make such a deed without the unanimous consent of all the fellows. This consent would not have been easily obtained; but the parliament proceeded in a summary manner to annul all these statutes; by which means the revenues of those houses were exposed to the rapacity of the king and his favourites. Henry also now extorted from many bishops a surrender of their chapter-lands; by which means he pillaged the

England.

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Suppression
of the knights of
Malta.

227
And of many
colleges,
hospitals,
&c.

fees of Canterbury, York, and London, and enriched his favourites with their spoils. He engaged the parliament to mitigate the penalties of the six articles, as far as regarded the marriage of priests, which was now only subjected to a forfeiture of goods, chattels, and lands during life: he was still equally bent on maintaining a rigid purity in speculative principles. He had appointed a commission consisting of two archbishops and several bishops of both provinces, together with a considerable number of doctors of divinity; and by virtue of his ecclesiastical supremacy he had charged them to choose a religion for his people. Before the commissioners, however, had made any progress in this arduous undertaking, the parliament had passed a law by which they ratified all the tenets which these divines should establish with the king's consent; and thus they were not ashamed of declaring expressly that they took their religion upon trust, and had no other rule either in religious or temporal concerns than the arbitrary will of their master. One clause of the statute, however, seems to favour somewhat of the spirit of liberty. It was enacted, that the ecclesiastical commissioners should establish nothing repugnant to the laws and statutes of the realm. But in reality this proviso was inserted by the king, to serve his own purposes. By introducing a confusion and contradiction into the laws, he became more the master of every one's life and property; and as the ancient independence of the church still gave him jealousy, he was well pleased, under cover of such a clause, to introduce appeals from spiritual to civil courts. For the same reason he would never promulgate a body of canon law; and he encouraged the judges on all occasions to interpose in ecclesiastical causes, wherever they thought the law or the prerogative concerned. Being thus armed by the authority of parliament, or rather by their acknowledgement of his spiritual supremacy, the king employed his commissioners to select a system of tenets for the assent and belief of the nation. A small volume was published, under the title of *The Institution of a Christian Man*, which was received by the convocation, and made the infallible standard of orthodoxy. In this book the points of justification, faith, free-will, good-works, and grace, were discussed in a manner somewhat favourable to the opinions of the reformers. The sacraments, which a few years before were only allowed to be three, were now increased to seven, conformably to the sentiments of the Catholics. Throughout the whole of this book the king's caprice is very discernible; and the book is in reality to be regarded as his composition. For Henry, while he made his opinion a rule for the nation, would himself submit to no authority whatever; not even to any which he had formerly established. The same year the people had a farther instance of the king's inconsistency. He ordered a new book to be composed, called *The Erudition of a Christian man*; and without asking the consent of the convocation, he published by his own authority this new model of orthodoxy. He was no less positive in his new creed than he had been in the old one; but though he required the faith of the nation to veer about at his signal, he was particularly careful to inculcate the doctrine of passive obedience in all his books, and he was no less careful to retain the nation in the practice.

But while the king was thus spreading his own books among the people, both he and the clergy seem to have been very much perplexed with regard to the Scriptures. A review had been made by the ecclesiastical synod of the new translation of the Bible; and bishop Gardiner had proposed, that, instead of employing English expressions throughout, several Latin words should still be preserved, because they contained, as he pretended, such peculiar energy and significance, that they had no correspondent terms in the English tongue. Among these were *ecclesia*, *pœnitentia*, *pontifex*, *contritus*, &c. But as this mixture would appear extremely barbarous, and was plainly calculated for no other purpose than to retain the people in their ancient ignorance, the proposal was rejected. The knowledge of the people, however, seemed to be still more dangerous than their ignorance; and the king and parliament, soon after the publication of the Scriptures, retracted the concession which they had formerly made, and prohibited all but gentlemen and merchants to peruse them. Even that liberty was not granted without an apparent hesitation, and dread of the consequences. These persons were allowed to read, *so it be done quietly and with good order*. And the preamble to the act sets forth, "That many seditious and ignorant persons had abused the liberty granted them of reading the Bible; and that great diversity of opinion, animosities, tumults, and schisms, had been occasioned by perverting the sense of the Scriptures." The mass-book also passed under the king's examination; but little alteration was yet made in it. Some doubtful or fictitious saints only were struck out; and the name of the pope was erased. The latter precaution was also used with every new book that was printed, and even every old one that was sold. The word *pope* was carefully omitted or blotted out; as if that precaution could abolish the term from the language, or cause the people forget that such a person existed. About this time also, the king prohibited the acting of plays, interludes, and farces, in derision of the popish superstitions; which the Protestants had been in use to practise: and this prohibition was in the highest degree pleasing to the Roman Catholics.

In this tyrannical and head-strong manner Henry proceeded with regard to ecclesiastical affairs. In other respects his conduct was equally violent. With regard to his domestic concerns, history scarce affords his parallel; for an account of which, see the biographical article *HENRY*.

The last instances of the king's injustice and cruelty were the duke of Norfolk and his son the earl of Surrey. The former had served the king with fidelity, and the latter was a young man of the most promising hopes. His qualifications, however, were no security against the violence of Henry's temper. He had dropped some expressions of resentment against the king's ministers, who had displaced him from the government of Boulogne; and the whole family had become obnoxious on account of the late queen Catherine Howard. From these motives, orders were given to arrest both the father and son; and accordingly they were arrested both on the same day, and confined to the tower. The duchess dowager of Richmond, Surrey's own sister, was among the number of his accusers; and Sir Richard Southwell also, his most intimate friend, charged him

England. him with infidelity to the king. Surry denied the charge, and challenged his accuser to a single combat. This favour was denied him; and, notwithstanding his eloquent and spirited defence, he was condemned and executed at Tower-hill.—The duke of Norfolk vainly endeavoured to mollify the king by letters and submissions. An attainer was found against him, though the only crime his accusers could allege was, that he had once said that the king was sickly, and could not hold out long; and that the kingdom was likely to be torn between the contending parties of different persuasions. Cranmer, though engaged for many years in an opposite party to that of Norfolk, and though he had received many and great injuries from him, would have no hand in such an unjust prosecution; but retired to his seat at Croydon. The death-warrant, however, was made out, and immediately sent to the lieutenant of the tower; but a period was put to the cruelties and violence of the king by his death, which happened on the 14th of January 1547, the night before Norfolk was to have been executed.

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Henry dies,
and is suc-
ceeded by
Edward VI.

Henry was succeeded by his only son Edward, a boy of nine years of age. The most remarkable transactions of his reign are those with regard to religion. The restraint which Henry VIII. had laid upon the protestants was now taken off; and they not only maintained their doctrines openly, but soon became the prevailing party. Henry had fixed the majority of his son at 18 years of age; and, in the mean time, appointed 16 executors of his will, to whom, during the minority, he entrusted the government of the king and kingdom. This will, he imagined, would be obeyed as implicitly after his death as though he had been alive. But the first act of the executors was to chuse the earl of Hertford, afterwards duke of Somerset, protector of the realm; and in him was lodged all the regal power, together with a privilege of naming whom he pleased for his privy council.

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Reformation
com-
pleted.

The duke of Somerset had long been reckoned a secret partizan of the reformers; and, immediately on his elevation to his present high dignity, began to express his intention of reforming the abuses of the ancient religion. Under his direction and that of Cranmer, therefore, the reformation was carried forward and completed; so that the religion of the English became almost what it is at present.—The only person of consequence who opposed the reformers was Gardiner bishop of Winchester; and, to the disgrace of their own principles, the reformers now shewed that they could persecute as severely as the papists had formerly persecuted them. Gardiner was committed to the Fleet prison, where he was treated with great severity. He was afterwards sent to the tower; and having continued there two years, he was commanded to subscribe several articles, among which was one confessing the justice of his own imprisonment. To all the articles but this he agreed to subscribe; but that did not give satisfaction. He was then committed to close custody; his books and papers were seized; all company was denied him, and he was not even permitted the use of pen and ink. The bishops of Chichester, Worcester, and Exeter, were in like manner deprived of their offices; but the bishops of Landaff, Salisbury, and Coventry, escaped by sacrificing the most considerable share of their revenues. The libraries of Westminster and

England. Oxford were ordered to be ransacked, and purged of the Romish legends, missals, and other superstitious volumes; in which search, great devastation was made even in useful literature. Many volumes clasped in silver were destroyed for the sake of their rich bindings; many of geometry and astronomy were supposed to be magical, and destroyed on that account; while the members of the university, unable to put a stop to these ravages, trembled for their own safety.

The reformers, however, were not contented with severities of this kind. A commission was granted to the primate and others, to search after all Anabaptists, heretics, or contemners of the new liturgy. Among the numbers who were found guilty upon this occasion, was one Joan Boucher, commonly called *Joan of Kent*; who was so very obstinate, that the commissioners could make no impression upon her. She maintained an abstruse metaphysical sentiment, that Christ, as man, was a sinful man; but, as the Word, he was free from sin, and could be subject to none of the frailties of the flesh with which he was clothed. For maintaining this doctrine, the poor woman was condemned to be burnt to death as an heretic. The young king, who it seems had more sense than his teachers, refused at first to sign the death-warrant; but, at last, being overcome by the importunities of Cranmer, he reluctantly complied; declaring, that if he did wrong, the sin should be on the head of those who had persuaded him to it. The primate, after making another unsuccessful effort, to reclaim the woman from her opinions, committed her to the flames. Some time after, one Van Paris, a Dutchman, was condemned to death for Arianism. He suffered with so much satisfaction, that he hugged and caressed the faggots that were consuming him.

The rest of this reign affords only the history of intrigues and cabals of the courtiers one against another. The protector was first opposed by his own brother admiral Sir Thomas Seymour, who had married Catharine Par, the late king's widow. She died soon after the marriage; and he then made his addresses to the princess Elizabeth, who is said not to have been averse to the match. His brother the duke, however, who was at that time in the north, being informed of his ambitious projects, speedily returned, had him attainted of high treason, and at last condemned and executed. The duke of Somerset himself, however, was some time afterwards deprived of his office by Dudley duke of Northumberland; who at last found means to get him accused of high treason, and executed. Not satisfied with the office of Protector, which he assumed on the death of Somerset, this ambitious nobleman formed a scheme of engrossing the sovereign power altogether. He represented to Edward, who was now in a declining state of health, that his sisters Mary and Elizabeth, who were appointed by Henry's will to succeed, in failure of direct heirs, to the crown, had both been declared illegitimate by parliament; that the queen of Scots his aunt, stood excluded by the king's will, and, being an alien also, lost all right of succeeding. The three princesses being thus excluded, the succession naturally devolved to the marchioness of Dorset eldest daughter of the French queen, Henry's sister, who had married the earl of Suffolk, after her first husband's death. The next heir to the marchioness was the Lady Jane Gray,

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The reform-
ers perse-
cute the ca-
tholics.

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Lady Jane
Gray declar-
ed heir to
the crown.

England.

England.

a lady universally respected, both on account of the charms of her person, and the virtues and endowments of her mind. The king, who was accustomed to submit to the politic views of this minister, agreed to have the succession submitted to council, where Northumberland hoped to procure an easy concurrence. The judges, however, who were appointed to draw up the king's letters patent for this purpose, warmly objected to the measure; and gave their reasons before the council. They begged that a parliament might be summoned, both to give it force, and to free its partisans from danger: they said that the form was invalid, and would not only subject the judges who drew it, but every counsellor who signed it, to the pains of treason. Northumberland could not brook their demurs; he threatened them with his authority, called one of them a *traitor*, and said he would fight with any man in his shirt in such a just cause as that of Lady Jane's succession. A method was therefore found out of screening the judges from danger, by granting them the king's pardon for what they should draw up; and at length the patent for changing the succession was completed, the princesses Mary and Elizabeth were set aside, and the crown settled on the heirs of the dukes of Suffolk (for she herself was contented to forego her claim.)

For some time the king had languished in a consumption. After this settlement of the crown, his health visibly declined every day, and little hopes were entertained of his recovery. To make matters worse, his physicians were dismissed by Northumberland's advice, and by an order of council; and he was put into the hands of an ignorant old woman, who undertook in a little time to restore him to health. After the use of her medicines all his bad symptoms increased to the most violent degree. He felt a difficulty of speech and breathing; his pulse failed, his legs swelled, his colour became livid, and many other signs of approaching death made their appearance. He expired at Greenwich on the 6th of July 1553, in the 16th year of his age and 7th of his reign.

After the death of king Edward, very little regard was paid to the new patent by which Lady Jane Gray had been declared heir to the throne. The undoubted title of Mary, notwithstanding the scandalous behaviour of her father and his servile parliaments, was acknowledged by the whole nation. Northumberland, however, was resolved to put the late king's will in execution. He therefore carefully concealed the death of Edward, in hopes of securing the person of Mary, who by an order of council had been required to attend her brother during his illness; but she being informed of his death, immediately prepared to assert her right to the crown. Northumberland then, accompanied by the duke of Suffolk, the earl of Pembroke, and some other noblemen, saluted Lady Jane Gray queen of England. Jane was in a great measure ignorant of these transactions, and it was with the utmost difficulty she was persuaded to accept of the dignity conferred upon her. At last she complied, and suffered herself to be conveyed to the tower, where it was then usual for the sovereigns of England to pass some days after their accession. Mary, however, who had retired to Kenning-hall in Norfolk, in a very few days found herself at the head of 40,000 men; and Lady Jane re-

signed the sovereignty in ten days, with much more pleasure than she had received it. She retired with her mother to their own habitation; and Northumberland finding his affairs quite desperate, attempted to quit the kingdom. But he was stopped by the band of pensioner guards, who informed him that he must stay to justify their conduct in taking arms against their lawful sovereign. He therefore surrendered himself to Mary, and was soon after executed, together with Sir John Gates, and Sir Thomas Palmer, two infamous tools of his power. Sentence was also pronounced against Lady Jane Gray and her husband Lord Guildford; but without any intention of putting it in execution against them at present, as their youth and innocence pleaded so strongly in their favour, neither of them having yet reached their 17th year.

Mary now entered London, and was peaceably settled on the throne without any effusion of blood. The English, however, soon found reason to repent their attachment to her cause. Though she had at first solemnly promised to defend the religion and laws of her predecessor, she no sooner saw herself firmly established on the throne, than she resolved to restore the Popish religion, and give back their former power to the clergy. Gardiner, Bonnar, and the other bishops who had been imprisoned or suffered loss during the last reign, were taken from prison, reinstated in their sees, and now triumphed in their turn. On pretence of discouraging controversy, the queen by her prerogative silenced all preachers throughout England, except such as should obtain a particular license, and this she was resolved to give only to those of her own persuasion. The greater part of the foreign Protestants took the first opportunity of leaving the kingdom; and many of the arts and manufactures, which they had successfully introduced, fled with them. Soon after the queen called a parliament, which seemed willing to concur in all her measures. They at once repealed all the statutes with regard to religion, that had passed during the reign of Edward VI. and the national religion was again placed on the same footing in which it had been at the death of Henry VIII.

The queen's ministers being now willing to strengthen her power by a Catholic alliance, looked out for a proper husband to the queen. The person pitched upon, and whom the queen married, was Philip prince of Spain, and son of the emperor Charles V. In order to render this match as little disagreeable to the people as possible, the articles of marriage were drawn as favourable to their interests and honour as the nature of the thing would admit. It was agreed, that though Philip should have the title of king, the administration of government should be entirely in hands of the queen; that no foreigner should be capable of enjoying any office in the kingdom; that no innovation should be made in the English laws, customs, and privileges; that the queen's issue should inherit, together with England, Burgundy and the Low Countries; and that if Don Carlos, Philip's son by a former marriage, should die, the children of queen Mary should then enjoy all the dominions possessed by king Philip.

Notwithstanding all these precautions, however, Mary's alliance with Philip filled the whole nation with discontent. Sir Thomas Wyatt, a Roman Catholic, at

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Mary declared queen.

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Marries Philip of Spain.

238
Wyat's insurrection.

at

234
Death of Edward VI.

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Lady Jane Gray placed on the throne, but is forced to resign it.

England.

England.

at the head of 4000 insurgents, marched from Kent to Hyde Park, publishing, as he went forward, a declaration against the queen's evil counsellors, and against the Spanish match. His first aim was to secure the tower; but his temerity proved his ruin. As he marched through the city of London, and among the narrow streets, without suspicion, care was taken by the earl of Pembroke, to block up the way behind him by ditches and chains thrown across, and guards placed at the avenues, to prevent his return. Wyatt passed on, and supposed himself ready to reap the fruits of his undertaking; when, to his utter confusion, he found he could neither go forward nor retreat; so that he was obliged to surrender at discretion. Some other insurrections were formed; but all of them were easily suppressed, and the principal conspirators executed. The queen was now determined to remove every person of whom there could be the least cause of suspicion. Lady Jane Gray and her husband were both ordered to prepare for death. The place intended at first for their execution was without the tower; but their youth, beauty, and innocence, being likely to raise an insurrection among the people, orders were given that they should be executed within the verge of the tower*.

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Execution
of lady Jane
Gray and her
husband.

* See Gray.

The enemies of the state being thus suppressed, those of the Catholic religion were next persecuted. The old sanguinary laws which had been rejected by a former parliament, were now revived. Orders were given, that the priests and bishops who had married should be ejected; that the mass should be restored; the pope's authority established; and that the church and its privileges, all but their goods and estates, should be put on the same footing on which they were before the commencement of the reformation. But as the gentry and nobility had already divided the churchlands among them, it was thought inconvenient, and indeed impossible, to make a restoration of these. The persons who chiefly promoted these measures were Gardiner bishop of Winchester, and cardinal Pole, who was a kinsman of Henry VIII's, but had been long in Italy, and was now returned from it. The latter was for tolerating the Protestants; but the former, perceiving that rigorous measures would be most agreeable to the king and queen, declared himself against it. He was too prudent, however, to appear in person at the head of the persecution; and therefore consigned that office to Bonner bishop of London, a man of a very abandoned character. The bloody scene began by the execution of Hooper bishop of Gloucester, and Rogers prebendary of St Paul's. These were quickly followed by others, of whom the principal were archbishop Cranmer, Ridley bishop of London, and Latimer bishop of Worcester*. These persecutions soon became odious to the whole nation, and the perpetrators of them were all willing to throw the blame from themselves upon others. Philip endeavoured to fasten the whole reproach upon Bonner; but that bishop would not take the whole, and therefore retorted on the court. A bold step was now taken to introduce a court similar to the Spanish inquisition, that should be empowered to try heretics, and condemn them without any other law but its own authority. But even this was thought a method too dilatory in the present exigence of affairs. A proclamation issued against books of heresy, treason, and sedition, decla-

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Protestants
persecuted.

* See Cranmer, &c.

red, that whosoever had such books in his possession, and did not burn them without reading, should suffer as a rebel. This was attended with the execution of such numbers, that at last the magistrates who had been instrumental in these cruelties, refused to give their assistance any longer. It was computed, that, during this persecution, 277 persons suffered by fire, besides those punished by imprisonments, fines, and confiscations. Among those who suffered by fire were five bishops, 21 clergymen, eight lay-gentlemen, 84 tradesmen, 100 husbandmen, 55 women, and four children.

The only remarkable transaction which happened during this reign with regard to the temporal affairs of the kingdom was the loss of Calais, which had been in the possession of the English for upwards of 200 years*. This loss filled the whole kingdom with complaints, and the queen with grief. She was heard to say, that, when dead, the name of Calais would be found engraven on her heart. She did not long survive this loss; but died in the year 1558, of a lingering illness, after a reign of five years four months and eleven days.

* See Calais.

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Mary dies,
and is suc-
ceeded by
Elizabeth.

After the death of Mary, the princess Elizabeth succeeded to the throne without opposition. She was at Hatfield when news of her sister's death were brought her; upon which she hastened up to London, where she was received with great joy. This princess was well qualified for government. She had judgment sufficient to make choice of proper ministers, and authority enough to keep her subjects in awe. The restraints also, to which she had been subjected during her sister's reign, had taught her so well to conceal her sentiments, that she had become a perfect mistress of dissimulation; which, though no commendable part of her character, proved occasionally of great service to her government. She perfected the reformation, and put the religion of England upon the same plan which subsists at present. This was accomplished without the least difficulty; for the persecutions in Mary's reign had served only to give the whole nation an aversion for popery. In the time of Edward VI. the people had been compelled to embrace the Protestant religion, and their fears induced them to conform; but now, almost the whole nation were Protestants from inclination. The reformation was confirmed by act of parliament in 1559, and thus England was seen to change its religion four times in the space of 32 years.

For many years of queen Elizabeth's reign nothing remarkable occurs, except her ungenerous and cruel treatment of Mary queen of Scots, who had fled into her dominions for protection from her own subjects. On the 11th of November 1586, this unfortunate princess was executed, under pretence of having engaged herself in a conspiracy against the queen of England; for an account of which, see the articles MARY and SCOTLAND. In a short time after her execution, Elizabeth found herself in a much greater danger than what could have arisen from the machinations of Mary. Philip of Spain, who had long meditated the destruction of England, and who by his extensive power seemed to have reasonable grounds to hope for success, began now to put his projects in execution. The perpetual object of his schemes was to support the Catholic religion and exterminate the reformation. The revolt of the Dutch, who about this time broke off from Spain, still more inflamed

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Projected
invasion
from Spain.

England.

inflamed his resentment against the English, as they had encouraged that insurrection and assisted the revolters. He had, therefore, for some time, been making preparations to attack England by a powerful invasion; and now every part of his vast empire resounded with the noise of armaments, and every art was used to levy supplies for that great design. The marquis of Santa Croce, a sea-officer of great reputation and experience, was destined to command the fleet, which consisted of 130 vessels, of a greater size than any that had been hitherto seen in Europe. The duke of Parma was to conduct the land-forces, 20,000 of whom were on board the fleet, and 34,000 more were assembled in the Netherlands, ready to be transported into England. The most renowned nobility and princes of Italy and Spain were ambitious of sharing in the honour of this great enterprise. Don Amadeus of Savoy, Don John of Medici, Gonzago duke of Sabionetta, and others, hastened to join this great equipment; no doubt was entertained of its success, and it was ostentatiously styled the *invincible armada*. It carried on board, besides the land-forces, 8400 mariners, 2000 galley-slaves, and 2630 great pieces of brass ordnance. It was victualled for six months; and was attended with 20 lesser ships, called *caravals*, having 10 slaves, and six oars a-piece.

Nothing could exceed the terror and consternation which all ranks of people felt in England upon the news of this terrible armada being under sail to invade them. A fleet of not above 30 ships of war, and those very small, in comparison, was all that was to oppose it by sea; and as for resistance by land, that was supposed to be impossible, as the Spanish army was composed of men well disciplined, and long inured to danger. The queen alone seemed undismayed in this threatening calamity; she issued all her orders with tranquillity; animated her people to a steady resistance; and the more to excite the martial spirit of the nation, appeared on horseback in the camp at Tilbury, exhorting the soldiers to their duty, and promising to share the same dangers and the same fate with them. "I myself, (cried she), will be your general, your judge, and the rewarder of every one of your virtues in the field. Your alacrity has already deserved its rewards; and on the word of a prince they shall be duly paid you. Persevere then in your obedience to command; shew your valour in the field; and we shall soon have a glorious victory over those enemies of my God, my kingdom, and my people." The soldiers with shouts proclaimed their ardour, and only wished to be led on to conquest.

Nor were her preparations by sea carried on with less alacrity; although the English fleet was much inferior in number and size of shipping to that of the enemy, yet it was much more manageable, the dexterity and courage of the mariners being greatly superior. Lord Howard of Effingham, a man of great courage and capacity, as lord high admiral took upon him the command of the navy. Drake, Hawkins, and Forbisher, the most renowned seamen in Europe, served under him; while a small squadron consisting of 40 vessels, English and Flemish, commanded by lord Seymour, lay off Dunkirk, in order to intercept the duke of Parma. Such were the preparations made by the English, while all the Protestant powers of Europe regarded this enterprise as the critical event which was to decide for

ever the fate of their religion.

In the mean time, while the Spanish armada was preparing to sail, the admiral Santa Croce died, as likewise the vice-admiral Paliano; and the command of the expedition was given to the duke de Medina Sidonia, a person utterly unexperienced in sea-affairs; and this, in some measure, served to frustrate the design. But some other accidents also contributed to its failure. Upon leaving the port of Lisbon, the armada next day met with a violent tempest, which sunk some of the smallest of their shipping, and obliged the fleet to put back into harbour. After some time spent in refitting, they again put to sea; where they took a fisherman, who gave them intelligence that the English fleet, hearing of the dispersion of the armada in a storm, was retired back into Plymouth harbour, and most of the mariners discharged. From this false intelligence, the Spanish admiral, instead of going directly to the coast of Flanders, to take in the troops stationed there, as he had been instructed, resolved to sail to Plymouth, and destroy the shipping laid up in that harbour. But Effingham, the English admiral, was very well prepared to receive them; he was just got out of port when he saw the Spanish armada coming full sail towards him, disposed in the form of an half-moon, and stretching seven miles from one extremity to the other. However, the English admiral, seconded by Drake, Hawkins, and Forbisher, attacked the armada at a distance, pouring in their broadsides with admirable dexterity. They did not choose to engage the enemy more closely, because they were greatly inferior in the number of ships, guns, and weight of metal; nor could they pretend to board such lofty ships without manifest disadvantage. However, two Spanish galleons were disabled and taken. As the armada advanced up the channel, the English still followed and infested their rear; and their fleet continually increasing from different ports, they soon found themselves in a capacity to attack the Spanish fleet more nearly; and accordingly fell upon them, while they were as yet taking shelter in the port of Calais. To increase their confusion, Howard took eight of his smaller ships, and filling them with combustible materials, sent them, as if they had been fire-ships, one after the other into the midst of the enemy. The Spaniards, taking them for what they seemed to be, immediately took flight in great disorder; while the English, profiting by their panic, took or destroyed about 12 of their ships.

This was a fatal blow to Spain. The duke de Medina Sidonia being thus driven to the coast of Zealand, held a council of war, in which it was resolved, that as their ammunition began to fail, as their ships had received great damage, and the duke of Parma had refused to venture his army under their protection, they should return to Spain by sailing round the Orkneys, as the wind was contrary to his passage directly back. Accordingly they proceeded northward, and were followed by the English fleet as far as Flamborough head, where they were terribly shattered by a storm. Seventeen of the ships, having 5000 men on board, were afterwards cast away upon the Western isles, and the coast of Ireland. Of the whole armada, 53 ships only returned to Spain, in a miserable condition; and the seamen as well as soldiers who remained, only served, by their accounts, to intimidate their countrymen from

England.

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Destruction
of the Spa-
nish arma-
da.

England. attempting to renew so dangerous an expedition.

These disasters of the Spanish armada, served only to excite the spirit and courage of the English to attempt invasions in their turn. It would be endless to relate all the advantages obtained over the enemy at sea, where the capture of every ship must have made a separate narrative. It is sufficient to observe, that the sea-captains of that reign are still considered as the boldest and most enterprising set of men that England ever produced; and among this number, we are to reckon Raleigh and Howard, Drake, Cavendish, and Hawkins. The English navy then began to take the lead; and has since continued irresistible in all parts of the ocean.

Elizabeth continued to reign with great glory till the year 1603; but all her greatness could not prevent her from being extremely miserable before her death. She had caused her greatest favourite, and probably her lover, the earl of Essex * to be executed. Though this execution could not be called unjust, the queen's affection (on being informed that he had at last thrown himself entirely on her clemency) returned to such a degree, that she thenceforth gave herself entirely over to despair. She refused food and sustenance; she continued silent, and gloomy; sighs and groans were the only vent she gave to her despondence; and she lay for ten days and nights upon the carpet, leaning on cushions, which her maids brought her. Perhaps the faculties of her mind were impaired by long and violent exercise; perhaps she reflected with remorse on some past actions of her life, or perceived, but too strongly, the decays of nature, and the approach of her dissolution. She saw her courtiers remitting in their assiduity to her, in order to pay their court to James the apparent successor. Such a concurrence of causes was more than sufficient to destroy the remains of her constitution; and her end was now visibly seen to approach. Feeling a perpetual heat in her stomach, attended with an unquenchable thirst, she drank without ceasing, but refused the assistance of her physicians. Her distemper gaining ground, Cecil, and the lord admiral, desired to know her sentiments with regard to the succession. To this she replied, that, as the crown of England had always been held by kings, it ought not to devolve upon any inferior character, but upon her immediate heir the king of Scotland. Being then advised by the archbishop of Canterbury to fix her thoughts upon God, she replied, that her thoughts did not in the least wander from him. Her voice soon after left her; she fell into a lethargic slumber, which continued some hours; and she expired gently without a groan, in the 70th year of her age, and 45th of her reign. She was succeeded by James I. king of Scotland; since which time, the history of both England and Scotland is comprehended under the article BRITAIN.

Since the Norman conquest, England has been divided into six circuits, each circuit containing a certain number of counties. Two judges are appointed for each circuit, which they visit in the spring and autumn, for administering justice to the subjects who are at a distance from the capital. In holding the Lent (or spring) assizes, the northern circuit extends only to York and Lancaster; the assizes at Durham, Newcastle, Carlisle, and Appleby, being held only in the autumn, and distinguished by the appellation of the

long circuit. These circuits and counties are:

1. *Home Circuit* contains the counties of Essex, Hertford, Kent, Surry, and Suffex.
2. *Norfolk Circuit* contains those of Bucks, Bedford, Huntingdon, Cambridge, Suffolk, and Norfolk.
3. *Oxford Circuit.* Oxon, Berks, Gloucester, Worcester, Monmouth, Hereford, Salop, and Stafford.
4. *Midland Circuit.* Warwick, Leicester, Derby, Nottingham, Lincoln, Rutland, and Northampton.
5. *Western Circuit.* Hants, Wilts, Dorset, Somerset, Devon, and Cornwall.

6. *Northern Circuit.* York, Durham, Northumberland, Lancaster, Westmoreland, and Cumberland.

Middlesex and Cheshire are not comprehended in the above circuits; the former being the seat of the supreme courts of justice, and the latter a county palatine. There is still a court of chancery in Lancaster and Durham, with a chancellor; and there is a court of exchequer at Chester, of a mixed kind, both for law and equity, of which the chamberlain of Chester is judge; there are also other justices in the counties palatine to determine civil actions and pleas of the crown.

Besides the 40 counties into which England is divided, there are counties corporate, consisting of certain districts, to which the liberties and jurisdictions peculiar to a county have been granted by charter from the throne. Thus the city of London is a county distinct from Middlesex; the cities of York, Chester, Bristol, Norwich, Worcester, and the towns of Kingston upon Hull and Newcastle upon Tyne, are counties of themselves, distinct from those in which they lie. The fame may be said of Berwick upon Tweed, which lies in Scotland, and has within its jurisdiction a small territory of two miles on the north side of the river. Under the name of a *town*, boroughs and cities are contained: for every borough or city is a town, though every town is not a borough or city.—An account of the English constitution and government is given under the articles KING, LORDS, COMMONS, PARLIAMENT, LAW, LIBERTY, RIGHTS, &c.

The established religion of England is episcopacy. Since the reign of Henry VIII. the sovereigns of England have been called, in public writs, the supreme heads of the church; but this title conveys no spiritual meaning, as it only denotes the regal power to prevent any ecclesiastical differences, or, in other words, to substitute the king in place of the pope before the reformation, with regard to temporalities and the internal economy of the church. The kings of England never intermeddle in ecclesiastical disputes, and are contented to give a sanction to the legal rights of the clergy.

The church of England, under this description of the monarchical power over it, is governed by two archbishops, and 24 bishops, besides the bishop of Sodor and Man, who, not being possessed of an English barony, does not sit in the house of peers. See ARCHBISHOP and BISHOP.

England contains about 60 archdeacons. Subordinate to them are the rural deacons, formerly styled *arch-presbyters*, who signify the bishops pleasure to his clergy, the lower class of which consists of parish-priests (who are called *rectors* or *vicars*), deacons, and curates. See the articles CURATE, DEACON, PARSON, and VICAR.

The following is a list of the English bishoprics, with

* See DEVEUX.

244 Elizabeth's grief for the execution of Essex.

245 Her death.

246 England, how divided.

England, with their revenues, as charged in the king's books: though that sum is far from being the real annual value of the see, yet it affords in forming a comparative estimate between the revenues of each see with those of another.

	ARCHBISHOPRICS.	£.	s.	d.
Canterbury,	-	2682	12	2
York,	-	1610	0	0
	BISHOPRICS.			
London,	-	2000	0	0
Durham,	-	1821	1	3
Winchester,	-	3124	12	8

These three bishops take precedence of all others in England, and the others according to the seniority of their consecrations.

Ely,	-	2134	18	6
Bath and Wells,	-	533	1	3
Hereford,	-	768	11	0
Rocheſter,	-	358	4	9
Lichfield and Coventry,	-	559	17	3
Cheſter,	-	420	1	8
Worceſter,	-	929	13	3
Chicheſter,	-	677	1	3
St Aſaph,	-	187	11	8
Salisbury,	-	1385	5	0
Bangor,	-	131	16	3
Norwich,	-	834	11	7
Glouceſter,	-	315	7	3
Landaff,	-	154	14	2
Lincoln,	-	894	18	1
Bristol,	-	294	11	0
Carlisle,	-	531	4	9
Exeter,	-	500	0	0
Peterborough,	-	414	14	8
Oxford,	-	381	11	0
St Davids,	-	426	2	1

The eccleſiaſtical government of England is, properly ſpeaking, lodged in the convocation; which is a national repreſentative or ſynod, and answers pretty near to the ideas we have of a parliament. They are convoked at the ſame time with every parliament; and their buſineſs is to conſider of the ſtate of the church, and to call thoſe to an account who have advanced new opinions, inconſiſtent with the doctrines of the church of England. Some high-flying clergymen during the reign of queen Anne, and in the beginning of that of George I. raiſed the powers of the convocation to a height that was inconſiſtent with the principles of religious toleration, and indeed of civil liberty: ſo that the crown was obliged to exert its prerogative of calling the members together, and of diſſolving them; and ever ſince they have not been permitted to fit for any time, in which they could do buſineſs.

New ENGLAND, a province of the Britiſh empire in America, bounded on the north-eaſt by Nova Scotia, on the weſt by Canada, on the ſouth by New York, and on the eaſt by the Atlantic ocean. It lies between 41 and 49 degrees of north latitude, and between 67 and 74 of weſt longitude; extending in length 350 miles, and in breadth about 200.

This country was diſcovered in the beginning of the laſt century, and called *North Virginia*; but no Europeans ſettled there till the year 1608. The firſt colony, which was weak and ill-directed, did not ſucceed; and, for ſome time, there were only a few

adventurers who came over at times in the ſummer, built themſelves temporary huts for the fake of trading with the ſavages, and, like them, diſappeared again for the reſt of the year. At laſt ſome Engliſh preſbyterians, who had been driven from their own country, and had taken refuge in Holland, reſolved to found a church for their ſect in the new hemisphere. They therefore purchaſed, in 1521, the charter of the Engliſh North Virginia company. Forty-one families, making in all 120 perſons, landed in the beginning of a very hard winter, and found a country entirely covered with wood, which offered a very melancholy proſpect to men already exhauſted with the fatigues of their voyage. Near one half periſhed either by cold, the ſcurvy, or other diſtreſs. The courage of the reſt was beginning to fail; but it was revived by the arrival of 60 ſavage warriors, who came to them in the ſpring, headed by their chief. The old tenants aſſigned for ever to the new ones all the lands in the neighbourhood of the ſettlement they had formed, under the name of *New Plymouth*; and one of the ſavages who underſtood a little Engliſh, ſtaid to teach them how to cultivate the maize, and inſtruct them in the manner of fiſhing upon their coaſt.

This kindneſs enabled the colony to wait for the companions they expected from Europe, with ſeeds, with domeſtic animals, and with every aſſiſtance they wanted. At firſt theſe ſuccours arrived but ſlowly; but the perſecution of the puritans in England increaſed the number of proſelytes to ſuch a degree in America, that, in 1630, they were obliged to form different ſettlements, of which Boſton ſoon became the principal. Theſe firſt ſettlers were not merely eccleſiaſtics, who had been deprived of their preferments on account of their opinions; nor thoſe ſeculars influenced by new opinions, that are ſo frequent among the common people. There were among them ſeveral perſons of high rank, who, having embraced puritanism, had taken the precaution to ſecure themſelves an aſylum in theſe diſtant regions. They had cauſed houſes to be built, and lands to be cleared, with a view of retiring there, if their endeavours in the cauſe of civil and religious liberty ſhould prove abortive.

The inhabitants of New England lived peaceably a long time, without any regular form of policy. Their charter had indeed authorized them to eſtabliſh any mode of government they might chooſe; but theſe enthuſiaſts were not agreed among themſelves upon the plan of their republic, and government did not pay ſufficient attention to them to urge them to ſecure their own tranquillity. At length they grew ſenſible of the neceſſity of a regular legiſlation; and this great work, which virtue and genius united have never attempted but with diffidence, was boldly undertaken by blind fanaticiſm. It bore the ſtamp of the rude prejudices on which it had been formed. Three was in this new code a ſingular mixture of good and evil, of wiſdom and folly. No man was allowed to have a ſtiare in the government except he were a member of the eſtabliſhed church. Witchcraft, perjury, blaſphemy, and adultery, were made capital offences; and children were alſo puniſhed with death, either for curſing or ſtriking their parents. Marriages, however, were to be ſolemnized by the magiſtrate. The price of corn was fixed at 2 s. 11½ d. per buſhel. The ſavages who neglected

Raynal's
History of
European
Settlements.

First code
of laws.

When firſt
diſcovered.

glected to cultivate their lands were to be deprived of them; and Europeans were forbidden under a heavy penalty to sell them any strong liquors or warlike stores. All those who were detected either in lying, drunkennels, or dancing, were ordered to be publicly whipped. But at the same time that amusements were forbidden equally with vices and crimes, one might be allowed to swear by paying a penalty of 11½ d. and to break the sabbath for 2 l. 19 s. 9½ d. Another indulgence allowed was, to atone, by a fine, for a neglect of prayer, or for uttering a rash oath. But it is still more extraordinary, that the worship of images was forbidden to the puritans on pain of death; which was also inflicted on Roman Catholic priests, who should return to the colony after they had been banished; and on Quakers who should appear again after having been whipped, branded, and expelled. Such was the abhorrence for these sectaries, who had themselves an aversion for every kind of cruelty, that whoever either brought one of them into the country, or harboured him but for one hour, was liable to pay a considerable fine.

Those unfortunate members of the colony, who, less violent than their brethren, ventured to deny the coercive power of the magistrate in matters of religion, were persecuted with still greater rigour. This was considered as blasphemy by those very divines who had rather chosen to quit their country than to shew any deference to episcopal authority. This system was supported by the severities of the law, which attempted to put a stop to every difference in opinion, by inflicting capital punishment on all who dissented. Those who were either convicted, or even suspected, of entertaining sentiments of toleration, were exposed to such cruel oppressions, that they were forced to fly from their first asylum, and seek refuge in another. They found one on the same continent; and as New England had been first founded by persecution, its limits were extended by it.

This intemperate religious zeal extended itself to matters in themselves of the greatest indifference. A proof of this is found in the following public declaration, transcribed from the registers of the colony.

⁴
Laws against
wearing
long hair.

"It is a circumstance universally acknowledged, that the custom of wearing long hair, after the manner of immoral persons and of the savage Indians, can have been introduced into England only in sacrilegious contempt of the express command of God, who declares that it is a shameful practice for any man who has the least care for his soul to wear long hair. As this abomination excites the indignation of all pious persons; we, the magistrates, in our zeal for the purity of the faith, do expressly and authentically declare, that we condemn the impious custom of letting the hair grow; a custom which we look upon to be very indecent and dishonest, which horribly disguises men, and is offensive to modelt and sober persons, in as much as it corrupts good manners. We, therefore, being justly incensed against this scandalous custom, do desire, advise, and earnestly request all the elders of our continent, zealously to shew their aversion for this odious practice, to exert all their power to put a stop to it, and especially to take care that the members of their churches be not infected with it; in order that those persons, who, notwithstanding these rigorous pro-

"hibitions, and the means of correction that shall be used on this account, shall still persist in this custom, shall have both God and man at the same time against them."

This severity soon exerted itself against the Quakers. They were whipped, banished, and imprisoned. The behaviour of these new enthusiasts, who in the midst of tortures and ignominy praised God, and called for blessings upon men, inspired a reverence for their persons and opinions, and gained them a number of proselytes. This circumstance exasperated their persecutors, and hurried them on to the most atrocious acts of violence; and they caused five of them, who had returned clandestinely from banishment, to be hanged. This spirit of persecution was, however, at last suppressed by the interposition of the mother-country, from whence it had been brought. Charles II. moved with the sufferings of the quakers, put a stop to them by a proclamation in 1661; but he was never able totally to extinguish the spirit of persecution that prevailed in America.

The colony had placed at their head Henry Vane, the son of that Sir Henry Vane who had such a remarkable share in the disturbances of his country. This obstinate and enthusiastic young man had contrived to revive the questions of grace and free-will. The disputes upon these points ran very high; and would probably have plunged the colony into a civil war, if several of the savage nations united had not happened at that very time to fall upon the plantations of the disputants, and to massacre great numbers of them. The colonists, heated with their theological contentions, paid at first very little attention to this considerable loss. But the danger at length became so urgent and so general, that all took up arms. As soon as the enemy was repulsed, the colony resumed its former dissensions; and the phrenzy which they excited, broke out in 1692 in a war, marked with as many atrocious instances of violence, as any ever recorded in history.

There lived in a town of New England, called Salem, two young women who were subject to convulsions, accompanied with extraordinary symptoms. Their father, minister of the church, thought that they were bewitched; and having in consequence cast his suspicions upon an Indian girl, who lived in this house, he compelled her by harsh treatment to confess that she was a witch. Other women, upon hearing this, immediately believed, that the convulsions, which proceeded only from the nature of their sex, were owing to the same cause. Three citizens, casually named, were immediately thrown into prison, accused of witchcraft, hanged, and their bodies left exposed to wild beasts and birds of prey. A few days after, 16 other persons, together with a counsellor, who, because he refused to plead against them, was supposed to share in their guilt, suffered in the same manner. From this instant, the imagination of the multitude was inflamed with these horrid and gloomy scenes. Children of ten years of age were put to death, young girls were stripped naked, and the marks of witchcraft searched for upon their bodies with the most indecent curiosity; and those spots of the scurvy which age impresses upon the bodies of old men, were taken for evident signs of the infernal power. In default of these, torments were employed to extort confessions dictated by the executioners

⁵
Extraordi-
nary per-
secution of
witches.

New
England.

tioners themselves. If the magistrates, tired out with executions, refused to punish, they were themselves accused of the crimes they tolerated; the very ministers of religion raised false witnesses against them, who made them forfeit with their lives the tardy remorse excited in them by humanity. Dreams, apparitions, terror, and contumelation of every kind, increased these prodigies of folly and horror. The prisons were filled, the gibbets left standing, and all the citizens involved in gloomy apprehensions. The most prudent quitted the country stained with the blood of its inhabitants; and nothing less than the total and immediate subversion of the colony was expected, when, on a sudden, all eyes were opened at once, and the excess of the evil awakened the minds which it had first stupified. Bitter and painful remorse was the immediate consequence; the mercy of God was implored by a general fast, and public prayers were offered up to ask forgiveness for the presumption of having supposed that heaven could have been pleased with sacrifices with which it could only have been offended.

Posterity, will, probably, never know exactly what was the cause or remedy of this dreadful disorder. It had, perhaps, its first origin in the melancholy which those persecuted enthusiasts had brought with them from their own country, which had increased with the scurvy they had contracted at sea, and had gathered fresh strength from the inconveniences and hardships inseparable from a change of climate and manner of living. The contagion, however, ceased like all other epidemical distempers, exhausted by its very communication. A perfect calm succeeded this agitation; and the Puritans of New England have never since been seized with so gloomy a fit of enthusiasm.

But though the colony has renounced the persecuting spirit which hath stained all religious sects with blood, it has preserved some remains if not of intolerance, at least of severity, which reminds us of those melancholy days in which it took its rise. Some of its laws are still too severe.

New England had, however, some remedy, against bad laws, in the constitution of its mother-country, where the people who have the legislative power in their own hands are at liberty to correct abuses; and it has others derived from its situation, which open a vast field to industry and population.

The clearing of the lands in this colony is not directed by chance as in the other provinces. This matter from the first was subjected to laws which are still religiously observed. No citizen whatever has the liberty of settling even upon unoccupied land. The government, desirous of preserving all its members from the inroads of the savages, and of placing them in a condition to share in the protection of a well-regulated society, hath ordered that whole villages should be formed at once. As soon as 60 families offer to build a church, maintain a clergyman, and pay a school-master, the general assembly allot them a situation, and permit them to have two representatives in the legislative body of the colony. The district assigned them always borders upon the lands already cleared, and generally contains 60,000 square acres. These new people choose the situation most convenient for their habitation, which is usually of a square figure. The church is placed in the centre; the colonists divide the land among them-

selves, and each incloses his property with a hedge. Some woods are reserved for a common; and thus New England is constantly enlarging its territory, though it still continues to make one complete and well constituted province.

Though the colony is situated in the midst of the temperate zone, yet the climate is not so mild as that of some European provinces which are under the same parallel. The winters are longer and colder; the summers shorter and hotter. The sky is commonly clear, and the rains are more plentiful than lasting. The air is grown purer since its circulation has been made free by cutting down the woods; and malignant vapours, which at first carried off numbers of the inhabitants, are no longer complained of.

The country is divided into four provinces, which at first had no connection with one another. The necessity of maintaining an armed force against the savages, obliged them to form a confederacy in 1643, when they took the name of the *United Colonies*. In consequence of this league, two deputies from each establishment used to meet in a stated place to deliberate upon the common affairs of New England, according to the instructions they had received from the assembly by which they were sent. This association laid no constraint upon the right of every individual to act entirely as he pleased, without either the permission or approbation of the mother-country. All the submission required of these provinces was merely to acknowledge the kings of England for their sovereigns. Charles II. wished to make them more dependent. The province of Massachusetts's bay, which, though the smallest, was the richest and the most populous of the four, being guilty of some misdemeanour against government, the king seized that opportunity of taking away its charter in 1684: and it remained without one till the revolution; when it received another, which, however, did not answer its claims or expectations. The crown reserved to itself the right of nominating the governor, and appointing to all military employments, and to all principal posts in the civil and juridical departments: it allowed the people of the colony their legislative power, and gave the governor a negative voice and the command of the troops, which secured him a sufficient influence to enable him to maintain the prerogative of the mother-country in all its force. The provinces of Connecticut and Rhode-Island by timely submission prevented the punishment which that of Massachusetts had incurred, and retained their original charter. That of New-Hampshire had been always regulated by the same mode of administration as the province of Massachusetts's bay. The same governor presides over the whole colony, but with regulations adapted to the constitution of each province. According to the most exact calculations, the number of inhabitants in New England, before the commencement of the present war, was computed at 400,000; but the southern parts of the colony are better peopled than the northern, where the soil is less fertile. Among such a number of citizens, there are few proprietors wealthy enough to leave the care of their plantations to stewards or farmers: most of them are planters in easy circumstances, who live upon their estates, and are employed in the labours of the field. This equality of fortune, joined to their religious principles, and to the nature of the government, gives this

Climate,
&c.Division,
&c.

people.

6
Manner of
settlement
in this co-
lony.

English.

English.

people a more republican cast than is to be observed in the other colonies.

No European fruits have degenerated in New England; it is even said, that the apple is improved, at least has multiplied exceedingly, and made cyder a more common drink there than in any other part of the world. All European roots and garden-stuffs have equally prospered; but the seeds have not thriven quite so well. Wheat is apt to be blighted, barley grows dry, and oats yield more straw than grain. In default of these, the maize, which is commonly used in making beer, is the drink of the common people. There are large and fruitful meadows, which are covered with numerous flocks.

The arts, though carried to a greater degree of perfection in this colony than in any of the others, have not made near the same progress as agriculture. Before the commencement of the disputes with the mother-country, there were not more than four or five manufactures of any importance.

ENGLISH, or the *English Tongue*, the language spoken by the people of England, and, with some variation, by those of Scotland, as well as part of Ireland, and the rest of the British dominions.

The ancient language of Britain is generally allowed to have been the same with the Gaulic, or French; this island, in all probability, having been first peopled from Gallia, as both Cæsar and Tacitus affirm, and prove by many strong and conclusive arguments, as by their religion, manners, customs, and the nearness of their situation. But now we have very small remains of the ancient British tongue, except in Wales, Cornwall, the islands and Highlands of Scotland, part of Ireland, and some provinces of France; which will not appear strange, when what follows is considered.

Julius Cæsar, some time before the birth of our Saviour, made a descent upon Britain, though he may be said rather to have discovered than conquered it; but, about the year of Christ 45, in the time of Claudius, Aulus Plautius was sent over with some Roman forces, by whom two kings of the Britons, Togodumnus and Caractacus, were both overcome in battle: whereupon a Roman colony was planted at Malden in Essex, and the southern parts of the island were reduced to the form of a Roman province: after that, the island was conquered as far north as the friths of Dunbarton and Edinburgh, by Agricola, in the time of Domitian; whereupon a great number of the Britons, in the conquered part of the island, retired to the west part called *Wales*, carrying their language with them.

The greatest part of Britain being thus become a Roman province, the Roman legions, who resided in Britain for above 200 years, undoubtedly disseminated the Latin tongue; and the people being afterwards governed by laws written in Latin, must necessarily make a mixture of languages. This seems to have been the first mutation the language of Britain suffered.

Thus the British tongue continued, for some time, mixed with the provincial Latin, till, the Roman legions being called home, the Scots and Picts took the opportunity to attack and harrahs England: upon which, K. Vortigern, about the year 440, called the Saxons to his assistance; who came over with several of their neighbours, and having repulsed the Scots and Picts, were rewarded for their services with the isle of Tha-

net, and the whole county of Kent; but growing too powerful, and not being contented with their allotment, dispossessed the inhabitants of all the country on this side of the Severn †: thus the British tongue was in a great measure destroyed, and the Saxon introduced in its stead.

What the Saxon tongue was long before the conquest, about the year 700, we may observe in the most ancient manuscript of that language, which is a gloss on the Evangelists, by bishop Edfrid, in which the three first articles of the Lord's prayer runs thus:

"Uren fader thic arth in heofnas, sic gehalgud thin noma, fo cymeth thin ric. Sic thin willa fue is beofnas, and in eorþo, &c."

In the beginning of the ninth century the Danes invaded England; and, getting a footing in the northern and eastern parts of the country, their power gradually increased, and they became sole masters of it in about 200 years. By this means the ancient British obtained a tincture of the Danish language; but their government being of no long continuance, did not make so great an alteration in the Anglo-Saxon, as the next revolution, when the whole land, A. D. 1067, was subdued by William the conqueror, duke of Normandy in France: for the Normans, as a monument of their conquest, endeavoured to make their language as generally received as their commands, and thereby rendered the British language an entire medley.

About the year 900, the Lord's prayer, in the ancient Anglo-Saxon, ran thus:

"Thue ur fader the eart on heofenum, fi thin nama gehalgud; cume thin rice fi thin willa on eorþan swa, two on heofenum, &c."

About the year 1160, under Henry II. it was rendered thus by pope Adrian, an Englishman, in rhyme:

"Ure fader in heaven rich,
"Thy name be haled ever lich,
"Thou bring us thy michell blisse:
"Als hit in heaven y doe,
"Ever in yearth becom it also, &c."

Dr Hicks gives us an extraordinary specimen of the English, as spoken in the year 1385, upon the very subject of the English tongue.

"As it is knowe how meny maner peple beeth in this lond; theer beeth also fo many dyvers longages and tonges. Notheles Walschemen and Scots that beeth nought medled with other nation, holdeth wel nyh hir firste longage and speche; but yif the Scottes, that were sometime confederate and woned with the Pictes, drawe somewhat after hir speche; but the Fleminges, that woneth on the west side of Wales, haveth lost hir strange spech, and speketþ Saxonlike now. Also Englisshemen, they had from the bygynnyng thre maner speche; northerne, southerne, and middel speche in the middel of the lond, as they come of thre maner of peple of Germania: notheles by commyxion and melodyng first with Danes, and afterwards with Normans, in meny the contrary longage is apayred (*corrupted*.)

"This apayryng of the burth of the tynge is bycause of twie things; oon is for children in scole agent the usfage and maner of all other nations, beeth compelled for to leve hire own longage, and for to construe hir lessons and here thynges in French, and so they haveth sethe Normans come first into Engeland. Also gentlemen children beeth taught to speke Frensche from

† See Eng-
land, n^o 13,
—41.

English.

from the tyme that they beeth roked in here cradel, and kunneth speke and play with a childe's broche; and uplondische men will lykne hymself to gentilmen, and fondeith with great beynefelle for to speake Frenche to be told of.—Hit seemeth a greet wonder how Englischemen and her own longage and tonge is so dyverle of fown in this oon land: and the longage of Normandie is comlynge of another lond, and hath oon maner foun amoinge alle men that speketh hit arigt in Engeland. Allo of the forefaid Saxon tonge that is deied (*divided*) a three, and is abide scarcelye with fewe uplondische men, is greet wonder. For men of the elt, with men of the welt, is, as it were, undir the same partie of hevne accordeth more in fownynge of speche, than men of the north with men of the south. Therefore it is that Mercii, that beeth men of myddel Engeland, as it were, partners of the endes, understondeh bettre the fide longes northerne and southerne, than northerne and southerne underitondeth either other.—All the longage of the Northumbers and spechialliche at York, is so scharp, sitting and frotynge, and unschape, that we southerne men may that longage unnethe underitonde, &c.”

In the year 1537, the Lord's prayer was printed as follows: “O oure father which arte in heven, hallowe be thy name; let thy kingdome come, thy will be fulfilled as well in erth as it is in heven; geve us this daye in dayly bred, &c.” Where it may be observed, that the diction is brought almost to the present standard, the chief variations being only in the orthography. By these instances, and many others that might be given, it appears, that the English Saxon language, of which the Normans despoiled us in a great measure, had its beauties, was significant and emphatical, and preferable to what they imposed on us. “Great, verily, (says Camden), was the glory of our tongue before the Norman conquest, in this, that the old English could express most aptly, all the conceptions of the mind in their own tongue, without borrowing from any.” Of this he gives several examples.

Having thus shewn how the ancient British language was in a manner extirpated by the Romans, Danes, and Saxons, and succeeded by the Saxon, and after that the Saxon blended with the Norman French, we shall now mention two other causes of change in the language. The first of these is owing to the Britons having been a long time a trading nation, whereby offices, dignities, names of wares, and terms of traffic, are introduced, which we take with the wares from the persons of whom we have them, and form them anew, according to the genius of our own tongue; and besides this change in the language, arising from commerce, Britain's having been a considerable time subject to the see of Rome, in ecclesiastical affairs, must unavoidably have introduced some Italian words among us. Secondly, As to the particular properties of a language, our tongue has undergone no small mutation, or rather has received no small improvement upon that account: for, as to the Greek and Latin, the learned have, together with the arts and sciences now rendered familiar among us, introduced abundance; nay, almost all the terms of art in the mathematics, philosophy, physic, and anatomy; and we have entertained many more from the Latin, French, &c. for the sake of neatness and elegance: so that, at this day, our language, which,

about 1800 years ago, was the ancient British, or Welsh, &c. is now a mixture of Saxon, Teutonic, Dutch, Danish, Norman, and modern French, embellished with the Greek and Latin. Yet this, in our opinion, is so far from being a disadvantage to the English tongue as now spoken, (for all languages have undergone changes, and do continually participate with each other), that it has so enriched it, as now to become the most copious, significant, fluent, courteous, and masculine language in Europe, if not in the world.*

* See *Lan-*
ENGRAFTING, in gardening. See GRAFTING. *Eng.*

ENGRAILED, or INGRAILED, in heraldry, a term derived from the French *greffy*, “hail;” and signifying a thing the hail has fallen upon and broke off the edges, leaving them ragged, or with half-rounds, or semicircles, struck out of their edges.

ENGRAVING, the art of cutting metals and precious stones, and representing thereon figures, letters, or whatever device, or design, the artist fancies.

Engraving, properly a branch of sculpture, is divided into several other branches, according to the matter whereon it is employed, and the manner of performing it. For the rudest branch, that of

ENGRAVING on Wood. See CUTTING in Wood.

ENGRAVING on Copper, the making, correspondently to some delineated figure or design, such concave lines on a smooth surface of copper, either by cutting or corrosion, as render it capable, when charged properly with any coloured fluid, of imparting by compression an exact representation of the figure or design to paper or parchment.

Whether we consider the art of engraving, with regard to the utility and pleasure it affords, or the difficulty that attends its execution, we cannot but confess, that on every account it deserves a distinguished rank among the polite arts †. It is by means of this art † See Po-
that the cabinets of the curious are adorned with the portraits of the greatest men of all ages and all nations; that their memories, their most remarkable and most glorious actions, are transmitted to the latest posterity. It is by this art also, that the paintings of the greatest masters are multiplied to a boundless number; and that the lovers of the polite arts, diffused over the face of the whole earth, are enabled to enjoy those beauties which their distant situations seemed to have for ever barred them; and persons of moderate fortunes are hereby enabled to become possessed of all the spirit, and all the poetry, that are contained in those miracles of art, which seemed to have been reserved for the temples of Italy, or the cabinets of princes. When we reflect, moreover, that the engraver, beside the beauties of poetic composition, and the artful ordonnance of design, is to express, merely by the means of light and shade, all the various tints of colours and clair obscure; to give a relief to each figure, and a truth to each object; that he is now to paint a sky serene and bright, and then loaded with dark clouds; now the pure tranquil stream, and then the foaming, raging sea; that here he is to express the character of the man, strongly marked in his countenance, and there the minutest ornament of his dress; in a word, that he is to represent all, even the most difficult objects in nature; we cannot sufficiently admire the vast improvements in this art, and that degree of perfection to which it is at this day arrived. See the article *PRINTS*.

The

Engraving.

Bielfield's
Elem. of
Engraving.

The invention of this art is said to be owing to chance. In the 15th century, a goldsmith of Florence, who was in much esteem with pope Innocent X. having placed a sheet of oiled paper under a plate of silver that was engraved, and on which, by accident, he had laid a heavy weight, was much surprised to find, a few days after, a complete impression of the plate upon the paper. This he communicated to some able painters, his contemporaries; who profiting by that example, laid the first foundation of the art of engraving: which Raphael in Italy, and Albert Durer in Germany, greatly improved; and which the Italian, French, and Flemish masters, such as Michael Angelo, Edelinck, Rembrandt, &c. and lately some of the British artists, have successively carried to the highest degree of excellence.

The method by which engraving is performed, is of three kinds: By the graver or tool alone, which is in common language the only kind called *engraving*; by corrosion with aqua fortis, which is generally called *etching*; and by covering the surface of a copper-plate with a freeze or ground, in such a manner, that the whole would produce the effect of black in an impression; and then scraping or burnishing away part of the freeze, so as to cause the remainder to have the same effect as if they had been cut on the even surface, according to the delineation of any figure or design; which last kind is called *scraper in mezzotinto*. See *ETCHING* and *MEZZOTINTO*.

Engraving with the tool was the kind originally practised, and it is yet retained for many purposes. For though the manœuvre of etching be more easy, and other advantages attend it; yet where great regularity and exactness of the stroke or lines are required, the working with the graver is much more effectual: on which account it is more suitable to the precision necessary in the execution of portraits; as there every thing the most minute must be made out and expressed, according to the original subject, without any license to the fancy of the designer in deviating from it, or varying the effect either by that masterly negligence and simplicity in some parts, or those bold fallies of the imagination and hand in others, which give spirit and force to history-painting.

The principal instruments used in engraving with the tool, are graters, scrapers, a burnisher, an oil-stone, and a cushion for bearing the plates.

Gravers are made in several forms with respect to the points, some being square, others lozenge; the square graver for cutting broad and deep, and the lozenge for more delicate and fine strokes and hatches. La Boffe recommends, as the most generally useful, such as are of a form betwixt the square and lozenge; and he advises, that they should be of a good length; small towards the point, but stronger upwards, that they may have strength enough to bear any stress there may be occasion to lay upon them: for if they be too small and mounted high, they will bend; which frequently causes their breaking, especially if they be not employed for very small subjects.

The burnisher is used to assist in the engraving on some occasions, as well as to polish the plates. It is seven inches in length, and made of fine steel well polished. The burnisher is formed at one end, and a scraper on the other, each about an inch and a half

long from the point: betwixt them, about four inches of the instrument is made round, and serves as a handle; and is thicker in the middle than at the necks, where the burnisher and scraper begin, which necks are only one quarter of an inch in diameter. The principal application of it in engraving, besides its use in polishing the plates, is to take out any scratches, or accidental defacings, that may happen to the plates during the engraving; or to lessen the effect of any parts that may be too strongly marked in the work, and require to be taken down.

A cushion, as it is called, is likewise generally used for supporting the plate in such a manner, that it may be turned every way with ease. It is a bag of leather filled with sand, which should be of the size that will best suit the plates it is intended to bear. They are round, and about nine inches over, and three inches in thickness.

The cushion, made as above directed, being laid on the table, the plate must be put upon it; and the graver being held in the hand, according to the instructions before given, the point must be applied to the plate, and moved in the proper direction for producing the figures of the lines intended: observing, in forming straight lines, to hold the plate steady on the cushion; and where they are to be finer, to press more lightly, using greater force where they are to be broader and deeper. In making circular or other curve lines, hold your hand and graver steadily; and as you work, turn your plate upon the cushion against your graver, otherwise it will be impossible for you to make any circular or curved lines with that neatness and command of hand you by this means may. After part of the work is engraved, it is necessary to scrape it with the scraper, or graver, passed in the most level direction over the plate to take off the roughness formed by the cutting of the graver; but great care must be taken not to incline the edge of the scraper or tool used, in such a manner that it may take the least hold of the copper, as it would otherwise produce false strokes or scratches in the engraving: and that the engraved work may be rendered more visible, it may afterwards be rubbed over with a roll of felt dipped in oil. In using the graver, it is necessary to carry it as level as possible with the surface of the plate; for otherwise, if the fingers slip betwixt them, the line that will be produced, whether curve or straight, will become deeper and deeper in the progress of its formation; which entirely prevents strokes being made at one cut, that will be fine at their extremities, and larger in the middle; and occasions the necessity of retouching, to bring them to that state. For this reason, it is very necessary for those, who would learn to engrave in perfection, to endeavour, by frequent trials, to acquire the habit of making such strokes both straight and curving, by lightening or sinking the graver with the hand, according to the occasion. If, after finishing the design, any scratches appear, or any part of the engraving be falsely executed, such scratches, or faulty parts, must be taken out by the burnisher, and further polished, if necessary, by the above-mentioned roll.

The plate being thus engraved, it is proper to round off the edges, by using first a rough file, and afterwards a smoother; and to blunt the corners a little, by the same means: after which, the burnisher should be passed

Engraving.

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ENGRAVING on *Precious Stones*, is the representing of figures, or devices, in relief or indented, on divers kinds of hard polished stones.

The art of engraving on precious stones is one of those wherein the ancients excelled; there being divers antique agates, cornelians, and onyxes, which surpass any thing of that kind the moderns have produced. Pyrgoteles among the Greeks, and Diofcorides under the first emperors of Rome, are the most eminent engravers we read of: the former was so esteemed by Alexander, that he forbid any body else to engrave his head; and Augustus's head, engraven by the latter, was deemed so beautiful, that the succeeding emperors chofe it for their seal.

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In this branch of engraving, they make use either of the diamond, or of emery.

The diamond, which is the hardest of all stones, is only cut by itself, or with its own matter. The first thing to be done in this branch of engraving, is to cement two rough diamonds to the ends of two sticks big enough to hold them steady in the hand, and to rub or grind them against each other till they be brought to the form desired. The dust or powder that is rubbed off serves afterwards to polish them, which is performed with a kind of mill that turns a wheel of soft iron. The diamond is fixed in a brass dish; and, thus applied to the wheel, is covered with diamond-dust, mixed up with oil of olives; and when the diamond is to be cut facet-wise, they apply first one face, then another, to the wheel. Rubies, sapphires, and topazes, are cut and formed the same way on a copper wheel, and polished with tripoli diluted in water. As to agates, amethysts, emeralds, hyacinths, granates, rubies, and others of the softer stones, they are cut on a leaden wheel, moistened with emery and water, and polished with tripoli on a pewter wheel. Lapis-lazuli, opal, &c. are polished on a wooden wheel. To fashion and engrave vases of agate, crystal, lapis-lazuli, or the like, they make use of a kind of lathe, like that used by pewterers to hold the vessels, which are to be wrought with proper tools: that of the engraver generally holds the tools, which are turned by a wheel; and the vessel is held to them to be cut and engraven, either in relief or otherwise; the tools being moistened from time to time with diamond dust and oil, or at least emery and water. To engrave figures or devices on any of these stones, when polished, such as medals, seals, &c. they use a little iron wheel, the ends of whose axis are received within two pieces of iron, placed upright, as in the turner's lathe; and to be brought closer, or set further apart,

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Engravers in steel commonly begin with punches, which are in relief, and serve for making the creux, or cavities, of the matrices and dyes: though sometimes they begin with the creux, or hollowness; but then it is only when the intended work is to be cut very shallow. The first thing done, is that of designing the figures; the next is the moulding them in wax, of the size and depth they are to lie, and from this wax the punch is engraven. When the punch is finished, they give it a very high temper, that it may the better bear the blows of the hammer with which it is struck to give the impression to the matrix.

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16 G

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The steel is made hot to soften it, that it may the more readily take the impression of the punch; and after striking the punch on it, in this state, they proceed to touch up or finish the strokes and lines, whereby reason of their fineness or the too great relief they are any thing defective, with steel gravers of different kinds, chisels, flatters, &c. being the principal instruments used in graving on steel.

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Enhydrius || **Ennius.** melody of speech, which rises or falls by intervals still more minute than the enharmonic, when properly modulated, and applied with taste, has an astonishing power over the soul. As to the modern *enharmonic* system, we may likewise refer the reader to the same work for an account of its nature and use; though he will find it accurately and clearly explained by D'Alembert, in the Treatise of Music given in the present work, (art. 144. 145. 146.)

ENHYDRUS, in natural history, a genus of siderochita or cruusted ferrugineous bodies, formed in large and in great part empty cases, inclosing a small quantity of an aqueous fluid.

Of this genus there are only two species: 1. The thick-shelled enhydrius, with black, reddish-brown, and yellow crusts. 2. The thinner-shelled kind, with yellowish-brown and purple crusts; neither of which ferments with aqua fortis, or gives fire with steel.

ENIGMA. See **ÆNIGMA.**

ENIXUM, among chemists, a kind of neutral salt, generated of an acid and an alkali.

The sal enixum of Paracelsus, is the caput mortuum of spirits of nitre with oil of vitriol, or what remains in the retort after the distillation of this spirit; being of a white colour, and pleasing acid taste.

ENMANCHE, in heraldry, is when lines are drawn from the centre of the upper edge of the chief to the sides, to about half the breadth of the chief; signifying sleeved, or resembling a sleeve, from the French *manche*.

ENNEAGON, in geometry, a polygon with nine sides. See **POLYGON.**

ENNEAHEDRIA, in natural history, a genus of columnar, crystalliform, and double-pointed spars, composed of a trigonal column, terminated at each end by a trigonal pyramid.

Of this genus there are several species, distinguished by the length or shortness of the column and pyramids, none of which give fire with steel, but all of them ferment with aqua fortis. See **SPAR.**

ENNEANDRIA, in botany, (from *ενναι*, nine, and *ανδρ*, a man or husband), the name of the ninth class in Linnaeus's sexual system, consisting of plants which have hermaphrodite flowers with nine stamina or male organs. See **BOTANY**, p. 1292.

ENNIUS (Quintus), an ancient Latin poet, born at Rudii, a town in Calabria. He came first to Rome when M. Porcius Cato was questor, whom he had instructed in the Greek language in Sardinia; and by his genius and behaviour he gained the esteem of the most eminent persons in the city. According to Horace, Ennius never applied himself to writing till he had drank freely of wine. Hence he contracted the gout, of which he died 9 y. B. C. He was interred in Scipio's sepulchre; who had a great esteem and friendship for him, and caused a statue to be erected to him upon his monument. He endeavoured to introduce the treasures of the Greek tongue among the Latins, and was the first among the Romans who made use of heroic verses. He wrote the *Annals of Rome*: he translated several tragedies from the Greek, and wrote others, beside federal comedies. We have only some fragments of his works, which were first collected by the two Stephens, and afterwards published at Naples, with a learned commentary, by Jerom Columna,

in quarto, 1590; and reprinted at Amsterdam in 1707, in quarto, with additions by Hesfelius.

ENOCH (the Prophecy of); an apocryphal book, of which there remains but a few fragments.

Enoch was certainly one of the most illustrious prophets of the first world, since Moses says of him, that *he walked with God*. This prophet is famed in the church for two things: The first is, his being taken up into heaven, without seeing death, (Heb. xi. 5.); the second is, his prophecy; a passage of which St Jude has cited in his epistle, ver. 14. The ancients greatly esteemed the prophecy of Enoch. Tertullian, on the authority of this book, deduces the original of idolatry, astrology, and unlawful arts, from the revolted angels, who married with the daughters of men. And it is on the testimony of this book, that the fathers of the 2d and 3d centuries, as Irenæus, Cyprian, and Lactantius, received for true this fable of the marriage of the angels with the daughters of men. St Augustin, who was less credulous, allows, indeed, that Enoch wrote something divine, because he is cited by St Jude; but insinuates, that the authority of this book is doubtful, and that it cannot be proved that it was really written by Enoch. Indeed, the account it gives of giants engendered by angels, and not by men, has manifestly the air of a fable; and the most judicious critics believe, it ought not to be ascribed to Enoch.

ENS, among metaphysicians, denotes entity, being, or existence: this the schools call *ens reale*, and *ens positivum*; to distinguish it from their *ens rationis*, which is only an imaginary thing, or exists only in the imagination.

Ens, among chemists, imports the power, virtue, and efficacy, which certain substances exert upon our bodies.

Ens, in geography, a city of Germany, situated at the confluence of the Danube and the river Ens, about 80 miles south of Vienna: E. Long. 14. 20. N. Lat. 48. 16.

ENSATÆ, in botany, (from *ensis*, a sword); the name of the sixth order in Linnaeus's natural method, consisting of plants with sword-shaped leaves*. It contains the following genera, viz. Antholyza, Callisia, Commelina, Crocus, Eriocaulon, Ferraria, Gladiolus, Iris, Ixia, Moræa, Pontederia, Sisyrinchium, Tradescantia, Wachendorffia, Xyris. * See Botany, p. 1305.

ENSEELED, in falconry, is said of a hawk that has a thread drawn through her upper eye-lid, and made fast under her beak, to take away the sight.

ENSEMBLE, a French term, sometimes used in our language; literally signifying *together*, or *one with another*:—being formed from the Latin *in simul*.

In architecture, we say the *ensemble*, or *tout ensemble*, of a building, meaning the whole work, or composition, considered together, and not in parts; and sometimes also, the relative proportion of the parts to the whole.—“All those pieces of building make a fine *ensemble*.”

To judge well of a work, a statue, or other piece of sculpture, one must first examine whether the *ensemble* be good. The *tout ensemble* of a painting, is that harmony which results from the distribution of the several objects or figures whereof it is composed.—“This picture is good, taking the parts separately: but the *tout ensemble* is bad.”

Ensch || **Ensemble.**

Enformis
||
Entabler.

ENSIFORMIS CARTILAGO. See XIPHOIDES.

ENSIGN, in the military art, a banner or colours under which soldiers are ranged, according to the different companies or parties they belong to. See FLAG, COLOURS, STANDARD, &c.

The Turkish ensigns are horses tails; those of the Europeans are pieces of taffety, with divers figures, colours, arms, and devices thereon. Xenophon tells us, that the ensign bore by the Persians was a golden eagle on a white flag; the Corinthians bore the winged horse, or Pegasus, in theirs; the Athenians, an owl; the Messenians, the Greek letter M; the Lacedæmonians, the Λ. The Romans had a great diversity of ensigns; the wolf, minotaur, horse, boar, and at length the eagle, where they stopped: this was first assumed in the second year of the consulate of Marius†.—A military ensign on a medal of a Roman colony, denotes it a colony peopled with old soldiers.

† See Engle.

ENSIGN is also the officer that carries the colours, being the lowest commissioned officer in a company of foot, subordinate to the captain and lieutenant. It is a very honourable and proper post for a young gentleman at his first coming into the army: he is to carry the colours both in assault, day of battle, &c. and should not quit them but with his life: he is always to carry them himself on his left shoulder: only on a march he may have them carried by a soldier. If the ensign is killed, the captain is to carry the colours in his stead.

Naval ENSIGN, a large standard or banner hoisted on a long pole erected over the poop, and called the *ensign staff*.—The ensign is used to distinguish the ships of different nations from each other, as also to characterise the different squadrons of the navy. The British ensign in ships of war is known by a double cross, viz. that of St George and St Andrew, formed upon a field which is either red, white, or blue.

ENSISHEIM, a town of France, in Upper Alsace. It is a pretty little place, well built, and consists of about 200 houses. E. Long. 7. 41. N. Lat. 47. 49.

ENT (Sir George), an eminent English physician, born at Sandwich in Kent in 1604. He was educated at Sidney college, Cambridge; and, afterwards travelling into foreign countries, received the degree of doctor of physic at Padua. After his return he obtained great practice, was made president of the college of physicians in London, and at length received the honour of knighthood from king Charles II. He was extremely intimate with Doctor Harvey; whom he learnedly defended in a piece entitled, “*Apologia pro Circulatione Sanguinis, contra Æmilium Parifanum.*” He also published, “*Animadversiones in Malachie Thruftoni;*” and some observations in the Philosophical Transactions. Glauville, speaking of his Plus Ultra of the modern improvements in anatomy, numbers Sir George Ent, Doctor Glisson, and Doctor Wallis, with the most celebrated discoverers in that science. The two former were among the first members of the Royal Society. Sir George Ent died in October 1680.

ENTABLATURE, or ENTABLEMENT, in architecture, is that part of an order of a column which is over the capital, and comprehends the architrave, frieze, and cornice. See ARCHITECTURE, chap. i.

ENTABLER, in the menage, the fault of a horse

whose croupe goes before his shoulders in working upon volts; which may be prevented by taking hold of the right rein, keeping your right leg near, and removing your left leg as far from the horse's shoulder as possible.

This is always accompanied with another fault called *aculer*. See ACULER.

ENTAIL, in law, signifies *see tail*, or *see entailed*; that is, abridged, curtailed, or limited to certain conditions. See FEE, and TAIL.

ENTE, in heraldry, a method of marshalling, more frequent abroad than with us, and signifying grafted or ingrafted.

We have, indeed, one instance of *enté* in the fourth grand quarter of his majesty's royal ensign, whose blazon is Brunwick and Lunenburg impaled with ancient Saxony, *enté en pointé*, “grafted in point.”

ENTEROCÆLE, in surgery, a tumor formed by a prolapsion of the intestines through the rings of the abdomen and proceffes of the peritonæum, into the scrotum. See SURGERY.

ENTHUSIASM, a transport of the mind, whereby it is led to think and imagine things in a sublime, surprising, yet probable manner. This is the enthusiasm felt in poetry, oratory, music, painting, sculpture, &c.

ENTHUSIASM, in a religious sense, implies a transport of the mind, whereby it fancies itself inspired with some revelation, impulse, &c. from heaven. Mr Locke gives the following description of enthusiasm. “In all ages, men in whom melancholy has mixed with devotion, or whose conceit of themselves has raised them into an opinion of a great familiarity with God, and a nearer admittance to his favour than is afforded to others, have often flattered themselves with a persuasion of an immediate intercourse with the Deity, and frequent communications from the Divine Spirit. Their minds being thus prepared, whatever groundless opinion comes to settle itself strongly upon their fancies, is an illumination from the Spirit of God. And whatsoever odd action they find in themselves a strong inclination to do, that impulse is concluded to be a call or direction from heaven, and must be obeyed. It is a commission from above, and they cannot err in executing it. This I take to be properly enthusiasm, which, tho' arising from the conceit of a warm and overweening brain, works, when it once gets footing, more powerfully on the persuasions and actions of men, than either reason or revelation, or both together; men being most forwardly obedient to the impulses they receive from themselves.” Devotion, when it does not lie under the check of reason, is apt to degenerate into enthusiasm. When the mind finds itself inflamed with devotion, it is apt to think that it is not of its own kindling, but blown up with something divine within it. If the mind indulges this thought too far, and humours the growing passion, it at last flings itself into imaginary raptures and ecstasies; and when once it fancies itself under the influence of a divine impulse, no wonder if it slightes human ordinances, and refuses to comply with the established form of religion, as thinking itself directed by a much superior guide.

ENTHUSIAST, a person possessed with enthusiasm. See the preceding article.

ENTHYMEME. See LOGIC, n° 93. and ORATORY, n° 31.

Entail
||
Enthy-
meme.

Entity
||
Entry.

ENTITY, the same with ENS.

ENTREPAS, in the manege, a broken pace or going, that is neither walk nor trot, but has somewhat of an amble.

This is a pace or gait of such horses as have no reins or hack, and go upon their shoulders; or, of such as are spoiled in their limbs.

ENTRING-Ladders, in a ship, are of two sorts; one used by the vessel's sides, in a harbour, or in fair weather, for persons to go in and out of the ship: the other is made of ropes, with small flaves for steps; and is hung out of the gallery to enter into the boat, or to come aboard the ship, when the sea runs so high that they dare not bring the boat to the ship's side for fear of flaving it.

ENTROCHUS, in natural history, a genus of extraneous fossils, usually of about an inch in length, and made up of a number of round joints, which, when separate and loose, are called *trochites*: they are composed of the same kind of plated clay with the fossil shells of the echini, which is usually of a bluish-grey colour, and very bright where fresh-broken; they are all striated from the centre to the circumference, and have a cavity in the middle. See Plate CI. fig. 4.

The entrochi are found of all sizes, from that of a pin's head to a finger's length, and the thickness of one's middle finger; and are plainly of marine origin, having often sea-shells adhering to them. They seem to be the petrified arms of that singular species of the sea-starfish, called *Stella arborefcens*.

They are esteemed very powerful diuretics, and prescribed in nephritic cases with good success; the dose being as much of the powder as will lie on a shilling.

ENTRY, in law, signifies taking possession of lands or tenements, where a person has a right to do so.

ENTRY of an Heir, in Scots law, that form of law by which an heir vests in himself a proper title to his predecessor's estate. See *Precept of CLARE CONSTAT*.

Bill of ENTRY, in commerce. See *BILL*.

In making entries inwards, it is usual for merchants to include all the goods they have on board the same ship in one bill, though sometimes they may happen to be upwards of 20 several kinds; and in case the goods are short entered, additional or post entries are now allowed; though formerly the goods, so entered, were forfeited. As to bills of entry outwards, or including goods to be exported, upon delivering them, and paying the customs, you will receive a small piece of parchment called a *cocket*, which testifies your payment thereof, and all duties for such goods.

If several sorts of goods are exported at once, of which some are free, and others pay customs; the exporter must have two cockets, and therefore must make two entries; one for the goods that pay, and the other for the goods that do not pay custom.

Entries of goods, on which a drawback is allowed, must likewise contain the name of the ship in which the goods were imported, the importer's name, and time of entry inwards. The entry being thus made, and an oath taken that the customs for those goods were paid as the law directs, you must carry it to the collector and comptroller, or their deputies; who, after examining their books, will grant warrant, which must be given to the surveyor, searcher, or loud-waiter, for them

Envelope
||
Epaminon-
das.

to certify the quantity of goods; after which the certificate must be brought back to the collector and comptroller, or their deputies, and oath made that the said goods are really shipped, and not landed again in any part of Great Britain.

ENVELOPE, in fortification, a work of earth, sometimes in form of a simple parapet, and at others like a small rampart with a parapet: it is raised sometimes on the ditch, and sometimes beyond it.

ENVIRONNE, in heraldry, signifies surrounded with other things: thus, they say, a lion environné with so many bezants. See *BEZANT*.

ENUMERATION, an account of several things, in which mention is made of every particular article.

ENUMERATION, in rhetoric, a part of peroration; in which the orator, collecting the scattered heads of what has been delivered throughout the whole, makes a brief and artful relation or recapitulation thereof.

ENVOY, a person deputed to negotiate some affair with any foreign prince or state. Those sent from the courts of Britain, France, Spain, &c. to any petty prince or state, such as the princes of Germany, the republics of Venice, Genoa, &c. go in quality of envoys, not ambassadors; and such a character only do those persons bear, who go from any of the principal courts of Europe to another, when the affair they go upon is not very solemn or important. There are envoys ordinary and extraordinary, as well as ambassadors: they are equally under the protection of the law of nations, and enjoy all the privileges of ambassadors; only differing from them in this, that the same ceremonies are not performed to them.

ENVY, in ethics; pain felt, and malignity conceived, at the sight of excellence or happiness in another. See *EMULATION*.

EPAMINONDAS, a celebrated Theban, the son of Polymnus, and one of the greatest captains of antiquity. He learned philosophy and music under Lysis, a Pythagorean philosopher; and was from his infancy inured to all the exercises of body and mind. He was learned, generous, well-skilled in war, brave, modest, and prudent; and had such a regard for truth, that he would not tell a falsehood even in jest. He served first under the Lacedaemonians; saved the life of Pelopidas their chief, who received in a battle seven or eight wounds; and contracted a strict friendship with that general, which lasted till his death. At his persuasions, Pelopidas delivered the city of Thebes from the yoke of the Spartans, who had rendered themselves masters of Cadmea, which occasioned a bloody war between the two nations. Epaminondas was made general of the Thebans; on which he gained the celebrated battle of Leuctra, in which Cleombrotus, the valiant king of Sparta, was killed. He then ravaged the enemy's country, and caused the city of Messina to be rebuilt and peopled. At length, the command of the army was given to another, because Epaminondas had kept his troops in the field four months longer than he had been ordered by the people; but, instead of retiring in disgust, he now served as a common soldier, and distinguished himself by so many brave actions, that the Thebans, ashamed of having deprived him of the command, restored him to his post, in order to carry the war into Thessaly, where his arms were always victorious. A war breaking out between the

Eliaus

Ephemerides.

Elians and the inhabitants of Mantinea; the Thebans took the part of the former. Epaminondas then resolved to endeavour to surprize Sparta and Mantinea; but not succeeding, he gave the enemy battle, in which he received a mortal wound with a javelin, the bearded iron remaining in the wound. Knowing that it could not be drawn out without occasioning immediate death, he would not suffer it to be touched, but continued to give his orders: and on his being told, that the enemy were entirely defeated, "I have lived long enough," he cried, since I die without being conquered;" and at the same time he plucked the javelin from his wound, and expired, 363 B. C.

EPANOLOPSIS. See ORATORY, n° 73.

EPANODOS. *Ibid.* n° 75.

EPANORTHOSIS. *Ibid.* n° 86.

EPARER, in the manage, signifies the flinging of a horse, or his jerking and striking with his hind-legs.

EPAULEMENT, in fortification, a work raised to cover sidewise, is either of earth, gabions, or fascines loaded with earth. The epaulements of the places of arms for the cavalry, at the entrance of the trenches, are generally of fascines mixed with earth.

EPENTHESIS, in grammar, the interposition or insertion of a letter or syllable in the middle of a word; as *alituum*, for *alitum*; *religio*, for *religio*; *induperator*, for *imperator*, &c.

EPEUS, of the line of Endymion, the inventor of the battering ram, an engine of great service in sieges to make a breach. He is thought to have built the Trojan horse, and to have founded the city Metapontum.

EPHA, or EPHAN, in Jewish antiquity, a measure for things dry, containing 10.961 of a bushel.

EPHEMERA, from *ἡμέρα*, "a day;" a diary fever, or fever of one day's continuance only. In this case, such a heat as attends an excess of wine, a pulse somewhat full and quick, but soft and regular, a slight head-ach, a nausea, and restlessness, are all the symptoms, and which terminate without any sensible evacuation. If it continue unto the third day, it is not a diary fever; and if the constitution is very dry, an hectic is to be dreaded.

EPHEMERA, the *Day-Fly*, in zoology, a genus belonging to the order of neoptera. It has no teeth or palps; there are two large protuberances above the eyes; the wings are erect, the two hind ones being largest; and the tail is bristly. There are 11 species, distinguished by their colour and the number of bristles in their tail. This fly derives its name from the circumstance of its living but one day. They are seen flying about the surface of the water in mid-summer, for three days, and no longer; they eat nothing, and their only business is to drop their eggs on the water after they have copulated. These eggs sinking to the bottom, produce a sort of worms or maggots; these soon hollow themselves cavities in the clay, where they remain three years, growing every year about an inch in length. When the worm is come to its full growth, it rises to the surface of the water, about six o'clock in the morning; and there issues from it this fly, which lays its eggs, and dies, about six o'clock the same night: so that the life of the creature in the fly-state is only about 12 hours.

EPHEMERIDES, in literary history, an appella-

tion given to those books or journals, which shew the motions and places of the planets for every day of the year.

It is from the tables contained in these ephemerides that eclipses, and all the variety of aspects of the planets, are found.

EPHESUS, a city of antiquity, much celebrated on account of its temple of Diana, and for being the most famous mart or staple town of Hither Asia. It was enlarged and walled round by Lyfimachus and Paulanias; and owed its increase of trade and riches to Lyfander the Lacedemonian. It is now subject to the Turks; and is still a considerable city of Natolia, or Lesser Asia. E. Long. 27. 3. N. Lat. 38. 16.

EPHOD, in Jewish antiquity, one part of the priestly habit; being a kind of girdle, which, brought from behind the neck over the two shoulders, and hanging down before, was put cross the stomach, then carried round the waist, and made use of as a girdle to the tunic.—There were two sorts of ephods, one of plain linen for the priests, and the other embroidered for the high priest.

EPHORI, in Grecian antiquity, magistrates established in ancient Sparta to balance the regal power. The authority of the ephori was very great. They sometimes expelled and even put to death the kings, and abolished or suspended the power of the other magistrates, calling them to account at pleasure. There were five of them, others say nine. They presided in the public shews and festivals. They were entrusted with the public treasure; made war and peace; and were so absolute, that Aristotle makes their government equal to the prerogative of a monarchy. They were established by Lycurgus.

EPHREM (Syrus), an ancient Christian writer, in the fourth century, deacon of Edessa, was born at Nisibe, in Syria. He was greatly esteemed by St Basil, St Gregory Nyssen, and other great men. He wrote against the opinions of Sabellius, Arius, Apollonarius, the Manichees, &c. and acquired such reputation by his virtue and his works, that he was called the *doctor and prophet of the Syrians*. He died in 378. The best editions of his works are, that of Oxford, in 1708, in folio, and that of Rome, from 1732 to 1736, in Syriac, Greek, and Latin, 6 vols folio.

EPHYDOR, in antiquity, an officer in the Athenian courts of justice, who was to provide the plaintiff and defendant with equal water hour-glasses. When the glass was run out, they were not permitted to speak any farther; and, therefore, we find them very careful not to lose or mispend one drop of their water. Whilst the laws quoted by them were reciting, or if any other business happened to intervene, they gave orders that the glass should be stopped.

EPICCHARMUS, an ancient poet and philosopher, born in Sicily, was a scholar of Pythagoras. He and Phormus are said to have invented comedy in Syracuse. He presented 55 plays. Horace commends Plautus for imitating him, in following the chase of the intrigue so closely as not to give the readers or spectators time to trouble themselves with doubts concerning the discovery. He wrote likewise, treatises concerning philosophy and medicine; but none of his works have been preserved. He died aged 90, according to Laertius, who has preserved four verses inscribed on his statue.

EPIC,

Ephesus
Epicharmus.

Epic
Epicetetus.

EPIC, or HEROIC, Poem, a poem expressed in narration, formed upon a story partly real, and partly feigned; representing, in a sublime style, some signal and fortunate action, distinguished by a variety of great events, to form the morals, and affect the mind with the love of heroic virtue.

We may distinguish three parts of the definition, namely, the matter, the form, and the end. The matter includes the action of the fable, under which are ranged the incidents, episodes, characters, morals, and machinery. The form comprehends the way or manner of the narration, whether by the poet himself, or by any persons introduced, whose discourses are related: to this branch likewise belong the moving of the passions, the descriptions, discourses, sentiments, thoughts, style, and verification; and besides these, the similes, tropes, figures, and, in short, all the ornaments and decorations of the poem. The end is to improve our morals, and increase our virtue. See **POETRY**, chap. ii.

EPICEDIUM, in ancient poetry, a poem rehearsed during the funeral solemnity of persons of distinction.

EPICOENE, in grammar, a term applied to nouns, which, under the same gender and termination, mark indifferently the male and female species.

EPICETETUS, a celebrated Stoic philosopher, born at Hierapolis in Phrygia, in the first century, was the slave of Epaphroditus, a freedman and one of Nero's guard. Domitian banishing all philosophers from Rome, about the year 94, Epictetus retired to Nicopolis in Epirus, where he died in a very advanced age; and after his death, the earthen lamp he made use of sold for 3000 drachmas. He was a man of great modesty; which was eminent in his own practice, as well as in his recommendation to others: hence he used to say, "That there is no need of adorning a man's house with rich hangings or paintings, since the most graceful furniture is temperance and modesty, which are lasting ornaments, and will never be the worse for wearing." Of all the ancient philosophers, he seems to have made the nearest approaches to the Christian morality, and to have had the most just ideas of God and providence. He always possessed a cool and serene mind, unruffled by passion; and was used to say, that the whole of moral philosophy was included in these words, *support and abstain*. One day, his master Epaphroditus strove in a frolic to wrench his leg; when Epictetus said, with a smile, and free from any emotion, "If you go on, you will certainly break my leg;" but the former redoubling his effort, and striking it with all his strength, he at last broke the bone; when all the return Epictetus made was, "Did not I tell you, Sir, that you would break my leg?" No man was more expert at reducing the rigour of the maxims of the Stoics into practice. He conformed himself strictly, both in his discourse and behaviour, to the manners of Socrates and Zeno. He waged continual war with fancy and fortune; and it is an excellence peculiar to himself, that he admitted all the severity of the Stoics without their sourness, and reformed Stoicism as well as professed it; and besides his vindicating the immortality of the soul, as strenuously as Socrates, or any Stoic of them all, he declared openly against self-murder, the lawfulness of which was maintained by the rest of the sect. Arrian, his disciple,

wrote a large account of his life and death, which is lost; and preserved four books of his discourses, and his Enchiridion, of which there have been several editions in Greek and Latin; and, in 1758, a translation of them into English was published by the learned and ingenious Miss Carter.

EPICUREAN PHILOSOPHY, the doctrine or system of philosophy maintained by Epicurus and his followers.

His philosophy consisted of three parts; canonical, physical, and ethereal. The first was about the canons or rules of judging. The censure which Tully passes upon him for his despising logic, will hold true only with regard to the logic of the Stoics, which he could not approve of, as being too full of nicety and quirk. Epicurus was not acquainted with the analytical method of division and argumentation, nor was he so curious in modes and formation as the Stoics. Soundness and simplicity of sense, assisted with some natural reflections, was all his art. His search after truth proceeded only by the senses; to the evidence of which he gave so great a certainty, that he considered them as an infallible rule of truth, and termed them the *first natural light of mankind*.

In the second part of this philosophy he laid down atoms, space, and gravity, as the first principles of all things: he did not deny the existence of God, but thought it beneath his majesty to concern himself with human affairs; he held him a blessed immortal Being, having no affairs of his own to take care of, and above meddling with those of others.

As to his ethics, he made the supreme good of man to consist in pleasure, and consequently supreme evil in pain. Nature itself, says he, teaches us this truth; and prompts us from our birth to procure whatever gives us pleasure, and avoid what gives us pain. To this end he proposes a remedy against the sharpness of pain: this was to divert the mind from it, by turning our whole attention upon the pleasures we have formerly enjoyed. He held that the wise man must be happy, as long as he is wise: the pain, not depriving him of his wisdom, cannot deprive him of his happiness.

There is nothing that has a fairer show of honesty than the moral doctrine of Epicurus. Gassendus pretends, that the pleasure in which this philosopher has fixed the sovereign good, was nothing else but the highest tranquillity of mind in conjunction with the most perfect health of body: but Tully, Horace, and Plutarch, as well as almost all the fathers of the church, give us a very different representation: indeed the nature of this pleasure, in which the chief happiness is supposed to be seated, is a grand problem in the morals of Epicurus. Hence there were two kinds of Epicureans, the rigid and the remiss: the first were those who understood Epicurus's notion of pleasure in the best sense, and placed all their happiness in the pure pleasures of the mind, resulting from the practice of virtue: the loose or remiss Epicureans, taking the words of that philosopher in a gross sense, placed all their happiness in bodily pleasures or debauchery.

EPICURUS, the greatest philosopher of his age, was born at Gargettium in Attica, about 340 B. C. in the 109th Olympiad. He settled at Athens in a fine garden he had bought; where he lived with his friends in great tranquillity, and educated a great number of disciples.

They

Epicyle
Epiden-
drum.

They lived all in common with their master. The respect which his followers paid to his memory is admirable: his school was never divided, but his doctrine was followed as an oracle. His birth-day was still kept in Pliny's time; the month he was born in was observed as a continued festival; and they placed his picture every where. He wrote a great many books, and valued himself upon making no quotations. He raised the atomical system to a great reputation, though he was not the inventor of it, but had only made some change in that of Democritus. As to his doctrine concerning the supreme good or happiness, it was very liable to be misrepresented, and some ill effects proceeded from thence, which discredited his sect. He was charged with perverting the worship of the gods, and inciting men to debauchery; but he did not forget himself on this occasion: he published his opinions to the whole world; he wrote some books of devotion; recommended the veneration of the gods, sobriety, and chastity; and it is certain that he lived in an exemplary manner, and conformably to the rules of philosophical wisdom and frugality. Timocritus, a deserter of his sect, spoke very scandalously of him. Gassendus has given us all he could collect from the ancients concerning the person and doctrine of this philosopher; who died of a suppression of urine, aged 72.

EPICYCLE, in the ancient astronomy, a little circle whose centre is in the circumference of a greater circle: or it is a small orb or sphere, which being fixed in the deferent of a planet, is carried along with it; and yet, by his own peculiar motion, carries the planet fastened to it round its proper centre.

It was by means of epicycles, that Ptolemy and his followers solved the various phenomena of the planets, but more especially their stations and retrogradations.

EPICYCLOID, in geometry, a curve generated by the revolution of the periphery of a circle, along the convex or concave side of the periphery of another circle.

EPICYEMA, among physicians, denotes a suppurating; being a false conception or mole happening after the birth of a regular fetus.

EPIDEMIA, in Grecian antiquity, festivals kept in honour of Apollo and Diana, at the stated seasons when those deities, who could not be present every where, were supposed to visit different places, in order to receive the vows of their adorers.

EPIDEMIC, among physicians, an epithet of diseases which at certain times are popular, attacking great numbers at or near the same time.

EPIDENDRUM, in botany, a genus of the diandria order, belonging to the gynandria class of plants. This is the plant which produces the fruit called *vanilla*, and which is used in the making of chocolate. It is a native of Mexico and also of some parts of the East Indies. It is a parasitic plant; the leaves of which greatly resemble the vine, and are about 18 inches long and three inches broad. The flowers are of a white colour intermixed with stripes of red and yellow. When these fall off, they are quickly succeeded by the pods, which at first are green, but afterwards, as they ripen, become yellow, and are gathered for use. The pods of the best vanilla are long, slender, and well filled with seeds. If opened when fresh, the

cavity of the pod is found to contain a humid substance that is black, oily, and balsamic, of such a strong smell, that it frequently causes head-achs, and even a sort of temporary intoxication. The season for gathering the pods begins about the latter end of September, and lasts till the end of December. They are dried in the shade; and when dry and fit for keeping, they are rubbed externally with a little oil of cocoa or calba, to render them supple, or preserve them the better, and to prevent them from becoming too dry or brittle. The use of this fruit is only for perfuming chocolate. In New Spain it is reckoned unwholesome, and therefore never used: but in England and other countries of Europe, it is a constant ingredient; and perhaps its noxious qualities may be corrected by the sea-air. In those countries where they grow, the plants are very easily propagated by cuttings. In this country they require to be kept in a stove, and also to be placed near some American tree, round which they may climb for their support.

EPIDERMIS, in anatomy. See ANATOMY, n° 73.
EPIDIDYMIS, in anatomy. See ANATOMY, n° 371, c.

EPIGASTRIC REGION, a part or subdivision of the abdomen. See ANATOMY, n° 349, b.

EPIGLOTTIS, in anatomy, one of the cartilages of the larynx, or wind-pipe. See ANATOMY, n° 380, a.

EPIGRAM, in poetry, a short poem in verse, treating only of one thing, and ending with some lively, ingenious, and natural thought or point.

* See Poetry, n° 47.

EPIGRAPHE, among antiquarians, denotes the inscription of a building, pointing out the time when, the persons by whom, the uses, and the like, for which it was erected.

EPILEPSY, in medicine, the same with what is otherwise called the *falling-sickness*, from the patient's falling suddenly to the ground. See MEDICINE.

EPILEPSY, in farriery. See there, § ix.

EPILOBIUM, the WILLOW-HERB; a genus of the monogynia order, belonging to the octandria class of plants. There are seven species, all of them natives of Britain. They grow in marshes, or under hedges in moist and shady places; having blossoms generally of a red colour, and sometimes of considerable beauty. The most remarkable is the *hirsutum*, commonly called *codlins* and *creams*. The top-shoots of this plant have a very delicate fragrant; but so transitory, that before they have been gathered five minutes, it is no longer perceptible. Horses, sheep, and goats eat this plant; cows are not fond of it; swine refuse it.

EPILOGUE, in oratory, the end or conclusion of a discourse, ordinarily containing a recapitulation of the principal matters delivered.

EPILOGUE, in dramatic poetry, a speech addressed to the audience, after the play is over, by one of the principal actors therein; usually containing some reflections on certain incidents in the play, especially those in the part of the person that speaks it; and having somewhat of pleasantry, intended to compose the passions raised in the course of the representation: A practice which is ridiculed by the *Spectator*; and compared to a merry jig upon the organ after a good sermon, to wipe away any impressions that might have been made thereby, and send the people away just as they came.

Epime-
dium
Epiphanis

EPIMEDIUM, **BARREN-WORT**; a genus of the monogynia order, belonging to the tetrandria class of plants. There is only one species, viz. the alpinum. It is a low herbaceous plant, with a creeping root, having many stalks about nine inches high, each of which has three flowers composed of four leaves placed in the form of a cross. They are of a reddish colour, with yellow stripes on the border.

EPIMENIDES, an ancient poet and philosopher, was born at Gnosius in Crete. Contrary to the custom of his country, he always wore his hair long; which, according to some, was because he was ashamed of being thought a Cretan: and indeed he does not seem to have had a high opinion of his countrymen, if that verse cited by St Paul be, as it is generally believed to be, his; "The Cretans are always liars, evil beasts, slow bellies." Many stories are related of him, too wonderful to merit attention; however, his reputation was so great over all Greece, that he was there esteemed a favourite of the gods. The Athenians being afflicted with the plague, and commanded by the oracle to make a solemn lustration of the city, sent Nicias, the son of Niceratus, with a ship to Crete, to desire Epimenides to come to them. He accepted their invitation, accompanied the messengers to Athens, performed the lustration of the city, and the plague ceased. Here he contracted an acquaintance with Solon, whom he privately instructed in the proper methods for the regulation of the Athenian commonwealth. Having finished his business at Athens, the citizens offered him many valuable presents and high honours, and appointed a ship to carry him back to Crete: but he returned their presents, and would accept of nothing except a little branch of the sacred olive preferred in the citadel; and desired the Athenians to enter into an alliance with the Gnosians. Having obtained this, he returned to Crete; where he died four years, aged 157 years; or as the Cretans, consistently with their character, pretended, 299. He was a great poet, and wrote 5000 verses on "the genealogy of the gods," 6500 "on the building of the ship Argos and Jason's expedition to Colchis," and 4000 "concerning Minos and Rhadamanthus." He wrote also in prose, "Concerning sacrifices and the commonwealth of Crete." St Jerom likewise mentions his "book of oracles and responses." The Lacedaemonians procured his body, and preserved it among them by the advice of an oracle; and Plutarch tells us, that he was reckoned the seventh wife man by those who refused to admit Periander into the number.

EPIPHANIUS (St), an ancient father of the church, born at Besanduan, a village in Palestine, about the year 332. He founded a monastery near the place of his birth, and presided over it. He was afterwards elected bishop of Salamis; when he sided with Paulinus against Meletius, and ordained in Palestine, Paulinian, the brother of St Jerom; on which a contest arose between him and John bishop of Jerusalem. He afterwards called a council in the island of Cyprus, in which he procured a prohibition of the reading of Origen's writings; and made use of all his endeavours to prevail on Theophilus, bishop of Alexandria, to engage St Chrysostom to declare in favour of that decree: but not meeting with success, he went himself to Constantinople, where he would not have

any conversation with St Chrysostom; and formed the design of entering the church of the apostles, to publish his condemnation of Origen: but being informed of the danger to which he would be exposed, he resolved to return to Cyprus; but died at sea, in the year 403. His were printed in Greek, at Basil 1544, in folio; and were afterwards translated into Latin, in which language they have been often reprinted. Petavus revised and corrected the Greek text by two manuscripts, and published it together with a new translation at Paris in 1622. This edition was reprinted at Cologne in 1682.

EPIPHANY, a Christian festival, otherwise called the *Manifestation of Christ to the Gentiles*, observed on the sixth of January, in honour of the appearance of our Saviour to the three magi, or wise-men, who came to adore him and bring him presents. The feast of epiphany was not originally a distinct festival; but made a part of that of the nativity of Christ, which being celebrated 12 days, the first and last of which were high or chief days of solemnity, either of these might properly be called *epiphany*, as that word signifies the appearance of Christ in the world.

The word in the original Greek, *ἐπιφάνεια*, signifies *appearance or apparition*; and was applied, as some critics will have it, to this feast, on account of the star which appeared to the magi.—St Jerom and St Chrysostom take the epiphany for the day of our Saviour's baptism, when he was declared to men by the voice, *Hic est filius meus dilectus, in quo mihi complacui*: "This is my beloved Son, in whom I am well pleased." And accordingly it is still observed by the Coptæ and Ethiopians in that view. Others contend, that the feast of Christmas, or the nativity of our Saviour, was held in divers churches on this day; which had the denomination *epiphany*, or *appearance*, by reason of our Saviour's first appearance on earth at that time. And it must be allowed, that the word is used among the ancient Greek fathers, not for the appearance of the star to the magi, but for that of our Saviour to the world: In which sense, St Paul uses the word *epiphania*, in his second epistle to Timothy, c. i. v. 10.

EPIPHONEMA. See ORATORY, n° 96.

EPIPHORA, in medicine, a preternatural defluxion of the eyes, when they continually discharge a sharp ferous humour, which exoriates the cheeks.

EPIPHYSIS, in anatomy. See ANATOMY, n° 1. c.

EPIPLOCELE, in medicine, is a kind of hernia, or rupture, in which the omentum subsides into the scrotum.

EPIPLOOMPHALON, in medicine, an hernia umbilicalis, proceeding from the omentum falling into the region of the umbilicus or navel.

EPIPLOON. See OMENTUM.

EPIRUS, a district of ancient Greece, bounded on the east by Etolia, on the west by the Adriatic, on the north by Thessaly and Macedon, and on the south by the Ionian sea. This country was anciently governed by its own princes, in which state it made a very considerable figure. The country, according to Josephus, was first peopled by Dodanim the son of Javan and grandson of Japhet. The people were very warlike: but they continued in their savage state long after their neighbours were civilized; whence the Islanders used to threaten their offenders with transportation

Epiphany
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Epirus.

Epirus.

tation to Epirus. Their horses were in great request among the ancients, as well as the dogs produced in one of the divisions called *Molossus*; and hence these dogs were called by the Romans *Molossi*.

The history of Epirus commences with the reign of Pyrrhus the son of Achilles by Deidamia the daughter of Lycomedes king of Scyros. He is said to have behaved with great bravery at the siege of Troy; but it would appear that he behaved with no less barbarity. After the city was taken, he is said to have killed old king Priam with his own hand; to have thrown Astyanax the son of Hector and Andromache headlong from an high tower; and sacrificed Polyxena the daughter of Priam on the tomb of his father. He carried Andromache with him into Epirus, where he settled by the advice of the famous footlayer Helenus, one of Priam's sons, who had served during the Trojan war both under his father and himself. The only remarkable period of the history of Epirus is the reign of Pyrrhus II. who made war upon the Romans. He was invited into Italy by the Tarentines; and embarked about 280 B. C. After having escaped many dangers by sea, he landed in that country, and with great difficulty gained a victory over the Romans; but he was afterwards utterly defeated by them *, and obliged to return into his own country. To retrieve his honour, he then undertook an expedition against Macedon; where he overthrew Antigonus, and at last made himself master of the whole kingdom. He then formed a design of subduing all the other Grecian states; but met with such an obstinate resistance at Lacedæmon, that he was obliged to drop the enterprize; and was soon after killed at the siege of Argos, by a woman, who from the wall threw a tile upon his head. Deidamia, the grand-daughter of Pyrrhus, was the last that sat on the throne of Epirus. She is said to have been murdered after a short reign; upon which the Epirotes formed themselves into a republic.

Under the new form of government Epirus never made any considerable figure, but seems rather to have been dependent on the kingdom of Macedon. The Romans having conquered Philip king of that country, restored the Epirotes to their ancient liberty; but they, forgetful of this favour, soon after took up arms in favour of Perseus. As a punishment for this ingratitude, the Romans gave orders to Paulus Emilius, after the reduction of Macedon, to plunder the cities of Epirus, and level them with the ground. This was punctually executed throughout the whole country on the same day, and at the same hour. The booty was sold, and each foot-soldier had 200 denarii, that is, six pounds nine shillings and two pence, and each of the horse the double of this sum. An hundred and fifty thousand men were made slaves, and sold to the best bidder for the benefit of the republic. Nor did the vengeance of Rome stop here; all the cities of Epirus, to the number of 70, were dismantled, and the chief men of the country carried to Rome, where they were tried, and most of them condemned to perpetual imprisonment. After this terrible blow, Epirus never recovered its ancient splendor. Upon the dissolution of the Achaean league, it was made part of the province of Macedon; but, when Macedon became a diocese, Epirus was made a province of itself, called the province of *Old Epirus*, to distinguish it from *New Epirus*, an-

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other province lying to the east of it. On the division of the empire, it fell to the emperors of the east, and continued under them till the taking of Constantinople by the Latins, when Michael Angelus, a prince nearly related to the Greek emperor, seized on Etolia and Epirus, of which he declared himself despot or prince; and was succeeded by its brother Theodorus, who took several towns from the Latins, and so far enlarged his dominions, that, disdaining the title of *despote*, he assumed that of *emperor*, and was crowned by Demetrius archbishop of Bulgaria. Charles, the last prince of this family, dying without lawful issue, bequeathed Epirus and Acarnania to his natural sons, who were driven out by Amurath the second. Great part of Epirus was afterwards held by the noble family of the Castriots; who, though they were masters of all Albania, yet styled themselves princes of Epirus. Upon the death of the famous George Castriot, surnamed *Scanderbeg*, Epirus fell to the Venetians, who were soon dispossessed of it by the Turks; in whose hands it still continues, being now known by the name of *Albania*, which comprehends the Albania of the ancients, all Epirus, and that part of Dalmatia which is subject to the Turks.

EPISCOPACY, the government of the church by bishops. See the word *BISHOP*.—In that article, when describing the office and power of bishops in the first ages, we followed Mr Peter King's Account of the *Constitution of the Ancient Church*; and considered them only as pastors of a single congregation. But here a regard to impartiality obliges us to acknowledge, that we were not then acquainted with Mr Slater's Answer to that performance, in his *Original Draught of the Primitive Church*; where it is shown, that, at the time Mr Peter King alludes to, bishops had more than one, sometimes many congregations, with their clergy, under their care. As to the absolute validity of his reasoning, however, or how far it is capable of being redargued, we must leave our polemical readers to judge from a perusal of the books themselves.

EPISCOPAL, something belonging to BISHOPS.

EPISCOPALIANS, in church-history, an appellation given to those who prefer the episcopal government and discipline to all others. See EPISCOPACY.

By the test act, none but Episcopals, or members of the church of England, are qualified to enjoy any office civil or military.

EPISCOPIUS (Simon), one of the most learned men of the 17th century, and the chief supporter of the Arminian sect, was born at Amsterdam in 1583. In 1612, he was chosen divinity professor at Leyden, in the room of Gomarus, who resigned; and the functions of his office, with his private studies, were light burdens to him, compared with the difficulties he sustained on account of the Arminian controversy: which, though it began in the universities, soon flew to the pulpits, from whence it spread and inflamed the people. The states of Holland having invited Episcopius to take his place at the synod of Dort, he went thither accompanied by some remonstrant ministers; but the synod would not allow them to sit as judges, nor to appear in any other capacity than as persons summoned before them: they submitted, were deposed from their functions, and banished the territories of the commonwealth. Episcopius and his persecuted brethren

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Epirus.

Episcopus
Epistle.Epistolary
Epode.

threen retired to Antwerp; but the times growing more favourable, he returned to Holland in 1626, and was made minister of the church of the Remonstrants at Rotterdam: in 1634, he was chosen rector of the college founded by his sect at Amsterdam, where he spent the remainder of his days. He died in 1643, of the same disorder which had killed his wife before, a retention of urine; having lost his sight some weeks previous to his end. The learned have bestowed great eulogiums on Episcopius; but he did not always write with that moderation which might have been wished. His works make two volumes in folio, of which the second consists of posthumous publications.

EPISCOPUS, the same with bishop. See **BISHOP** and **EPISCOPACY**.

EPISODE, in poetry, a separate incident, story, or action, which a poet invents, and connects with his principal action, that his work may abound with a greater diversity of events; though, in a more limited sense, all the particular incidents whereof the action or narration is compounded, are called *episodes*. See **POETRY**, chap. ii. 19.

EPISPASTIC, in medicine, a topical remedy, which being applied to the external parts of the body, attracts the humours to that part.

EPISTATES, in the Athenian government, was the president of the proedri. See **PROEDRI**.

EPISTEMONARCH, in the ancient Greek church, an officer of great dignity, who had the care of every thing relating to faith, in the quality of censor. His office answered pretty nearly to that of master of the sacred palace at Rome.

EPISTLE, denotes the same with a missive letter; but is now chiefly used in speaking of ancient writings, as the epistles of St Paul, epistles of Cicero, epistles of Pliny, &c.

EPISTLES and Gospels, in the liturgy of the church of England, are select portions of scripture, taken out of the writings of the evangelists and apostles, and appointed to be read, in the communion-service, on Sundays and holidays. They are thought to have been selected by St Jerom, and by him put into the lectionary. It is certain, they were very anciently appropriated to the days whereon we now read them, since they are not only of general use throughout the western church, but are also commented upon in the homilies of several ancient fathers, which are said to have been preached upon those very days to which these portions of scripture are now affixed.

The epistles and gospels are placed in an admirable order and method, and bear a special relation to the several days whereon they are read. The year is distinguished into two parts; the first being designed to commemorate Christ's living among us, the other to instruct us to live after his example. The former takes in the whole time from Advent to Trinity-Sunday; the latter, all the Sundays from Trinity to Advent. During the first of these seasons, the epistles and gospels are calculated to raise in us a grateful sense of what our Saviour did and suffered for us, and set before our eyes his nativity, circumcision, and manifestation to the Gentiles; his doctrines, and miracles; his baptism, fasting, and temptation; his agony and bloody sweat; his cross and passion; his death, burial, resurrection, and ascension; and his mission of the Holy Ghost.

During the second season of the year, the epistles and gospels tend to instruct us in the true paths of Christianity. See **COLLECTS**.

EPISTOLARY, something belonging to an epistle. See **EPISTLE**.

EPISTOLARY Composition. See **LETTER**; and **POETRY**, n° 76, &c.

EPISTROPHE. See **ORATORY**, n° 71.

EPISTYLE, in the ancient architecture, a term used by the Greeks for what we call *architrave*, viz. a massive piece of stone or wood, laid immediately over the capital of a column.

EPITAPH, a monumental inscription in honour or memory of a person deceased. See **POETRY**, n° 102.

EPITASIS, in ancient poetry, the second part or division of a dramatic poem, wherein the plot, entered upon in the first part, or prologus, was carried on, heightened, and worked up, till it arrived at its state, or height, called *catastasis*.

EPITASIS, in medicine, the increase of a disease, or beginning of a paroxysm, particularly in a fever.

EPITHALAMIUM, in poetry, a nuptial song, or composition, in praise of the bride and bridegroom, praying for their prosperity, for a happy offspring, &c.

Among the Greeks, the married couple were no sooner bedded, than the young men and maids gathered round the door, dancing and singing the epithalamium, shouting, and stamping with their feet, with intention to drown the maid's cries.

EPITHEM, in pharmacy, a kind of fomentation, or remedy of a spirituous or aromatic kind, applied externally to the regions of the heart, liver, &c. to strengthen and comfort the same, or to correct some intemperature thereof. See **PHARMACY**, n° 1015, &c.

EPITHET, in poetry and rhetoric, an adjective expressing some quality of a substantive to which it is joined; or such an adjective as is annexed to substantives by way of ornament and illustration, not to make up an essential part of the description. Nothing, says Aristotle, tires the reader more than too great a redundancy of epithets, or epithets placed improperly; and yet nothing is so essential in poetry as a proper use of them. The writings of the best poets are full of them.

EPITOME, in literary history, the same with **ABRIDGEMENT**.

EPITRITUS, in prosody, a foot consisting of three long syllables and one short. Of these, grammarians reckon four kinds: the first consisting of an iambus and spondee, as *salūtāntēs*; the second, of a trocheus and spondee, as *conciātī*; the third, of a spondee and an iambus, as *commūnicāns*; and the fourth, of a spondee and trocheus, as *incāntārē*. See the articles **SPONDEUS**, **TROCHEUS**, &c.

EPITROPE. See **ORATORY**, n° 83.

EPIZEUXIS. *Ibid.* n° 68.

EPOCH, in chronology, a term or fixed point of time whence the succeeding years are numbered or counted. See **ÆRA**.

EPODE, in lyric poetry, the third or last part of the ode, the ancient ode being divided into strophe, antistrophe, and epode. See **ODE**, &c.

The epode was sung by the priests, standing still before the altar, after all the turns and returns of the strophe

EPOPEIA strophe and antistrophe, and was not confined to any precise number or kind of verses.

Equitrian.

The epode is now a general name for all kinds of little verses that follow one or more great ones, of what kind soever they be: and in this sense, a pentameter is an epode after a hexameter. And as every little verse, which, being put after another, closes the period, is called *epode*; hence the sixth book of Horace's odes is entitled *liber epodon*, "book of epodes," because the verses are all alternately long and short, and the short ones generally, though not always, close the sense of the long one.

EPOPOEIA, in poetry, the history, action, or fable, which makes the subject of an epic poem. The word is derived from the Greek, *επος*, *carmen*, "verse;" and *ποιω*, *facio*, "I make."

In the common use of the word, however, *epopæia* is the same with *epos*, or epic poem itself. See the article **POETRY**.

EPOPS, or **HOPOPE**. See **ΥΡΡΥΑ**.

EPSOM, a town of Surrey, about 15 miles south-west of London: much resorted to on account of its medicinal waters; from which the bitter purging salt being first extracted, got the name of *Epsum salt* †.

EPULONES, in Roman antiquity, ministers who assisted at the sacrifices, and had the care of the sacred banquet committed to them.

EQUABLE, an appellation given to such motions as always continue the same in degree of velocity, without being either accelerated or retarded.

EQUAL, a term of relation between two or more things of the same magnitude, quantity, or quality.

Mathematicians speak of *equal lines*, angles, figures, circles, ratios, solids.

EQUALITY, that agreement between two or more things, whereby they are denominated equal.

EQUANIMITY, in ethics, denotes that even and calm frame of mind and temper, under good or bad fortune, whereby a man appears to be neither puffed up nor overjoyed with prosperity, nor dispirited, soured, or rendered uneasy by adversity.

EQUATION, in algebra. See **ALGEBRA**, sect. ii.

EQUATION of Time, in astronomy and chronology, the reduction of the apparent time or motion of the sun, to equable, mean, or true time †.

EQUATOR, in geography, a great circle of the terrestrial globe, equidistant from its poles, and dividing it into two equal hemispheres; one north, and the other south. See **GEOGRAPHY**.

EQUERRY, in the British customs, an officer of state, under the master of the horse.

There are five equeries, who ride abroad with his majesty: for which purpose they give their attendance monthly, one at a time, and are allowed a table.

As to the equeries of the crown stable, they have this distinct appellation, as being employed in mounting, managing, and breaking the saddle-horses for his majesty's use, and holding his stirrup.

EQUES AURATUS, is used for a knight **BACHELOR**, called *auratus*, q. d. *gilt*, because anciently none but knights were allowed to beautify their armour, or other habiliments for war, with gold.

EQUESTRIAN STATUE, signifies the statue of a person mounted on horseback.

EQUESTRIAN Order, among the Romans, signified

their knights, or equites; as also their troopers, or horsemen in the field: the first of which orders stood in contradistinction to the senators; as the last did to the foot, military, or infantry. Each of these distinctions was introduced into the state by Romulus.

EQUIANGULAR, in geometry, an epithet given to figures whose angles are all equal: such are a square, an equilateral triangle, &c.

EQUICRURAL, in geometry. See **ISOCELES**.

EQUIDISTANT, an appellation given to things placed at equal distances from some fixed point, or place, to which they are referred.

EQUILATERAL, in general, something that hath equal sides; as an equilateral triangle.

EQUILIBRIUM, in mechanics, is when the two ends of a lever or balance hang so exactly even and level, that neither doth ascend or descend, but both keep in a position parallel to the horizon; which is occasioned by their being both charged with an equal weight.

EQUIMULTIPLES, in arithmetic and geometry, are numbers or quantities multiplied by one and the same number or quantity. Hence, equimultiples are always in the same ratio to each other, as the simple quantities before multiplication: thus, if 6 and 8 are multiplied by 4, the equimultiples 24 and 32 will be to each other as 6 to 8.

EQUINOCTIAL, in astronomy, a great circle of the celestial globe, whose poles are the poles of the world. See **ASTRONOMY** and **GEOGRAPHY**.

EQUINOX, the time when the sun enters either of the equinoctial points, where the ecliptic intersects the equinoctial. See **ASTRONOMY**, n° 135.

Precession of the EQUINOXES. See **ASTRONOMY**, n° 137.

EQUISETUM, **HORSE-TAIL**; a genus of the order of filices, belonging to the cryptogamia class of plants. There are seven species, of which the most remarkable are, 1. The *sylvaticum*, or wood horse-tail. It grows in woods and moist shady places in many parts of England and Scotland. The stalk rises from 12 to 18 inches high, angular, and rough to the touch; the angles being edged with sharp *spiculae*, scarce visible without a microscope. The leaves grow verticillate, 12 or more in a whorl, and these whorls are about an inch distant from one another. The leaves are very slender, nearly quadrangular, about five inches long, pendent, and beset with several other secondary whorls, so that it resembles a pine-tree in miniature. Horses are very fond of this plant, and in some parts of Sweden it is collected to serve them as winter food. 2. The *arvense*, common or corn horse-tail, grows in wet meadows and corn-fields. The most remarkable property of this is, that its seeds, when viewed by a microscope, are seen to leap about as if they were animated. It has a very astringent and diuretic quality, and has been esteemed serviceable in the *hematuria* and *gonorrhœa*, but is disregarded by the present practice. It is a troublesome plant in pastures; and disagreeable to cows, being never touched by them unless they are compelled by hunger, and then it brings on an incurable diarrhœa. It does not seem to affect horses or sheep. 3. The *palustre*, marsh horse-tail, or paddock pipe, is frequent in marshes and ditches. It is not so rough as the former, but is likewise prejudicial to cattle. 4. The *fluvatile*, or great river horse-tail is frequent in shady

Equian-
gular
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Equitum.

† See
Chemistry,
n° 139.

† See
Astronomy,
n° 181.

Equity
Equuleus.

Equus.

marshes, and on the brinks of stagnant waters. It is the largest of all the species, growing sometimes to the height of a yard, and near an inch in diameter. Haller tells us, that this kind of equisetum was eaten by the Romans; and Linnæus affirms, that oxen and reindeer are fond of it, but that horses refuse it. 5. The hyemale, rough horse-tail, slave-grass, or Dutch rushes. This is much used by the whitesmiths and cabinet-makers, under the name of *Dutch rushes*, for polishing their metals and wood. All the other species will answer this purpose in some degree, but the last better than any of the rest. In Northumberland the dairy-maids scour and clean their milk-pails with it. Some imagine, that if cows are fed with this species, their teeth will fall out.

EQUITY, in a general sense, the virtue of treating all other men according to reason and justice, or as we would gladly be treated ourselves when we understand aright what is our due. See **JUSTICE**.

EQUITY, in jurisprudence, is defined a correction or qualification of the law, generally made in that part wherein it falleth or is too severe. It likewise signifies the extension of the words of the law to cases unexpressed, yet having the same reason; so that where one thing is enacted by statute, all other things are enacted that are of the like degree. For example, the statute of *Glouc.* gives action of waste against him that holds lands for life or years; and, by the equity thereof, a man shall have action of waste against a tenant that holds but for one year, or one half-year, which is without the words of the act, but within the meaning of it; and the words that enact the one, by equity enact the other. So that equity is of two kinds. The one abridges and takes from the letter of the law: the other enlarges and adds to it; and statutes may be construed according to equity, especially where they give remedy for wrong, or are for expedition of justice. Equity seems to be the interposing *law of reason*, exercised by the lord chancellor in extraordinary matters to do equal justice, and, by supplying the defects of the law, gives remedy in all cases. See **CHANCERY**. [See also *Blackst. Comment.* vol. i. 61, 91. vol. iii. 49, 429, 436. vol. iv. 435.]

EQUIVALENT, an appellation given to things which agree in nature or other circumstance; as *force, virtue, &c.*

EQUIVOCAL TERMS or words, among logicians, are those which have a doubtful or double meaning.

According to Mr Locke, the doubtfulness and uncertainty of words has its cause more in the ideas themselves, than in any incapacity of the words to signify them; and might be avoided, would people always use the same term to denote the same idea, or collection of ideas: but, adds he, it is hard to find a discourse on any subject where this is the case; a practice which can only be imputed to folly, or great dishonesty; since a man, in making up his accounts, might with as much fairness use the numeral characters sometimes for one sometimes for another collection of units.

EQUIVOCAL Generation, the production of animals without the intercourse between the sexes, by the influence of the sun or stars, &c.

This kind of generation is now quite exploded by the learned.

EQUULEUS, or **ECULEUS**, in antiquity, a kind

of rack used for extorting a confession, at first chiefly practised on slaves, but afterwards made use of against the Christians.

The equuleus was made of wood, having holes at certain distances, with a screw, by which the criminal was stretched to the third, sometimes to the fourth, or fifth hole, his arms and legs being fastened on the equuleus with cords; and thus was hoisted aloft, and extended in such a manner, that all his bones were dislocated. In this state red-hot plates were applied to his body, and he was goaded in the sides with an instrument called *angula*.

EQUULUS, in astronomy. See **ASTRONOMY**, n° 206.

EQUUS, the HORSE, in zoology, a genus of quadrupeds belonging to the order of belluæ. This genus comprehends the horse, the ass, and the zebra; they have six erect and parallel fore-teeth in the upper jaw, and six somewhat prominent ones in the under jaw; the dog-teeth are solitary, and at a considerable distance from the rest; and the feet consist of an undivided hoof. The horse is a domestic animal; and the figure and dimensions of his body are so well known, that a general description is altogether unnecessary. We shall therefore confine ourselves to the natural history of this noble animal.

The horse, in a domestic state, is a bold and fiery animal; equally intrepid as his master, he faces danger and death with ardour and magnanimity. He delights in the noise and tumult of arms, and seems to feel the glory of victory: he exults in the chase; his eyes sparkle with emulation in the course. But though bold and intrepid, he is docile and tractable: he knows how to govern and check the natural vivacity and fire of his temper. He not only yields to the hand, but seems to consult the inclination of his rider. Constantly obedient to the impressions he receives, his motions are entirely regulated by the will of his master. He in some measure resigns his very existence to the pleasure of man. He delivers up his whole powers; he reserves nothing; he will rather die than disobey. Who could endure to see a character so noble abused! who could be guilty of such gross barbarity!

This character, though natural to the animal, is in some measure the effect of education. His education commences with the loss of liberty, and it is finished by constraint. The slavery of the horse is so ancient and so universal, that he is but rarely seen in a natural state. Several ancient writers talk of wild horses, and even mention the places where they were to be found. Herodotus takes notice of white savage horses in Scythia; Aristotle says, they are to be found in Syria; Pliny, in the northern regions; and Strabo, in Spain and the Alps. Among the moderns, Cardan says, that wild horses are to be found in the Highlands of Scotland and the Orkney isles; Olaus, in Muscovy; Dapper, in the island of Cyprus; Leo and Marmol, in Arabia and Africa, &c. But as Europe is almost equally inhabited, wild horses are not to be met with in any part of it; and those of America were originally transported from Europe by the Spaniards; for this species of animals did not exist in the new world. The Spaniards carried over a great number of horses, left them in different islands, &c. with a view to propagate that useful animal in their colonies. These have multiplied incredibly in the vast deserts of those thinly peopled coun-

tries,

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tries, where they roam at large, without any restraint. M. de Salle relates, that he saw, in the year 1685, horses feeding in the meadows of North America, near the bay of St Louis, which were so ferocious that nobody durst come near them. Oexmelin says, that he has seen large troops of them in St Domingo running in the valleys: that when any person approached, they all stopped; and one of them would advance till within a certain distance, then snort with his nose, take to his heels, and the whole troop after him. Every author who takes notice of these horses of America, agree that they are smaller and less handsome than those of Europe. These relations sufficiently prove, that the horse, when at full liberty, though not a fierce or dangerous animal, has no inclination to associate with mankind; that all the softness and ductility of his temper proceeds entirely from the culture and polish he receives in his domestic education, which in some measure commences as soon as he is brought forth.

The motions of the horse are chiefly regulated by the bit and the spur; the bit informs him how to direct his course, and the spur quickens his pace. The mouth of the horse is endowed with an amazing sensibility: the slightest motion or pressure of the bit gives him warning, and instantly determines his course.

The horse has not only a grandeur in his general appearance, but there is the greatest symmetry and proportion in the different parts of his body. The regularity and proportion of the different parts of the head gives him an air of lightness, which is well supported by the strength and beauty of his chest. He erects his head, as if willing to exalt himself above the condition of other quadrupeds: his eyes are open and lively; his ears are handsome, and of a proper height; his mane adorns his neck, and gives him the appearance of strength and boldness.

At the age of two years, or two years and a half, the horse is in a condition to propagate; and the mare, like most other females, is ready to receive him still sooner. But the foals produced by such early embraces are generally ill-made and weakly. The horse should never be admitted to the mare till he is four or four and a half; this is only meant with regard to draught-horses. Fine horses should not be admitted to the mare before they be six years old; and Spanish stallions not till seven. The mares are generally in season from the beginning of April to the end of March; but their chief ardour for the horse lasts but about 15 or 20 days, and this critical season should always be embraced. The stallion ought to be found, well made, vigorous, and of a good breed. For fine saddle-horses, foreign stallions, as Arabians, Turks, Barbs, and Andalusians, are preferable to all others. Next to these, British stallions are the best; because they originally sprang from those above-mentioned, and are very little degenerated. The stallions of Italy, and especially the Neapolitans, are very good. The best stallions for draught or carriage horses, are those of Naples, Denmark, Holstein, and Freezeland. The stallions for saddle-horses should be from 14 to 15 hands high, and for draught-horses at least 15 hands. Neither ought the colour of stallions to be overlooked; as a fine black, grey, bay, sorrel, &c. Besides these external qualities, a stallion ought to have courage, tractability, spirit, agility, a sensible mouth, sure limbs, &c. These precau-

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tions in the choice of a stallion are the more necessary, because he has been found by experience to communicate to his offspring almost all his good or bad qualities, whether natural or acquired.

The mare contributes less to the beauty of her offspring than the stallion; but she contributes perhaps more to their constitution and stature: for these reasons, it is necessary that the mares for breed be perfectly sound, and make good nurses. For elegant horses, the Spanish and Italian mares are best; but, for draught-horses, those of Britain and Normandy are preferable. However, when the stallions are good, the mares of any country will produce fine horses, provided they be well made and of a good breed.

Mares go with young eleven months and some days. They bring forth standing; contrary to the course of most other quadrupeds, who lie during this operation. They continue to bring forth till the age of 16 or 18 years; and both horses and mares live between 25 and 30 years. Horses cast their hair once a-year; generally in the spring, but sometimes in the autumn. At this time they are weak, and require to be better fed and taken care of than at any other season.

In Persia, Arabia, and most eastern countries, they never geld their horses, as is done in Europe and China. This operation greatly diminishes their strength, courage, and spirit; but it makes them good humoured, gentle, and tractable. With regard to the time of performing this operation, the practice of different countries is different: some geld their horses when a year old, and others at 18 months. But the best and most general practice is to delay the operation till they be two years old at least; because, when the gelding is delayed for two years or more, the animals retain more of the strength and other qualities which naturally belong to the male.

As the utility of horses surpasses that of all other domestic animals, it may be of use to subjoin some marks by which the age and other properties of horses may be distinguished.

In old horses, the eye-pits are generally deep; but this is only an equivocal mark, being also found in young horses begot by old stallions. The most certain knowledge of the age is to be obtained from the teeth. Of these a horse has 40; 24 grinders or double-teeth, four tusks, and 12 fore-teeth: mares have no tusks, or at least very short ones. It is not from the grinders that we know the age; it is discovered first by the fore-teeth, and afterwards by the tusks. The 12 fore-teeth begin to shoot within 12 days after the colt is foaled. These first, or foal-teeth, are round, short, not very solid, and are cast at different times, to be replaced by others. At the age of two years and a half, the four middle fore-teeth are cast, two in the upper jaw, and two in the lower. In one year more, four others drop out, one on each side of the former, which are already replaced. When he is about four years and a half old, he sheds four others, and always next to those which have fallen out and been replaced. These four foal-teeth are replaced by four others, but are far from growing so fast as those which replaced the eight former, and are called the *corner-teeth*; they replace the four last foal-teeth, and by these the age of a horse is discovered. They are easily known, being the third both above and below, counting from the middle

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middle of the jaw. They are hollow, and have a black mark in their cavity. When the horse is four years and a half old, they are scarce visible above the gum, and the cavity is very sensible: at six and a half, they begin to fill; and the mark continually diminishes and contracts till seven or eight years, when the cavity is quite filled up, and the black spot effaced. After eight years, these teeth ceasing to afford any knowledge of the age, it is judged of by the tusks: which are four teeth adjoining to those last mentioned; and, like the grinders, are not preceded by any other teeth. The two in the lower jaw usually begin to shoot at three years and a half, and those of the upper jaw at four; continuing very sharp-pointed till six. At 10, the upper seem blunted, worn out, and long, the gum contracting itself as its years increase; the barer therefore they are, the older is the horse. From 10 to 13 or 14 years, little can be seen to indicate the age; but at that time some hairs of the eye-brows begin to turn grey. This mark, however, is equivocal, like that drawn from the depth of the eye-pits; horses from old stallions, or mares, having grey hairs in the eye-brows when they are not above nine or ten years old. In some horses the teeth are of such a hardness as not to wear; and in such the black mark always subsists, being never effaced by time: but the age of these horses, which are called *beguts* by the French, is easily known; the hollow of the tooth being filled up, and at the same time the tusks very long. It has been farther observed, that this is more common in mares than in horses. The age of a horse may be also known, though less accurately, by the bars in his mouth, which wear away as he advances in years.

When the horse is without blemish, the legs and thighs are clean, the knees straight, the skin and flank thin, and the back-flesh strong and well-braced. The sinews and the bones should be so distinct, as to make the legs appear thin and lathy, not full and round. The pastern joints should never be large and round; nor must there be any swelling near the coronet. The hocks should be lean and dry, not puffed up with wind. With regard to the hoof, the coronet should be equally thick, and the horn shining and greyish. A white horn is a sign of a bad foot, for it will wear out in a short time; and likewise when the horn is thin, it is liable to be spoiled in shoeing, and by travelling hard on stony grounds. This is best known when the shoe is taken off; for then the verge all round the sole will appear thin, and the horse will wince at the least touch of the pincers.

A strong foot has the fibres of the hoof very distinct running in a direct line from the coronet to the toe, like the grain of wood. In this case, care must be taken to keep the foot moist and pliable. The greatest inconvenience attending a hard strong foot, is its being subject to rifts and fissures, which cleave the hoof quite through sometimes from the coronet down to the bottom.

A narrow heel is likewise a defect; and when it is not above two fingers in breadth, the foot is bad. A high heel causes a horse to trip and stumble often; and the low one, with long yielding pasterns, is very apt to be worn quite away on a journey. Too large a foot in proportion to the rest of the body, renders a horse weak and heavy.

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The head of a horse should be small, and rather lean than fleshy. The ears should be small, erect, thin, sprightly, and pointed. The forehead, or brow, should be neither too broad nor too flat, and should have a star or snip thereon. The nose should rise a little, and the nostrils should be wide that he may breathe more freely. The muzzle should be small, and the mouth neither too deep nor too shallow. The jaws should be thin, and not approach too near together at the throat, nor too high upwards towards the onset, that the horse may have sufficient room to carry his head in an easy graceful posture. The eyes should be of a middle size, bright, lively, and full of fire. The tongue should be small, that it may not be too much pressed by the bit; and it is a good sign when his mouth is full of white froth, for it shews that he will not soon be overheated.

The neck should be arched towards the middle, growing smaller by degrees from the breast and shoulders to the head. The hair of the main should be long, small, and fine; and if it be a little frizzled, so much the better. The shoulders should be pretty long; the withers thin, and enlarge gradually from thence downwards; but so as to render his breast neither too narrow nor too gross. A thick-shouldered horse soon tires, and trips and stumbles every minute; especially if he has a thick large neck at the same time. When the breast is so narrow that the fore-thighs almost touch, they are never good for much. A horse of a middle size should have the distance of five or six inches between his fore-thighs, and there should be less distance between his feet than his thighs near the shoulders when he stands upright.

The body or carcase of a horse should be of a middling size in proportion to his bulk, and the back should sink a little below the withers; but the other parts should be straight, and no higher behind than before. He should also be home-ribbed; but the short ribs should not approach too near the hanches, and then he will have room to fetch his breath. When a horse's back is short in proportion to his bulk, and yet otherwise well limbed, he will hold out a journey, tho' he will travel slow. When he is tall, at the same time with very long legs, he is but of little value.

The wind should never be overlooked in the choice of a horse: and it may easily be known by his flanks, if he is broken-winded, when he stands quiet in the stable; because he always pinches them in with a very slow motion, and drops them suddenly. A thick-winded horse fetches his breath often, and sometimes rattles and wheezes. This may be always discovered when he is put to brisk exercises.

The temper of a horse should always be observed; a vicious horse generally lays his ears close to his pole, shews the whites of his eyes, and looks fullen and dogged. An angry horse may be known by his frowning looks; and he generally seems to stand in a posture of defence. When he is very vicious, he pays no regard to the groom that feeds him: However, some horses that are ticklish will lay back their ears, and yet be of a good disposition. A fearful horse is apt to start, and never leaves it off till he is old and useless. A fretful horse is very unfit for a journey; and you may discover his temper as soon as he gets out of the stable. A dull, heavy, sluggish horse may be easily known, whatever tricks are used to rouse his spirits.

With

Equus. With regard to the colour of a horse, the bright bay, and indeed all kinds of bays in general, are accounted good colours. The chestnut horse is generally preferable to the sorrel, unless the former happens to be bald, or party-coloured, with white legs. Brown horses have generally black manes and tails, and their joints are of a rusty black. Those of this colour that are dappled, are much handsomer than the rest. Horses of a shining black, and well-marked, without too much white, are in high esteem for their beauty. A star, or blaze, or white muzzle, or one or more feet tipped with white, are thought to be rather better than those that are quite black.

Of greys, the dappled are accounted best; though the silver grey make a more beautiful appearance, and often prove good. The iron grey with white manes and tails are thought not to be so hardy. Greys of every kind will turn white sooner or later; but the nutmeg grey, when the dappled parts incline to bay or chestnut, are said to be good hardy horses. Roan horses have a diversity of colours mixed together; but the white is more predominant than the rest. They are all generally hardy, and fit for the road; and some are exceeding good. Those of a strawberry colour most resemble the sorrel, and they are often marked with white on the face and legs. When the bay is blended with it, he seems to be tintured with claret; and some of these prove to be very good. Dun, fallow, and cream-coloured horses have a list down their backs; and their manes and tails are black. Dun horses are seldom chosen by gentlemen, and yet they may be very useful to the country farmer. The fallow and cream-coloured are more esteemed, both for beauty and use. Those horses that are finely spotted with gay colours like leopards are a great rarity, and for that reason are only in the hands of great men.

There is some difference in horses according to the different countries where they are bred. For instance, in France, those of Bretagne are pretty strong made, and have generally black hair, or brown bay; and they have good legs and feet, with a hardy mouth, and a head short and fleshy; but in general they are pretty clumsy. The horses of Franche Comté are said to have the legs of tigers, and the belly of a hind; but they are short and thick, and of a middle size; being much more proper for drawing than riding. The horses of Gascony are not unlike those of Spain; but they are not so handsome, nor so active, and therefore they are more proper to draw carriages. The Limosin horses are very vicious, and are good for little till they are six years old. Their colour is generally bay, or a bay brown. The horses of Normandy are much like those of Bretagne; and those of Poitou have good bodies, legs, feet, and eyes; but they are far from being handsome.

The horses of Germany are much better and more handsome than those of the Low countries. They are of great use for carriages; but much more for the army, and for drawing the artillery. They have a great deal of hair, especially about the legs. They are not large, but they are well set; and yet they have tender feet. The Hungarian horses are excellent for the coach, as well as for riding: but they are large, though well proportioned; and they are of all colours, and in general very swift.

The Danish horses are low, short, and square; but they have a fine head, and short hair. The horses of the Low countries are very fit for the coach, and they are best known by the name of Flanders-mares. The Polish horses are like the Danish; only they have not so fine a fore-hand: their colour is generally a bright bay, and that of the outward peel of an onion; and they are fiery and vicious. The horses of Switzerland are pretty much like those of Germany; which is no wonder, since the Germans purchase a great number of them. The horses of Piedmont are fiery, of a middle size, and of all sorts of colours; their legs are good and handsome, their eyes fine, their ears small, and their mouths good; but they do not carry their heads well.

The horses of Naples and Italy are generally ill-made, and lean; and yet they are good and useful, for they are light and proper for racing, though not for a long course; they never do well in a colder climate. The Spanish horses are very well made, and handsome, as well as very active and nimble; they have good eyes, handsome legs and heads, and are easily managed; they are also good for racing, if they are well kept: however, they are not so good in northern climates as in their own country. The Turkish horses are of different shapes; but they are generally swift, though their mouths are bad. Most of them are white; though there are other colours; and they are large, hardy, strong, and fit for the road.

The horses of Barbary, commonly called *barbs*, have strong hoofs, and are more proper for racing than any others whatever: some have said they never grow old, because they preserve their vigour to the last. They are excellent stallions; and some of them are used as such in Britain: however, the Arabian horses are not quite so good as the Barbary, though some think they are both of the same kind; only those that are used to the deserts of Arabia are always in action. The horses of the Gold-Coast of Guinea are very few in number, and in other parts of that coast there are none at all; for many of the negroes, when they have been first brought over to our American plantations, have expressed great admiration at the sight of a horse, and even been afraid to come near one.

The horses of the Cape of Good Hope were originally brought from Persia: and they are generally small, and of a chestnut colour; for those that are natives of that country are all wild, and could never yet be tamed. The horses of China are good, and more particularly those in the province of Yun Nan; for they are very vigorous, though a little low. The horses of the Eluth Tartars are good and full of fire; and their size is much the same as the Polish horses: they are afraid of nothing; not even of lions and tigers: but perhaps this may be owing to use. In the country of the Mogul they are very numerous, and of all colours: they are generally of the middle size, though there are some as large and as handsome as those in Europe. The wild horses of Tartary differ very little from the tame; but they are so swift, that they avoid the arrows of the most skillful hunters.

The breed of horses in Great Britain is as mixed as that of its inhabitants: the frequent introduction of foreign horses has given us a variety, that no single country can boast of: most other countries produce only one kind;

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The horse.

Pennant's Brit. Zoök.

Equus.
The horse.

Equus.
The horse.

kind; while ours, by a judicious mixture of the several species, by the happy difference of our soils, and by our superior skill in management, may triumph over the rest of Europe, in having brought each quality of this noble animal to the highest perfection.

In the annals of Newmarket, may be found instances of horses that have literally outstripped the wind, as the celebrated M. Condamine has lately shewn in his remarks on those of Great Britain. Childers is an amazing instance of rapidity; his speed having been more than once exerted equal to 82½ feet in a second, or near a mile in a minute: the same horse has also run the round course at Newmarket, (which is about 400 yards less than 4 miles) in six minutes and 40 seconds; in which case his fleetness is to that of the swiftest barb, as four to three; the former, according to Dr Maty's computation, covering at every bound a space of ground equal in length to 23 feet-royal, the latter only that of 18½ feet royal.

Horses of this kind derive their origin from Arabia; the feat of the purest and most generous breed.

The species used in hunting, is a happy combination of the former with others superior in strength, but inferior in point of speed and lineage: an union of both is necessary; for the fatigues of the chase must be supported by the spirit of the one, as well as by the vigour of the other.

No country can bring a parallel to the strength and size of our horses destined for the draught; or to the activity and strength united of those that form our cavalry.

In our capital there are instances of single horses that are able to draw on a plain, for a small space, the weight of three tons; but could with ease, and for a continuance, draw half that weight. The pack-horses of Yorkshire, employed in conveying the manufactures of that county to the most remote parts of the kingdom, usually carry a burden of 420 pounds; and that indifferently over the highest hills of the north, as well as the most level roads. But the most remarkable proof of the strength of our British horses, is to be drawn from that of our mill-horses: some of these will carry at one load 13 measures, which at a moderate computation of 70 pounds each, will amount to 910; a weight superior to that which the lesser sort of camels will bear: this will appear less surprising, as these horses are by degrees accustomed to the weight; and the distance they travel no greater than to and from the adjacent hamlets.

Our cavalry, in the late campaigns, (when they had opportunity) shewed over those of our allies, as well as of the French, a great superiority both of strength and activity: the enemy was broken through by the impetuous charge of our squadrons; while the German horses, from their great weight and inactive make, were unable to second our efforts; though those troops were actuated by the noblest ardour.

The present cavalry of this island only supports its ancient glory. It was eminent in the earliest times: our scythed chariots, and the activity and good discipline of our horses, even struck terror into Cæsar's legions: and the Britons, as soon as they became civilized enough to coin, took care to represent on their money the animal for which they were so celebrated. It is now impossible to trace out this species; for those which exist

among the *indigenæ* of Great Britain, such as the little horses of Wales and Cornwall, the hobbies of Ireland, and the helities of Scotland, though admirably well adapted to the uses of those countries, could never have been equal to the work of war: but probably we had even then a larger and stronger breed in the more fertile and luxuriant parts of the island. Those we employ for that purpose, or for the draught, are an offspring of the German or Flemish breed, meliorated by our soil and a judicious culture.

The English were ever attentive to an exact culture of these animals; and in very early times set a high value on their breed. The esteem that our horses were held in by foreigners so long ago as the reign of Athelstan, may be collected from a law of that monarch, prohibiting their exportation, except they were designated as presents. These must have been the native kind, or the prohibition would have been needless; for our commerce was at that time too limited to receive improvement from any but the German kind, to which country their own breed could be of no value.

But when our intercourse with the other parts of Europe was enlarged, we soon laid hold of the advantages this gave of improving our breed. Roger de Belme, earl of Shrewsbury, is the first that is on record; he introduced the Spanish stallions into his estate in Powisland, from which that part of Wales was for many ages celebrated for a swift and generous race of horses. Giraldus Cambrensis, who lived in the reign of Henry II. takes notice of it; and Michael Drayton, contemporary with Shakespeare, sings their excellence in the sixth part of his Polyolbion. This kind was probably destined to mount our gallant nobility, or courteous knights for feats of chivalry, in the generous contests of the tilt-yard. From these sprung, to speak the language of the times, the flower of coursers, whose elegant form added charms to the rider, and whose activity and managed dexterity gained him the palm in that field of gallantry and romantic honour.

The increase of our inhabitants, and the extent of our manufactures, together with the former neglect of internal navigation to convey those manufactures, multiplied the number of our horses: an excess of wealth, before unknown in these islands, increased the luxury of carriages, and added to the necessity of an extraordinary culture of these animals: their high reputation abroad has also made them a branch of commerce, and proved another cause of their vast increase.

As no kingdom can boast of parallel circumstances, so none can vie with us in the number of these noble quadrupeds. It would be extremely difficult to guess at the exact amount of them, or to form a periodical account of their increase: The number seems very fluctuating. William Fitz-Stephen relates, that in the reign of king Stephen, London alone poured out 20,000 horsemen in the wars of those times: yet we find, that, in the beginning of queen Elizabeth's reign, the whole kingdom could not supply 2000 horses to form our cavalry; and even in the year 1588, when in the most imminent danger from the Spanish invasion, all the cavalry which the nation could then furnish amounted only to 3000. To account for this difference we must imagine, that the number of horses which took the field in Stephen's reign was no more than an undisciplined rabble; the few that appear-

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ed under the banners of Elizabeth, a corps well formed, and such as might be opposed to so formidable an enemy as was then expected: but such is their present increase, that, in the late war, the number employed was 13,575; and such is our improvement in the breed of horses, that most of those which are used in our waggons and carriages of different kinds, might be applied to the same purpose: of those, our capital alone employs near 22,000.

The all-wise Creator hath finely limited the several services of domestic animals towards the human race; and ordered that the parts of such, which in their lives have been the most useful, should after death contribute the least to our benefit. The chief use that the *exuvie* of the horse can be applied to, is for collars, traces, and other parts of the harness; and thus, even after death, he preserves some analogy with his former employ. The hair of the mane is of use in making wigs; of the tail, in making the bottoms of chairs, floor-cloths, and cords; and to the angler in making lines.

TECHNICAL DESCRIPTION of the Parts of a Horse.

The Fore Part. 1. The forehead. 2. The temples. 3. Cavity above the eye. 4. The jaw. 5. The lips. 6. The nostrils. 7. The tip of the nose. 8. The chin. 9. The beard. 10. The neck. 11. The mane. 12. The fore-top. 13. The throat. 14. The withers. 15. The shoulders. 16. The chest. 17. The elbow. 18. The arm. 19. The plate vein. 20. The chestnut. 21. The knee. 22. The flank. 23. The main tendons. 24. The fetlock joint. 25. The fetlock. 26. The pattern. 27. The coronet. 28. The hoof. 29. The quarters. 30. The toe. 31. The heel.—*The Body.* 32. The reins. 33. The fillets. 34. The ribs. 35. The belly. 36. The flanks.—*The Hind Part.* 37. The rump. 38. The tail. 39. The buttocks. 40. The haunches. 41. The duff. 42. The thighs. 43. The hock. 44. The kerb. 45. The point of the hock.

For the breeding, rearing, &c. of horses, see the articles COLT, HORSE, and STALLION; for the method of training and managing them, see HORSEMANSHIP; and for their diseases and cure, see FARRIERY.

2. The Ass is likewise a domestic animal, and easily distinguished from the horse at first sight; we never confounding these two animals, even though they should happen to be of the same colour and stature. However, when we view the different parts of the ass, whether the external or internal, and compare them with the corresponding parts of the horse, the resemblance of these parts is so perfect, that we are surprised to find the individuals so different and so easily distinguishable by the eye. From this circumstance, some naturalists have considered the ass and the horse to be of the same species of animals; and that the small differences between them are accidental, or owing to the influence of climate, culture, &c. Linneus's specific mark of the horse is, that the whole tail is covered with long hair; and his specific mark of the ass is, that the tail has long hair only towards the point, and a black cross over the shoulders. On the other hand, when we consider the differences in the temper, the manners and dispositions of these two animals, and, above all, the impossibility of mixing them so as to produce a common or

Equus.
The Ass.

intermediate species capable of propagating and transmitting in the same manner as other distinct species, the notion that the horse and the ass are the same species will appear to be without any solid foundation. Besides, the ass differs materially from the horse in the thickness of the head, the length of the ears, the hardness of the skin, and in the voice, the dispositions, the manner of drinking, &c. With regard to animals, there is perhaps but one permanent and uniform specific distinction in nature: A male and female of different species may copulate, may produce a third animal resembling both, but very different from either: but here nature has put a final stop to all further procreation; the third animal, although it be seemingly furnished with every thing necessary for propagating, remains for ever barren. Now, the horse may be made to copulate with the ass; a mule, or mixture of the two, is the fruit of the unnatural embrace: but the impregnation of a mule is found by experience to be altogether impossible.

The ass, therefore, is a distinct species, and his race as ancient as that of the horse. Why, then, should this useful, patient, sober animal be so much despised? We are apt to compare him, on every occasion, with the horse, and from this comparison are led to very false and unfavourable conclusions. The horse is educated with great care and expence; while the poor ass, abandoned to the abuse of the meanest servants or the cruelty of children, instead of deriving benefit from instruction, loses in effect his natural good qualities by the bad treatment he suffers. He is the sport and buffet-block of every rustic, who beat and overload him without mercy or discretion. They never consider that the ass would be the most useful, the best made, and most distinguished of all animals, if there were no horses in the world.

The ass is as humble, patient, and tranquil, as the horse is bold, ardent, and impetuous. He submits with firmness, perhaps with magnanimity, to strokes and chastisement; he is temperate both as to the quantity and quality of his food; he contents himself with the rigid and disagreeable herbage which the horse and other animals leave to him, and disdain to eat: he is more delicate with regard to his drink, never using water unless it be perfectly pure. As his master does not take the trouble of combing him, he often rolls himself on the turf among thistles, ferns, &c. Without regarding what he is carrying, he lies down to roll as often as he can, seeming to reproach his master for neglect and want of attention.

When very young, the ass is a gay, sprightly, nimble, and gentle animal. But he soon loses these qualities, probably by the bad usage he meets with; and becomes lazy, untractable, and stubborn. When under the influence of love, he becomes perfectly furious. The affection of the female for her young is strong: Pliny assures us, that when an experiment was made to discover the strength of maternal affection in a she-ass, she run thro' the flames in order to come at her colt.

Although the ass be generally ill used, he discovers a great attachment to his master; he smells him at a distance, searches the places and roads he used to frequent, and easily distinguishes him from the rest of mankind. The ass has a very fine eye, an excellent scent, and a good ear. When overloaded, he hangs his head, and

Plate CIII.
fig. 1.

Plate CIII.
fig. 2.

Equus.
The Ass.

and sinks his ears: when too much teased or tormented, he opens his mouth and retracts his lips in a disagreeable manner, which gives him an air of ridicule and derision. If you cover his eyes, he will not move another step; if you lay him on his side, and place his head so that one eye rests on the ground, and cover the other with a cloth, he will remain in this situation without making any attempt to get up. He walks, trots, and gallops in the same manner as the horse; but all his motions are slower. Whatever be the pace he is going at, if you pull him, he instantly stops.

The cry of the horse is known by the name of *neighing*; that of the ass, by *braying*, which is a long, disagreeable noise, consisting of alternate discords from sharp to grave and from grave to sharp; he seldom cries but when pressed with hunger or love: the voice of the female is clearer and more piercing than that of the male.

The ass is less subject to vermin than other animals covered with hair; he is never troubled with lice, probably owing to the hardness and dryness of his skin; and it is probably for the same reason, that he is less sensible to the whip and spur than the horse.

The teeth of the ass fall out and grow at the same age and in the same manner as those of the horse; and he has nearly the same marks in his mouth.

Asses are capable of propagating when two years old. The females are in season during the months of May and June. The milk appears in the dugs ten months after impregnation; she brings forth in the twelfth month, and always one at a time. Seven days after the birth, the season of the female returns, and she is again in a condition to receive the male. The colt should be taken from her at the end of five or six months, that the growth and nourishment of the fetus may not be obstructed. The stallion or jack ass should be the largest and strongest that can be found; he should be at least three years old, and never ought to exceed ten.

The ass, like the horse, takes three or four years in growing, and lives till he be 25 or 30: he sleeps less than the horse, and never lies down to sleep but when excessively fatigued. He is more robust, and less subject to diseases, than the horse.

Travellers inform us that there are two sorts of asses in Persia; one of which is used for burdens, they being slow and heavy: the other is kept like horses for the saddle; for they have smooth hair, carry their head well, and are much quicker in their motion; but when they ride them, they fit nearer their buttocks than when on a horse: they are dressed like horses, and are taught to amble like them; but they generally cleave their nostrils to give them more room for breathing. Dr Ruffel likewise tells us they have two sorts in Syria; one of which is like ours, and the other very large, with remarkably long ears; but they are both put to the same use, which is, to carry burdens.

3. The *ONAGER*, or wild ass, has, by some authors, been confounded with the zebra; but very improperly, for this last is a distinct species; for the onager is not streaked like this, nor is his shape so beautiful. Wild-asses are said to be very swift of course; and when they see a man, they make a bound, and immediately fly away; inasmuch, that there is no taking of them, but by traps and gins. They have much the same shape as com-

mon asses; but they are of a brighter colour, and there runs a white list from the head to the tail. Of the hide of these asses, and particularly of that part next the rump, they make that excellent leather which we call *shagreen*, and which is put to so many curious uses.

In America there were originally no asses at all, nor yet horses; but they were carried thither long ago, at first by the Spaniards, and afterwards by other nations, where they have multiplied greatly; inasmuch, that, in some places, there are whole droves of them that run wild, and are very hard to be caught. Asses in general carry the heaviest burdens in proportion to their bulk; and, as their keeping costs little or nothing, it is a great wonder that they are not put to more uses than they generally are among us.

The flesh of the common ass is never eaten in these parts of the world; though some pretend their colts are tender, and not disagreeable.

3. The *ZEBCRA*.—This animal has the figure and gracefulness of the horse, joined to the swiftness of the stag. He is about 7 feet long, from the point of the muzzle to the origin of the tail, and about 4 feet high. The colour of his skin is beautiful and uniform, consisting of alternate parallel rings of black and white, disposed in the most regular manner, as represented in the plate. He is generally less than the horse, and larger than the ass.

Plate CIII.
fig. 3.

The zebra is found no where but in the eastern and southern provinces of Africa, from Ethiopia to the Cape of Good Hope, and from the Cape of Good Hope to Congo. The Dutch have been at great pains to tame and use them for domestic purposes, but with little success. He is hard-mouthed, and kicks when any person attempts to touch or come near him. He is restless and obstinate as a mule: but perhaps the wild horse is naturally as untractable as the zebra; for, it is probable, if he were early accustomed to obedience and a domestic life, he would become as docile as the horse.

ERA, in chronology. See *ÆRA*.

ERANARCHA, a public officer among the ancient Greeks, whose business was to preside over and direct the alms and provisions made for the poor. Cornelius Nepos, in his life of Epaminondas, describes his office thus: When any person was reduced to poverty, taken captive, or had a daughter to marry, which he could not effect for want of money, &c. the eranarcha called an assembly of friends and neighbours, and taxed each according to his means and estate, to contribute towards his relief.

ERASMUS (Desiderius), born at Rotterdam, 1467. He lost his father and mother at 14 years of age; and was committed to the care of certain guardians, who would force him to be an ecclesiastic, which he refused for a long time. However, he was obliged to assume the religious habit among the canons regular in the monastery of Stein near Tergou; but afterwards obtained a dispensation from his vows. He was the most learned man of the age in which he lived; and contributed, by his example and his writings, to the restoration of learning in the several countries in which he occasionally resided, viz. Italy, Switzerland, Holland, France, and England: with the last, he was most fastidious; and found the greatest encouragement from Henry VIII. Sir Thomas More, and all the learned Englishmen of those days. He published a great many books;

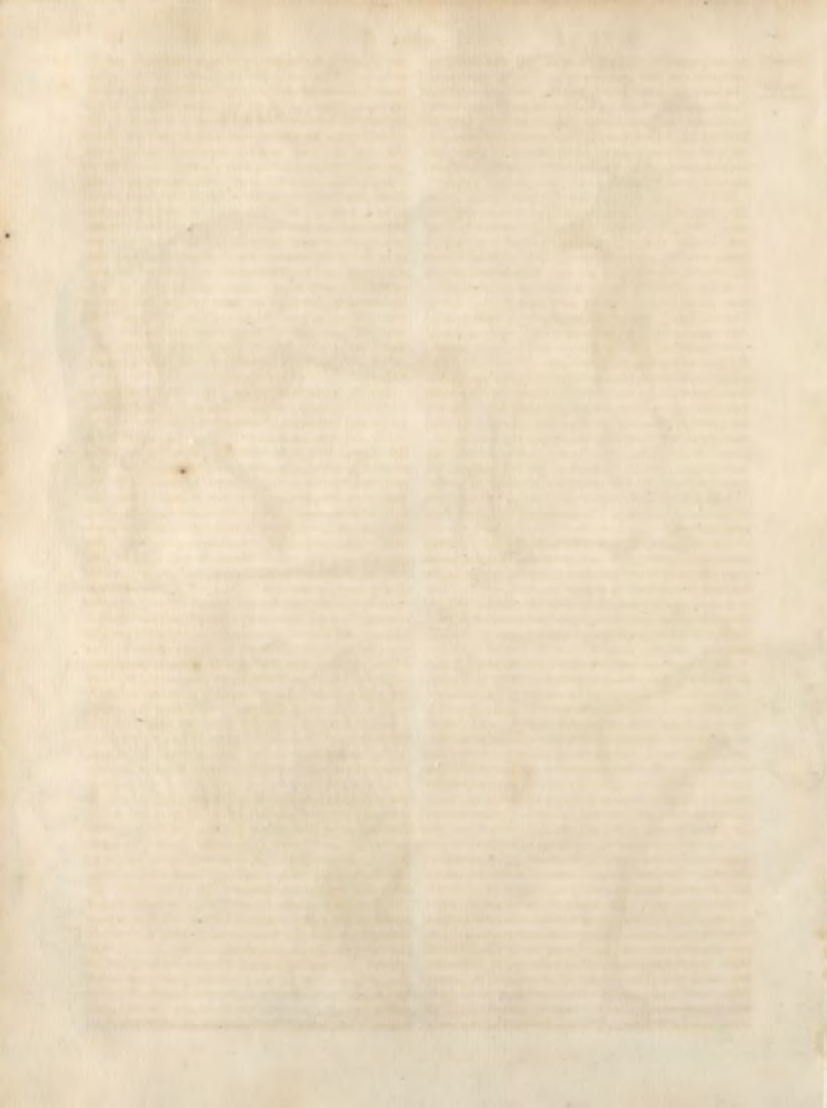


Fig. 1.
EQUUS CABALLUS,
or Horse.



Fig. 2. EQUUS ASINUS
or Ass.

Fig. 3. EQUUS ZEBRA.



books; and died at Basil in 1536. He was buried honourably, and his memory is still had in veneration. He had, however, many enemies; and as he did not embrace the reformation, and yet censured many things in Popery, he hath been treated injuriously both by Catholics and Protestants. The works of Erasmus in 10 vols folio were published at Leyden in 1706, in a very handsome manner, under the care of M. Le Clerc. Dr Jortin published his life in one vol. 4to, 1758.

ERATO, in fabulous history, one of the muses. She presided over elegiac or amorous poetry, and dancing; and is represented as a young maiden crowned with myrtle and roses, having a lyre in her right-hand, and a bow in her left; with a little winged Cupid placed by her, armed with his bow and arrows.

ERATOSTHENES, a Cyrenæan philosopher, historian, and poet; called for his learning, *Plato Minor*. He was keeper of the famous library at Alexandria; and was greatly in favour with Ptolemy Evergetes, by whose order he wrote a history of the Theban kings of Egypt, which successions was entirely omitted by Manetho. He thus fixed the Egyptian chronology, and his authority is by many preferred to that of Manetho. He wrote many other things, a catalogue of which is to be seen in Fabricius, Vossius, &c. but his only piece now remaining entire is a description and fabulous account of the stars. He starved himself in old age through grief for the dimness of his sight, about the 10th or 12th year of Ptolemy Epiphanes, 194 B.C.

EREBUS, called by the poets the *god of hell*, born of Chaos and Tenebræ. It is likewise the name of an infernal river.

ERECTION, in a general sense, the art of raising or elevating any thing; as the erection of a perpendicular, &c. It is also used in a figurative sense; as the erection of a bishopric, marquise, &c.

ERECTION is particularly used by medical writers, for the state of the penis when swelled and distended by the action of the muscles called *erectores*. See ANATOMY, n° 371, u, y.

There is also an erection of the clitoris, which is performed by muscles for that purpose. *Ibid.* n° 372, c.

EREMITA, in zoology; a species of SCARABÆUS.

ERFORT, a town of Germany, in the circle of Upper Saxony, the capital of Thuringia, and subject to the elector of Mentz. It is defended by good ramparts; and has a castle on an eminence, which commands the town. Its inhabitants are almost all Lutherans, but its principal churches belong to the Catholics. There are several handsome structures, both public and private; but the houses in general are but indifferently built. E. Long. 11. 14. N. Lat. 50. 49.

ERGOT, in farriery, is a stub, like a piece of fust horn, about the bigness of a chestnut, placed behind and below the pattern-joint, and commonly hid under the tuft of the fetlock.

ERICA, HEATH; a genus of the monogynia order, belonging to the octandria class of plants. Of this there are four species, natives of Britain; which are so well known, that no description needs be given of them. In the Highlands of Scotland this plant is made subservient to a great variety of purposes. The poorer inhabitants make walls for their cottages with alternate layers of heath and a kind of mortar made of black earth and straw. The woody roots of the heath

are placed in the centre; and the tops externally and internally. They make their beds of it, by placing the roots downwards; and the tops only being uppermost, they are sufficiently soft to sleep upon. Cabbins are also thatched with it. In the island of Ilay, ale is frequently made by brewing one part of malt and two of the tops of young heath; sometimes adding hops. Boethius relates, that this liquor was much used by the Picts.—Woolen cloth boiled in alum water, and afterwards in a strong decoction of heath-tops, comes out of a fine orange colour. The stalks and tops will tan leather. Beloms and faggots to burn in ovens are also made of this plant. It is also used for filling up drains that are to be covered over. Sheep and goats will sometimes eat the tender shoots, but they are not fond of them. Cattle not accustomed to feed on heath, give bloody milk; but they are soon relieved by drinking plentifully of water. Horses will eat the tops. Bees extract a great deal of honey from the flowers; and, where heath abounds, the honey has a reddish cast.

ERIDANUS, in astronomy. See ASTRONOMY, n° 206.

ERIE, a vast lake to the westward of Pennsylvania, in North America, situated between 80° and 87° W. Long. and between 41° and 42° N. Lat.

ERIGENA, or SCOTUS, (John), a famous scholastic divine, born about the beginning of the ninth century; but where, is a matter of dispute among authors. Bale and Pits say he was born at St David's in Wales; Dempster, Mackenzie, and Henry, that he was born at Ayr in Scotland; which they infer from his names *Erigena* and *Scotus*, by the latter of which he was generally distinguished by his cotemporary writers. But Du Pin and Sir James Ware assert that he was by birth an Irishman; Ireland being in those days called *Scotia*, and by the natives *Erin*. They agree, however, in relating that he travelled to Athens, where he acquired a competent knowledge of the Greek and other oriental languages; and that he afterwards resided many years in the court of Charles the Bald, king of France, who, on account of his singular abilities, treated him as his intimate friend and companion. He slept frequently in the royal apartment; and was constantly admitted to the king's table. "We may judge (says a modern historian) of the freedom which he used with Charles, by the following repartee. As the king and Scotus were sitting one day at table, opposite to each other, after dinner, drinking a cheerful glass, the philosopher having said something that was not quite agreeable to the rules of French politeness, the king in a merry humour asked him, Pray what is between a Scot and a fox? To which he answered, Nothing but the table." See *Henry's History of Great Britain*, vol. I. p. 344. who quotes this story from *Heosdeni Annal. ad an. 86*. Quer. What language were they talking when this *bon mot* was uttered?

During his residence with Charles, he wrote several books of scholastic divinity; which, though absurd enough, were at that time not sufficiently so to secure him from the imputation of heterodoxy; and on that account the pope commanded Charles the Bald to send him to Rome; but the king had too great a regard for his companion to trust him with his holiness. One of the chief controversies in which Scotus was engaged, and with which the pope was much offended, was concern-

Erigena
||
Erigone.

cerning the real preference and blood of Christ in the wafer. His opinion of this weighty matter is expressed in these few words: "What we receive corporally is not the body of our Lord; but that which feeds the soul, and is only perceived by faith." He was also engaged in two other controversies of equal importance, but of a somewhat less delicate nature. The first was, Whether any part of the eucharist be evacuated by stool? and the second, Whether Christ was born of the Virgin Mary *aperta vulva*? Paschasius was of opinion, that this could not be without some injury to her perpetual virginity; and therefore believed that Christ came into the world *per vulvam clausam*, as he came into the place where his disciples were assembled, through the door and not through the wall, without opening the door. Concerning the first of these delicate questions, Scotus with several others declared, that part of the eucharist was certainly evacuated by stool; for which they were honoured with the appellation of *Stercorists*. And as to the second question, he said, that the *vulva clausa* was a dangerous opinion: for it would thence follow, that he was not born, but issued; *non est nasci, sed erumpi*. See Macenzie, vol. I. p. 55.

Whether this John Scotus returned to England, or ended his days in France, is a matter of doubt. Some of our historians tell us, that he left France in the year 864; and that, after residing about three years in Oxford, he retired to the abbey of Malmbury, where his scholars stabbed him with their pen-knives. There is no foundation for this story. Probably he died about the year 874; but whether in France or England, is uncertain, and of little importance. Some have related, that he was invited to England by king Alfred: but in this they confound him with John, abbot of Etheburg, who was assassinated in 895; and to this mistake the various accounts concerning this author are to be attributed. Regardless of his history, he appears from his writings to have been a man of parts, and, in point of learning, superior to any of his contemporaries. He wrote, 1. *De divisione nature*, lib. v. 2. *De predestinatione Dei*. 3. *Excerpta de differentiis & societatibus Græci Latiniq; verbi*. 4. *De corpore et sanguine Domini*. 5. *Ambigua S. Maximi seu, scholia ejus in difficiles locos S. Gregorii Nazianzeni, Latine versa*. 6. *Opera S. Dionysii quatuor in Latinam ling. conversa*. All published. 7. *De visione Dei*, and several other works, in manuscript, preserved in different libraries.

ERIGERON, FLEA-BANE; a genus of the polygamia superflua order, belonging to the syngenesia class of plants. There are five species; of which the most remarkable is the viscosum, or male flea-bane of Theophrastus, and greater flea-bane of Dioscorides. It is a native of the south of France and Italy; and hath a perennial root, from whence arise many upright stalks near three feet high. The leaves in warm weather sweat out a clammy juice; the flowers are produced single upon pretty long footstalks, are of a yellow colour, and have an agreeable odour. The plants are easily propagated by seeds; and thrive best in a dry soil, and sunny exposure.

ERIGONE, in fabulous history, daughter to Icarus, died of grief for her father's death, was translated into heaven, and makes the sign Virgo.

Erinaceus,
or
Hedge-hog.

ERINACEUS, or HEDGE-HOG, in zoology; a genus of quadrupeds belonging to the order of feræ, the characters of which are these: They have two foreteeth in the upper jaw, at a considerable distance from one another, and two in the under jaw, less distant; and they have two recumbent dog-teeth, one on each side. There are three species, viz. 1. the europeus, or common hedge-hog, with round ears, and crested nostrils. It is about nine inches long; the upper part of the body is totally covered with sharp prickles, and the under part is covered with hair. The hedge-hog, even when standing on his legs, has a very ugly aspect. His body is an oblong mass, convex above, terminated on the fore-part by a very sharp muzzle, and mounted on four short legs, of which nothing appears but the feet, and the tail is not discernible. His ears are broad, round, and short; and his eyes are small and protuberant. The length of his body, from the point of the muzzle to the anus, is about nine inches.

The hedge-hog has a very uncommon method of defending himself from the attacks of other animals: being possessed of little strength or agility, he does not attempt to fly from or assail his enemies; but erects his bristles, and rolls himself up like a ball, exposing no part of his body that is not furnished with sharp weapons of defence; he will not unfold himself, unless thrown into water: the more he is frightened or harassed, the closer he shuts himself up; and frequently discharges his urine, which has a very fetid and loathsome smell. While in this state, most dogs, instead of biting him, stand off and bark, not daring to seize him; or, if they attempt it once, their mouths are so prickled with his bristles, that they cannot be prevailed upon to attempt it a second time. Both the male and female are covered with bristles from the head to the tail. These bristles are of great use in defending them from other animals; but must be very inconvenient when they incline to copulate. This operation they cannot perform in the manner of other quadrupeds; but do it face to face, either standing on end, or the female lying on her back. The females come in season in the spring, and bring forth their young in the beginning of summer. They commonly bring forth three or four, and sometimes five, at a time. The young ones are of a whitish colour, and only the points of the bristles appear above the skin. It is impossible to tame them: the mother and her young have frequently been confined together, and furnished with plenty of provisions; but, instead of nourishing them, she uniformly devoured them one after another. Males and females have likewise been kept in one apartment, where they lived, but never copulated. Hedge-hogs feed upon fallen fruits, some roots, and insects: they are very fond of flesh-meat, whether raw or roasted. They frequent woods, and live under the trunks of old trees, in the chinks of rocks, or under large stones. Naturalists allege, that they go into gardens, mount the trees, and come down with pears, apples, or plumbs, stuck upon their bristles. But this is a mistake: although kept in a garden, they never attempt to climb trees, or stick even fallen fruit upon their bristles, but lay hold of their food with their mouth. They never come out of their holes in the day, but go about in quest of food during the night. They eat but little, and.

Eringo
Erminites

and can live very long without taking any nourishment. They do not lay up any store of provisions in harvest; such an instinct would be useless, as they sleep all the winter. They lie under the undeserved reproach of sucking cattle and hurting their udders; but the smallness of their mouth renders that impossible.

2. The inauris, or white hedge-hog, has no external ears. It is a native of America. 3. The malaccensis has hanging ears, and is a native of Asia.

ERINGO, in botany. See ERYNGIUM.

ERINUS, in botany, a genus of the angiospermia order, belonging to the didynamia class of plants. There are six species, none of them natives of Britain. They grow from two inches to four feet in height, and are adorned with flowers of a white or purple colour. They are propagated by seeds, but in this country generally require to be kept in a stove.

ERIVAN, a city of Persia, in Asia, and capital of Persian Armenia. It is a large, dirty, ill-looking place, in which are no handsome buildings, the houses being very mean, and raised with earth or mud; but it is full of gardens or vineyards. It is situated in a plain which is surrounded on all sides with mountains. Two rivers pass near it, the Zengui to the north-west, and the Queur Boulac to the south-west. The fortrefs may pass for a town of itself; it is of an oval form, and is four miles in circumference, containing about 800 houses. It is inhabited by none but the native Persians. The Armenians have shops in it, where they work and trade in the day-time, but at night return to their habitations in the city. The fortrefs is surrounded with three walls, made with bricks dried in the sun, which have battlements, and are flanked with towers, and defended with ramparts. On the north-east there is a dreadful precipice, above 200 yards in depth, at the bottom of which the river runs. The garrison usually consisted of 2000 men; but how many there are since the revolution, is hard to say. The palace of the governor of the province is within the fortrefs. The city is about a cannon's shot distant from the fortrefs, and the space between is full of houses and markets. E. Long. 44. 50. N. Lat. 40. 20.

ERMIN, in zoology. See MUSTELA.

ERMIN, in heraldry. This word alone signifies black spots on a white field; but if the word *plain* should be added with it, it denotes nothing but white furs.

ERMIN, or *Ears of corn*; an order of knights in France, instituted by Francis the last of that name, duke of Brittany.

This order was so called on account that the collar of it was made up of ears of corn, lying athwart one another in saltier, bound together, both above and below, each ear being crossed twice, the whole of gold. To this collar there hung a little white beast, called an *ermin*, running over a bank of grass diversified with flowers.

ERMINES, in heraldry, the reverse of ermine, i. e. white spots on a black field.

ERMINITES, in heraldry, should signify little ermines, but it is otherwise; for it signifies a white field powdered with black, only that every such spot hath a little red hair on each.—Erminites also signify a yellow field powdered with black, which the French express much better by *or semé d'ermine de sable*.

ERMINOIS, in heraldry, signifies the field or, and the spots black.

EROSION, among physicians, denotes much the same with CORROSION, only in a stronger degree.

EROTESIS. See ORATORY, n° 94.

EROTIC, in general, any thing relating to the passion love.

ERPENIUS (Thomas), in Dutch THOMAS of ERPE; a celebrated professor of the Arabic language, was born at Gorcum in Holland, in 1584, and educated at Leyden. He applied himself to the oriental languages at the persuasion of Joseph Scaliger; and afterwards travelled into England, France, Italy and Germany, and every where obtained the esteem of the learned. On his return to Holland, he was made professor of Arabic in the university of Leyden, and died there in 1624. He published a great many excellent works, which spread his reputation through the whole learned world. It is said, that the king of Morocco admired so greatly the letters Erpenius wrote to him in Arabic in the name of the United Provinces, that he could not cease reading them, and showing them to those who spoke that language naturally.

ERRATIC, in general, something that wanders, or is not regular: hence it is the planets are called *erratic stars*.

ERRHINES, in pharmacy, medicines which when snuffed up the nose promote a discharge of mucus from that part.

Among the milder kinds of the errhines we may reckon marjoram, basilicon, thyme, hyssop, savory, marum syriacum, the tops of origanum, flowers of lilies of the valley, and gum benzoin, the resin of guaiacum, fine raspings of aloes wood, dry volatile salt of sal ammoniac perfumed with oil of marjoram, as also white vitriol. On the contrary, violent errhines are euphorbium, the powder of white hellebore, and, in a milder degree, several sorts of snuffs, precipitate mercury, and pepper.

Errhines are more friendly to the constitution and nerves than sternutatories, by their subtle, acrid, and volatile salt gently stimulating the pituitary membrane, and drawing the mucid humour from it. They are also much safer than sternutatories, in their effects.

Errhines prepared of cephalic herbs are of singular service in oppressive pains of the head, a hemicrania, lethargic disorders, weaknesses of memory, stuffings of the head, and coryza, mucous fluxions of the eyes, drowiness, vertiges, and in cases where the malignant humours generated by the lues venerea are lodged in the membranes of the nostrils.

ERROUR, ERROR, in philosophy, a mistake of our judgment, giving assent to that which is not true.

Mr Locke reduces the causes of error to these four; first, want of proofs; secondly, want of ability to use them; thirdly, want of will to use them; and, fourthly, wrong measures of probability.

He observes upon the first of these causes of error, that the greatest part of mankind want conveniencies and opportunities of making experiments and observations themselves, or of collecting the testimony of others, being prevented by the necessity of their condition. Upon the second of these causes, he observes, that there are many, who, from the state of their condition, might bestow time in collecting proofs, but yet are

Erminois
Error.

Error
||
ErUCA.

ErUCA,
or
Caterpillar.

are not able to carry a train of consequences in their heads, nor weigh exactly the preponderancy of contrary proofs and testimonies, merely from the difference in mens understandings, apprehensions, and reasonings. Thirdly, he remarks, that though some have opportunities and leisure enough, and want neither parts, learning, nor other helps, that they never come to the knowledge of several truths within their reach, either upon account of their attachment to pleasure or business; and otherwise because of their laziness or aversion to study. The fourth cause of error, *viz.* wrong measures of probability, he imputes, 1. To the practice of taking for principles propositions that are not in themselves certain and evident, but, on the contrary, doubtful and false. 2. To received hypotheses. 3. Predominant passions or inclinations. And, 4. To authority, or the giving up our assent to the common received opinions either of our friends or party, neighbours or country.

The causes of error in philosophy, or the reasons why all former philosophers have through so many ages erred, according to Lord Bacon, are these following. 1. Want of time suited to learning. 2. The little labour bestowed upon natural philosophy. 3. Few entirely addicted to natural philosophy. 4. The end of the sciences wrong fixed. 5. A wrong way chosen. 6. The neglect of experiments. 7. Regard to antiquity and authority. 8. Admiration of the works in use. 9. The artifice of teachers and writers in the sciences. 10. Ostentatious promises of the moderns. 11. Want of proposing worthy tasks. 12. Superstition and zeal being opposite to natural philosophy, as thinking philosophy dangerous, on account of the school-theology; from the opinion that deep natural inquiries should subvert religion. 13. Schools and academies proving unfavourable to philosophy. 14. Want of rewards. And, 15. Despair, and the supposition of impossibility.

ERROR Loci. Boerhaave is said to have introduced this term, from the opinion that the vessels were of different sizes for the circulation of blood, serum, and lymph; and that when the larger-sized globules were forced into the lesser vessels by an error of place, they were obstructed. But this opinion does not seem well grounded.

ERSKINE'S CENTRIFUGAL MACHINE. See *CENTRIFUGAL Machine*.

ERUCA, in general, denotes caterpillars of all kinds.

The caterpillar state is that through which every butterfly must pass before it arrives at its perfection and beauty; and, in the same manner, all the known winged animals, except only the puceron, pass through a reptile state; none of them, except this, being produced in their winged form. The change from caterpillar to butterfly was long esteemed a sort of metamorphosis; a real change of one animal into another; but this is by no means the case. The egg of a butterfly produces a butterfly, with all the lineaments of its parent; only these are not disclosed at first, but for the greater part of the animal's life they are covered with a sort of case or muscular coat, in which are legs for walking, which only suit it in this state; but its mouth takes in nourishment, which is conveyed to the included animal; and after a proper time

this covering is thrown off, and the butterfly, which all the while might be discovered in it by an accurate observer with the help of a microscope, appears in its proper form. Before it passes into this state, however, there requires a state of rest for the wings to harden, and the several other parts to acquire their proper firmness; this is transacted in a time of perfect rest, when the animal lies in what is called the *nymph* or *chrysalis* state, in appearance only a lump of inanimate matter. There is a settled and determined time for each of these changes in every species; but, in the several different kinds, the periods are very different.

Some caterpillars are produced from the eggs of their parent butterfly in the spring, as soon as the trees, on whose leaves they are to feed, begin to bud: after a life of 13 days, they pass into their chrysalis state; and, after remaining three weeks at rest in that, they issue forth with wings with all the beauty of their parents. As soon as they arrive at this their final state, their wings are scarce dry before they seek to copulate or propagate their species: this done, the male dies; and the female only lives to deposit her eggs, and then follows him. This is their whole business: nature never intending that they should eat in this state, has given them no organs for this purpose; so that they must necessarily die of hunger in a short time, could they escape their natural death, or the great devourers of them the birds. Many species of these spring butterflies have no farther being except in the embryo included in the egg, till the succeeding spring: they lay their eggs very carefully, and in extremely nice order, round about the stalk of a perennial plant, or the young branch of a tree; where they remain through the heats of the summer and colds of the winter, and are never hatched till the succeeding spring; and, though thus exposed, it is observable that the severest winters do them no harm.

Other species of these are sooner hatched from the egg; and live, during the remainder of the summer, on the leaves of trees. After this, they pass the whole winter in the caterpillar state, usually hiding themselves in some sheltered place, covered with webs of their own spinning. These remain torpid all the winter; and, at the return of spring, leave their webs as the others do their eggs, and feed a few weeks longer; after which they pass through the chrysalis state to their perfect form. The butterfly of this species, therefore, enjoys a much longer life than the other which remains so long in the egg; though the ultimate duration of the animal from its exclusion from the parent, till its death, is much the same; so great a part of it being passed in the egg state by the one, and so small a part by the other.

Other species of these animals remain the whole winter in the chrysalis state, and are butterflies in spring; and, after passing the middle of the summer in the egg, are caterpillars in the autumn. The difference of this stage of life is remarkably great, in proportion to the whole duration of the animal; in some species it does not exceed a fortnight, and in others continues 11 months.

There is no sign of sex in the animal while in the caterpillar state: the propagation of the species is the business of the creature in its ultimate perfection; and till that, these parts are never excluded: one female butterfly, when she has been impregnated by the male,

will

will produce 300 or 400 eggs, or even more.

There is no way of knowing the sexes of these little creatures by viewing the parts; but the whole figure and manner of the animal makes the difference. The females are always larger than the males; they are also more slow in their motions; and some of them have no wings, or, at the most, only very small ones. The males, however, have a sort of beard, more beautiful than the *antennæ* or horns of the females: the female is much stronger as well as bigger than the male; and not unfrequently, in case of danger or disturbance, she flies away with him in time of copulation.

On dissecting the female, her uterus affords an astonishing sight. The number of eggs in the tubes is amazing: but these have not all the same figure; and, in some species, as the silk-worm, &c. the eggs are of a beautiful blue; if any yellowish ones are seen among them, they are judged to be defective.

The care of all the butterfly tribe to lodge their eggs in safety is surprising. Those whose eggs are to be hatched in a few weeks, and who are to live in the caterpillar state during part of the remaining summer, always lay them on the leaves of such plants as will afford a proper nourishment; but, on the contrary, those whose eggs are to remain unhatched till the following spring, always lay them on the branches of trees and shrubs, and usually are careful to select such places as are least exposed to the rigour of the ensuing season, and frequently cover them from it in an artful manner. Some make a general coat of a hairy matter over them, taking the hairs from their own bodies for that purpose; others hide themselves in hollow places in trees, and in other sheltered cells, and there live in a kind of torpid state during the whole winter, that they may deposit their eggs in the succeeding spring, at a time when there will be no severities of weather for them to combat. The day-butterflies only do this, and of these but a very few species; but the night ones, or *phalæna*, all without exception, lay their eggs as soon as they have been in copulation with the male, and die immediately afterwards.

It is well known, that the common and natural food of these creatures is the leaves and verdure of vegetables; yet, as weak and harmless as they seem, they will many of them destroy their fellows whenever they get an opportunity. M. Reaumur gives us an instance of this in 20 caterpillars of the oak, which he kept in a box with a sufficient quantity of their natural food; yet their numbers daily decreased, till at last there remained only one. This is, however, only the case in some few species, the generality of these animals being very peaceable, many species living together in the same place, without molesting one another. These species, however, though freed from such dangers, are exposed to others of a much more terrible kind; the worms or maggots of several sorts of flies are frequently found about them, some preying upon their outside, others lodged within them under the skin, but both kinds eating the poor defenceless creature up alive. Those which feed on the outides are easily discovered, the others are more hid; and frequently the caterpillar, which seems very hearty and vigorous, and very fleshy, shall be found, upon opening, to be a mere skin, the internal parts being found to be all eaten away, and all the food that he swallows serving only to feed a vast

number of worms, or maggots, which crawl about at liberty within him. These devouring worms are of many different species; some being of the gregarious, some of the solitary kinds, and some spinning webs of their own silk to transform themselves in; others undergoing that change without any such covering. The beautiful cabbage-caterpillar is one of those unhappy kinds which frequently are infested with the gregarious kinds, large numbers of which spin themselves webs one after another, and afterwards come out in the shape of the parent-fly to whose eggs they owed their origin.

These intestine enemies are a sure prevention of the butterfly's appearing at its proper time; and as many of the former naturalists, who knew what butterfly to expect from a peculiar species of caterpillar which they preserved, often saw a parcel of flies come out in the place of it, they having no idea that the fly had laid its eggs in the flesh of the poor creature, supposed that this was one of its natural transformations, and that certain species of caterpillars sometimes produced butterflies, sometimes small flies.

These, and many other destroyers, among which the birds are to be reckoned in the principal place, serve a noble purpose in preventing the too great numbers of these mischievous animals. Their usual habitation being the leaves and flowers of plants, they are, in their feeding, much exposed to all those destroyers: yet nature has taken care to preserve a great number, by making many of them so exactly of the colour of the leaves they feed on, that they are not easily distinguished from them; and by giving others a caution of keeping on the under part of the leaves and being by that means, out of sight. But some species are much less exposed, and of much more mischief to the plants they feed on, by devouring more essential parts of them. Of these some eat the roots, and others the interior part of the trunk, destroying the vessels that imbibe, and those that distribute, the juices. These are different from the common caterpillars, in that their skin is much less rough and hard; and these are secure from our observation, and in general from their great destroyers the birds. They are not, however, absolutely safe from the common dangers of the other species; for there is a kind of worms that find their food and habitation even in the bodies of these.

The root-caterpillars, and those which live within the branches of plants, are much more easily found out. The roots of *scrophularia*, and the stalks of lettuces, and some other plants, afford caterpillars which seem all of the same species. Those found in the lettuces are extremely plentiful some years, and destroy vast quantities of that plant. These usually have their first habitation in the stalk, near the root.

Nothing more surprises us, in regard to insects, than their industry; and in this the caterpillars yield to no kind, not to mention their silk, the spinning of which is one great proof of it. The sheaths and cases which some of these insects build for the passing their transformations under, are, by some, made of the silk, with their own hair, mixed with pieces of bark, leaves, and other parts of trees, with paper, and other materials; and the structure of these is well worthy our attention.

There are others whose workmanship, in this article, far exceeds these. There is one which builds in wood, and is able to give its case a hardness greater than that of

Erucæ,
or
Caterpillar.

of the wood itself in its natural state. This is the strange horned caterpillar of the willow, which is one of those that eat their *exuvie*. This creature has extremely sharp teeth, and with these it cuts the wood into a number of small fragments: these fragments it afterwards unites together into a case, of what shape it pleases, by means of a peculiar silk; which is no other than a tough and viscous juice, which hardens as it dries, and is a strong and firm cement. The solidity of the case being thus provided for, we are to consider, that the caterpillar inclosed in it is to become a butterfly; and the wonder is, in what manner a creature of this helpless kind, which has neither legs to dig nor teeth to gnaw with, is to make its way out of so firm and strong a lodgment as this in which it is hatched. It has been supposed by some, that the butterfly, as soon as hatched, discharged a liquor which softened the viscous matter that holds the case together, and so its several fragments falling to pieces, the way out lies open. This is evidently the truth of the case; though those who supposed it, did it by mere conjecture: for, on a strict examination, this liquor is always to be found in the animal, and is of the most proper kind for such a service. Reaumur judged, from the effects, that this liquor must be of a singular nature, and very different from the generality of animal fluids: and in dissecting this creature in the caterpillar state, there will always be found near the mouth, and under the œsophagus, a bladder of the bigness of a small pea, full of a limpid liquor, of a very quick and penetrating smell, and which, upon divers trials, proves to be a very powerful acid; and, among other properties, which it has in common with other acids, it sensibly softens the glue of the case, on a common application.

It is evident that this liquor, besides its use to the caterpillar, remains with it in the chrysalis state, and is the very thing that gives it a power of dissolving the structure of the case, and making its way through in a proper manner at the necessary time. Dr Boerhaave has adopted the opinion, that there are no true acids in animals, except in the stomach, or intestines; but this familiar instance proves the error of that determination. Phil. Trans. abr. ix. p. 39, &c.

Another very curious and mysterious artifice, is that by which some species of caterpillars, when the time of their changing into the chrysalis state is coming on, make themselves lodgments in the leaves of the trees, by rolling them up in such a manner as to make themselves a sort of hollow cylindric case, proportioned to the thickness of their body, well defended against the injuries of the air, and carefully secured for their state of tranquillity.

Besides these caterpillars, which in this manner roll up the leaves of plants, there are other species which only bend them once; and others which, by means of thin threads, connect many leaves together to make them a case. All this is a very surprising work, but all much inferior to this method of rolling.

The different species of caterpillars have different inclinations, not only in their spinning, and their choice of food, but even in their manners and behaviour one to another. Some never part company from the time of their being hatched to their last change; but live and feed together, and undergo together their

last change into the chrysalis-state. Others separate one from another as soon as able to crawl about, and each hunts its fortune single; and there are others which regularly live to a certain time of their lives in community, and then separate each to shift for itself, and never to meet again in that state. Reaumur, *Hist. Insect.* vol. ii. *passim*.

Caterpillars are very destructive and pernicious in gardens, particularly those of two species. The one of these is that which afterwards becomes the common white butterfly. This is of a yellowish colour, spotted with black; and infests the leaves of cabbages, cauliflowers, and the Indian cress, of which it eats off all the tender parts, leaving only the fibres entire; so that whole plantations are often seen destroyed by them in autumn, especially such as are near large buildings, or are crowded with trees. There is no remedy against this evil, but the pulling the creatures off before they are spread from their nests, and watching the butterflies, which are daily, in the hot weather, depositing their eggs on these plants. These, however, feed principally on the outside of the leaves of the plants, and are therefore the easier taken off; but the other kind lives near the centre, and therefore is with much more difficulty discovered. This is much larger; and the skin is very tough, and of a brown colour. It is called by the gardeners, a *grub*, and is extremely pernicious. The eggs which produce it are usually deposited in the very heart, or centre, of the plant, particularly in cabbages; and the creature, when formed, and grown to some size, eats its way through all the blades, and leaves its dung in great quantity behind it, which spoils the cabbage. This insect also burrows under the surface of the ground, and makes sad havoc among young plants, by eating off their tender stalks, and drawing them into its holes. This mischief is chiefly done in the night; but wherever a plant is seen thus destroyed, if the earth be stirred with a finger an inch deep, the creature will be certainly found, and this is the only way of destroying them. Miller.

When these animals attack fruit-trees, the best method of driving them off is to boil together a quantity of rue, wormwood, and the common tobacco, of each equal parts, in common water; to make the liquor very strong, and sprinkle it on the leaves and young branches every night and morning, during the time when the fruit is ripening. See also the article CATERPILLAR.

In Dr Hawke's Account of the Voyages to the South Sea, vol. iii. p. 520. we have the following account of a kind of small green caterpillar, which the voyagers found in great numbers on the true West Indian mangroves. Their bodies were thick set with hairs, and they were ranging on the leaves side by side like files of soldiers, to the number of 20 or 30 together. When they touched them, they found that the hairs on their bodies had the quality of a nettle, and gave them a much more acute, though less durable pain.

ERUCÆ Aquaticæ, Water-Caterpillars. It may seem incredible, that there is any such thing as a caterpillar whose habitation is under water; but experience and observation prove, that there are such, and that they feed on the water-plants as regularly as the common

Erucæ,
or
Caterpillar.

Eruca,
or
Caterpillar.

common kinds do on those at land. These are not named at random like many of the aquatic animals of the larger kinds, as the sea-fowl, the sea-horse, &c. which might as well be called any thing else as *wolves* and *horses*; but they are properly what they are called, and do not respire in the manner of the fish-tribe, but by their stigmata as other caterpillars. M. Reaumur, in his observations, met with two species of these; the one upon the potamogeton or pond-weed, the other upon the lenticula or duck-meat. These are both very industrious animals; but the first being much the larger, its operations are more easily distinguished.

This, though truly an aquatic animal, swims but badly, and does not at all love to wet itself. The parent butterfly lays her egg on a leaf of the potamogeton; and as soon as the young caterpillar is hatched, it gnaws out a piece of the leaf, of a roundish shape. This it carries to another part of the same leaf, and lays it in such a manner, that there may be a hollow between, in which it may lodge. It then fastens down this piece to the larger leaf with silk of its own spinning; only leaving certain holes at which it can put out its head, and get to gnaw any of the leaves that are near. It only gets out, though the aperture be naturally small, since a little force from its body bends up the upper leaf, and bends down the lower, both being flexible; and when the creature is out, it has a sort of down that defends it from being wetted, and the natural elasticity of the leaves and of the silk joins the aperture up again, so that no water can get in. The leaves of this kind of plant are also naturally very slippery, and not easily wetted by water. It soon happens that this habitation becomes too small for the animal, in which case it makes just such another; and after that, at times, several others; each being only made fit for it at the size it is then of. The changes of this creature into the chrysalis and butterfly states are in the common method. The butterfly gets out of a chrysalis which was placed on the surface of the water; the lightness of the animal easily sustains it on the water till its wings are dried, and then it leaves that element, never to return to it again.

ERUCÆ Sylvestres, Wood-caterpillars; the name of a genus of caterpillars which do not live, after the manner of others, on leaves of trees or plants, or open to our observation; but under the bark, in the trunk and branches, and in the roots of trees, and sometimes in the body of fruits.

These are easily distinguished from those worms and maggots which are found in roots and fruits, and owe their origin to flies of another kind; but are liable to be confounded with a sort of animals, called by M. Reaumur, *falsæ* or *bastard caterpillars*, which carry a great resemblance in their figure to real caterpillars, but which have more legs than any of the true ones have, and are finally transformed into four-winged flies, which are not true butterflies.

The butterflies which are the parents of those caterpillars that lie imured in trees or fruits, lay their eggs on the surface; and the young caterpillars, when hatched, eat their way in. What appears something surprising, however, in this, is, that there usually is only one caterpillar in a fruit which is large enough to afford food to a great number; and if there are sometimes found two creatures within, one is usually

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a caterpillar, the other a worm of some other kind. The whole occasion of which is, that the operation of penetrating into the fruit is so difficult to the young animal, that it seldom succeeds in it; and tho' the butterfly deposits many eggs on each fruit, and these all hatch, yet it is only here and there one on a fruit that can find the way into it.

These creatures, when once lodged in their prison, have nothing to do but to eat up the substances which inclose them, leaving the outer hard shell unhurt, which still serves as a case for them. This is a very frequent case in the grains of corns, where the farinaceous substance serves as aliment, and the hard outer skin becomes a firm hollow case afterwards for the animal. The farinaceous substance in this case usually proves enough for the animal in its caterpillar-state; but if it does not, the creature has recourse to a very singular expedient: it eats again its own excrements; and finds its now stronger stomach able to separate nourishment from that very matter which had before passed off from its weaker stomach undigested.

Of these species of caterpillars, some go out of their prison in order to change into their chrysalis, and thence into their butterfly-state; but the greater number remain there, and pass through all their changes within. These caterpillars, like all the other kinds, have certain flesh-eating worms, whose parents are of the fly-kind, for their terrible enemies and destroyers; and it is not unfrequent, on opening one of these spoiled fruits, instead of the expected caterpillar, to find a fly just ready to come out: this has been produced from the chrysalis of a worm, which had before found its way into the fruit, and eat up the caterpillar, which was the original possessor of the place.

ERUDITION, denotes an extensive acquaintance with books, especially such as treat of the *BELLES Lettres*.

ERUPTION, in medicine, a sudden and copious excretion of humours, as pus or blood: it signifies also the same with exanthema, any breaking out, as the pustules of the plague, small-pox, measles, &c.

ERUPTION of Volcanoes. See *ÆTNA*, *VESUVIUS*, *VOLCANO*, &c.

ERVUM, the *LENTIL*; a genus of the decandria order, belonging to the diadelphia class of plants. There are six species; of which the most remarkable is the lens, or common lentil. It is cultivated in many parts of England, either as fodder for cattle, or for the seeds which are frequently used in meagre soups. It is an annual plant, and rises with weak stalks about 18 inches high, garnished with winged leaves composed of several pairs of narrow lobes, terminated by a clasper or tendril, which fastens to any neighbouring plant, and is thereby supported; the flowers come out three or four together, upon short footstalks from the side of the branches. They are small, of a pale purple colour, and are succeeded by short flat pods, containing two or three seeds which are flat, round, and a little convex in the middle. The seeds of this plant are most commonly sown in the month of March, where the land is dry; but in moist ground, the best time is April. The usual quantity of seed allowed for an acre of land is from one bushel and a half to two bushels. If these are sown in drills, in the same manner as pease, they will succeed better than when sown

Eruca
||
Ervm.

Eryngium in broadcast : the drills should be a foot and an half asunder, to allow room for the Dutch hoe to clean the ground between them ; for if the weeds are permitted to grow among them, they will get above the lentils and starve them. There is another sort of lentil also cultivated in this country under the name of *French lentil*. It is twice the size of the former, both in plant and seed ; and is much better worth cultivation than the other.

ERYNGIUM, SEA-HOLLY, or *Eryngo*; a genus of the digynia order, belonging to the pentandria class of plants. There are nine species ; most of which are hardy herbaceous perennials, producing erect stalks from one to two or three feet high ; with simple, entire, or divided prickly leaves ; and the stalks terminated by roundish aggregate heads of quinquepetalous flowers, of white, blue, or purple colours. They all flower mostly in July, and the seeds ripen in September. They are propagated by seeds sown in a bed or border, either in spring or autumn. The plants are to be removed the autumn after they come up, into those places where they are designed to remain. The leaves of one of the species, (*viz.* the maritimum, which grows naturally on the sea-coasts of England and Scotland) are sweetish, with a light aromatic warmth and pungency. The roots are accounted aphrodisiac, and are ordered to be kept candied in the shops. The young flowering shoots eaten like asparagus are very grateful and nourishing.

ERYSIMUM, HEDGE-MUSTARD ; a genus of the filiquosa order, belonging to the tetradynamia class of plants. There are six species, of which the most remarkable is the officinale, hedge-mustard, or bank-ruffles. It grows naturally in Britain under walls, by the sides of highways, and among rubbish. It is warm and acrid to the taste ; and when cultivated, is used as a vernal pot-herb. Birds are fond of the seeds ; sheep and goats eat the herb ; cows, horses, and swine refuse it. Some medical virtues have been attributed to the leaves, but these appear to be without foundation.

ERYSIPELAS, in medicine, an eruption of a fiery or acrid humour, from which no part of the body is exempted, tho' it chiefly attacks the face. See (*Index* subjoined to) **MEDICINE.**

ERYTHRINA, CORAL-TREE ; a genus of the decandria order, belonging to the diadelphia class of plants. There are four species, all of them shrubby flowering exotics for the stove, adorned chiefly with trifoliate or three-lobed leaves, and scarlet spikes of papilionaceous flowers. They are all natives of the warm parts of Africa and America ; and must always be kept in pots, which are to remain constantly in stoves in this country. They are propagated by seeds, which are annually imported hither from Africa and America. They are to be sown half an inch deep in pots of light rich earth, which are then to be plunged in the bark-bed of the stove ; and when the plants are two inches high, they are to be separated into small pots, plunging them also in the bark-bed, giving them frequent waterings, and as they increase in growth shifting them into larger pots.

ERYTHRINUS, in ichthyology, a species of **SARBUS.**

ERYTHROIDES, in anatomy, the first of the pro-

per tunics or coats which cover the testicles.

ERYTHRONIUM, DOG'S-TOOTH VIOLET ; a genus of the monogynia order, belonging to the hexandria class of plants. There is only one species, which, however, admits of several varieties in its flowers, as white, purple, pale red, dark red, crimson, and yellow. The plants are low and herbaceous, with a purple stalk and hexapetalous flowers. All the varieties are hardy and durable ; and may be planted in small patches in borders, where they will make a good appearance. They rarely perfect their seeds in this country, but may be propagated by offsets. In Siberia, according to Gmelin, they dry and mix the root of this plant with their soups. It grows there in great abundance ; and is called by the people of the country, *befs*.

ERZERUM, or ERZERON, a city of Turkey in Asia, and capital of Armenia, or Turkomania. It is a pretty large town, five days journey from the Black Sea, and ten from the frontiers of Persia. It stands in a delightful plain, at the foot of a chain of mountains, which hinder the Frats, or Euphrates, from falling into the Black Sea. A neighbouring hill supplies very fine springs, which not only water the fields, but the streets of the town. Erzerum is surrounded with double walls, defended by pentagonal towers ; but the ditches are neither deep nor well kept up. The beglerbeg, or bashaw of the province, lives in the seraglio, which is very ill-built. They reckon that there are 18,000 Turks at Erzerum, 6000 Armenians, and 10,000 Greeks. The Armenians have a bishop, and two churches ; and the Greeks have also a bishop, but the church is a miserable place. The last are mostly braziers, inhabiting the suburbs, who work the copper brought from the neighbouring mountains. They drive a great trade in copper utensils and furs, particularly martins skins. Five or six days journey from the town there are oaks that produce plenty of gall-nuts, which are brought hither. This place is the thoroughfare and resting place of all the merchants trading to the Indies, especially when the Arabs are watching for their prey round Aleppo and Bagdad. E. Long. 40. 50. N. Lat. 29. 46.

ESCAPE, in law ; a violent or privy evasion out of some lawful restraint, without being delivered by due course of law. There are two sorts of escapes, voluntary and negligent. Voluntary, when a man arrests another for felony, or other crime, and afterwards lets him go freely by consent ; in which case, the party that permits such escape is held guilty, committed, and must answer for it. Negligent escape, on the contrary, is where one is arrested, and afterwards escapes against the will of the person that arrested him, and is not pursued with fresh suit, and re-taken before the person pursuing hath lost sight of him. By statute 8 & 9 Will. III. c. 26. the keepers of prisons conniving at escapes, shall forfeit 500*l.* ; and, in civil cases, the sheriff is answerable for the debt.

ESCHAR, in surgery, the crust or scab occasioned by burns or caustic medicines.

ESCHAROTICS, in pharmacy, medicines which produce **ESCHARS.**

ESCHEAT, in law, signifies any lands or tenements that casually fall to a lord within his manor, by way of forfeiture, or by the death of his tenant, without any heirs general or special.

Erythronium
||
Escheat.

Escheate
Escutcheon

The word *eschelat* is sometimes used for the place or circuit within which the king or other lord is entitled to escheats; also for a writ to recover the same from the person in possession after the tenant's death.

ESCHEAT, in Scots law, is that forfeiture which is incurred upon a person's being denounced a rebel. See Law, Part III. N^o clxvi. 12.

ESCHRAKITES, in matters of religion, a sect of Mahometans, who believe that man's sovereign good consists in the contemplation of God. They avoid all manner of vice, and appear always in good-humour, despising the sensual paradise of Mahomet. The most able preachers in the royal mosques are of this sect.

ESCLAIRCISSEMENT, a French term adopted into our language, signifying the explaining or clearing up of some difficulty or obscurity.

ESCUAGE, in our old customs, a kind of knight-service, called *service of the shield*, by which the tenant was bound to follow his lord to the wars at his own charge. See the articles CHIVALRY, FEODAL System, and KNIGHT-Service.

ESCULENT, an appellation given to such plants, or the roots of them, as may be eaten: such are beets, carrots, artichokes, leeks, onions, parsneps, potatoes, radishes, scorzonera, &c.

ESCURIAL, a palace which takes its name from a village about 15 miles north-west of Madrid, the capital of Spain. It is the largest and most superb structure in the whole kingdom, and perhaps one of the finest in Europe. It was begun by Philip II. in 1557, who was 22 years in building it. He called it *St Laurence of the Escorial*, because he had gained a battle over the French on that saint's day. It contains as many different buildings as are usually met with in a city; for there is a royal palace, a church, a college, a library, cloisters, shops for mechanics, lodgings for great numbers of people, fine walks, large alleys, a vast park, and gardens with water-works. It is built in a dry barren spot, surrounded with rugged mountains, inasmuch that every thing that grows there is owing to art. This place was chosen only for the sake of the stone wherewith it is built, which is got from a mountain just by, and is very durable. The way from the village to the Escorial, is along a walk planted with four rows of elm and lime-trees, about a mile and a half in length. There is a glacia round the building, which, before the front, is separated from the square by walls, through which there are gates to enter the square. The square is paved with stones of different figures, disposed into compartments. The structure itself is almost square, and is a little longer one way than the other; all the walls are constructed with grey stone, so well polished, that it looks like marble. This noble structure has 11,000 windows, 17 cloisters, 22 courts, 800 columns, a prodigious number of chambers, halls, saloons, &c.

ESCUTCHEON, or SCUTCHEON, in heraldry, is derived from the French *escusson*, and that from the Latin *scutum*, and signifies the shield whereon coats of arms are represented.

Most nations of the remotest antiquity, were wont to have their shields distinguished by certain marks painted on them; and to have such on their shields was a token of honour, none being permitted to have them till they had performed some honourable action.

Esdras
Esox.

The escutcheon, as used at present, is square, only rounded off at the bottom.

ESDRAS, a Jewish priest, and doctor of the law. Artaxerxes Longimanus sent him with rich presents for the use and ornament of the temple at Jerusalem, re-built under Zerubbabel; the king also ordered the neighbouring governors to provide him with what conduced to the pomp of the Jewish religion, and to exempt the priests from paying taxes. He is supposed to be the collector of the Canon of Scripture; and that, by divine inspiration, he added some things which happened after the deaths of the authors. It is guessed he wrote the Chronicles, besides those books which bear his name, the two last of which are exploded even by the church of Rome.

ESK, the name of several rivers both in England and Scotland, particularly of one which forms part of the boundary between the two kingdoms. It runs from north-east to south-west, and gives name to the county of Eskdale.

ESKIMAUX. See ESQUIMAUX.

ESOX, in ichthyology, a genus of fishes belonging to the order of abdominales. The body is elongated; the head is plainish above; the upper jaw is plain, and shorter than the under one, which is dotted; and the branchiostegic membrane has from seven to twelve rays.

1. The LUCIUS, or PIKE, has a flat head: the upper The Pike. jaw is broad, and shorter than the lower: the under jaw turns up a little at the end, and is marked with minute punctures. The teeth are very sharp, disposed only in the front of the upper jaw, but in both sides of the lower; in the roof of the mouth, and often in the tongue. The slit of the mouth, or the gape, is very wide; the eyes small.

The pike is common in most of the lakes of Europe; but the largest are those taken in Lapland, which, according to Scheffer, are sometimes eight feet long. They are taken there in great abundance, dried, and exported for sale. The largest fish of this kind said to be caught in England, weighed 35 pounds.

All writers who treat of this species bring instances of its voraciousness. It hath been known to choke itself by attempting to swallow one of its own species which proved too large a morsel. Yet its jaws are very loosely connected, and have on each side an additional bone like the jaw of a viper, which renders them capable of greater distension when it swallows its prey. It does not confine itself to feed on fish and frogs; it will devour the water-rat, and draw down the young ducks as they are swimming about. But there are instances of its fierceness still more surprising, and which indeed border a little on the marvellous. Gesner relates, that a famished pike in the Rhone, seized on the lips of a mule that was brought to water, and that the beast drew the fish out before it could disengage itself; that people have been bit by these voracious creatures while they were washing their legs; and that the pike will even contend with the otter for its prey, and endeavour to force it out of its mouth.

Small fishes shew the same uneasiness and detestation at the presence of this tyrant, that the little birds do at the sight of the hawk or owl. When the pike lies dormant near the surface, as is frequently the case, the lesser fishes are often observed to swim around it in vast numbers and in great anxiety. Pikes are often halter-

Efox,
Espalier.

ed in a noose, and taken while they thus lie asleep, as they are often found in the ditches near the Thames, in the month of May.

The pike.

In the shallow water of the Lincolnshire fens they are often taken in a manner, we believe, peculiar to that country, and to the island of Ceylon. The fisherman makes use of what is called a *crown-net*; which is no more than a hemispherical basket, open at top and bottom. He stands at the end of one of the little fens-boats, and frequently puts his basket down to the bottom of the water; then poking a stick into it, discovers whether he has any booty by the striking of the fish; and vast numbers of pike are taken in this manner.

The longevity of this fish is very remarkable, if we may credit the accounts given of it. Rzaczynski tells us of one that was 90 years old; but Gesner relates, that, in the year 1497, a pike was taken near Hailbrun in Suabia, with a brazen ring affixed to it, on which were these words in Greek characters: "I am the fish which was first put into this lake by the governor of the universe, Frederick the Second, the 5th of October 1230:" So that the former must have been an infant to this Methusalem of a fish.

Pikes spawn in March or April, according to the coldness or warmth of the weather. When they are in high season, their colours are very fine, being green, spotted with bright yellow; and the gills are of a moist vivid and full red. When out of season, the green changes to a grey, and the yellow spots turn pale.

The gar.

2. The *BELONE*, or *GAR*, sometimes grows to the length of three feet or more. The jaws are very long, slender, and sharp-pointed; the under jaw extends much farther than the upper; and the edges of both are armed with numbers of short and slender teeth: the tongue is small: the eyes are large; the irides silvery; the nostrils wide and round. The body is slender, the belly quite flat, bounded on both sides by a rough line. The tail is much forked. The colours are extremely beautiful when the fish is in the water: the back is of a fine green, beneath which appears a rich changeable blue and purple: the sides and belly are of a fine silvery hue. This fish, which is found in many places, is known by the name of the *sea-needle*. It comes in shoals on our coasts in the beginning of summer, and precedes the mackerel: it has a resemblance to it in taste; but the light green which stains the back bone of this fish gives many a person a disgust to it.

Saury.

3. The *SAURUS*, or *SAURY*, is 11 inches in length: the nose slender; the jaws produced like those of the sea-needle, but of equal length: the eyes large: the body anguilliform; but towards the tail grows suddenly smaller, and tapers to a very inconsiderable girth. The tail is much forked: the back dusky: the belly bright and silvery. Great numbers of these fish were thrown ashore on the sands of Leith near Edinburgh, after a great storm in November 1768. Rondeletius describes this species among the fish of the Mediterranean; but speaks of it as a rare kind.

ESPALIERS, in gardening, are rows of trees planted about a whole garden or plantation, or in hedges, in such a manner as to inclose quarters or separate parts of a garden; and are trained up regularly to a lattice of wood-work in a close hedge for the defence of tender plants against the injuries of wind and weather. They are of admirable use and beauty in a

kitchen-garden, serving not only to shelter the tender plants, but screen them from the sight of persons in the walks.

Espalier
||
Esquire.

The trees chiefly planted for espaliers, are apples, pears, and some plums: some plant apples grafted upon paradise-stocks; but, as these are of short duration, it is better to plant those grafted upon crabstock, or upon what the gardeners call *Dutch-stocks*; which will both cause them to bear sooner, and prevent their growing too luxuriant. The best kind of apple for this purpose, are the golden pippen, nonpareil, rennet, &c. and the best sort of pear, are the jargonelle, blanquette, &c. These last, if designed for a strong moist soil, should be grafted upon quince-stocks; but, if for a dry soil, upon free-stocks.

While the trees are young, it will be sufficient to drive a few stakes into the ground on each side of them; fastening the branches to these in an horizontal position, as they are produced. This method will do for the three first years; after which an espalier should be made of ash-poles, whereof there must be two sorts, larger and smaller: the former to be driven upright into the ground a foot asunder, and the latter, or slender poles, to be nailed across these, at about nine inches. Some prefer to this another sort of espalier, made of square timber cut to any size: these are, indeed, more slightly, but withal vastly more expensive.

When the espalier is thus framed, the branches are to be fastened to it with osier-twigs; observing to train them in an horizontal position, and at equal-distances. Fruit-trees thus managed, are preferable to any others; not only as bearing better-tasted fruit, but as taking up very little room in a garden, so as to be less hurtful to plants which grow in the quarters.

ESPLANADE, in fortification, the sloping of the parapet of the covered-way towards the campaign.

ESPLEES, in law, the general products which lands yield, or the profit or commodity that is to be taken or made of a thing.

ESPOUSALS, in law, signify a contract or promise made between a man and a woman, to marry each other; and in cases where marriages may be consummated espousals go before. Marriage is termed an *espousal de presenti*.

ESQUIMAUX, a people of North America inhabiting all that vast tract of land known by the name of *Labrador*, or *New Britain*.—They differ very considerably, both in aspect and behaviour, from the other American nations; agreeing in most respects with the inhabitants of West Greenland. See *NEW BRITAIN*, and *GREENLAND*.

ESQUIRE, (from the French *escu*, and the Latin *scutum*, in Greek *σάυς*), which signify an hide, of which shields were anciently made, and afterwards covered; for, in the time of the Anglo-Saxons, the shields had a covering of leather) was originally he, who, attending a knight in time of war, did carry his shield; whence he was called *escuier* in French, and *scutifer*, or *armiger*, i. e. armour-bearer, in Latin. Hotoman says, that those whom the French call *esquires*, were a military kind of vassals, having *jus scuti*, viz. liberty to bear a shield, and in it the ensigns of their family, in token of their gentility or dignity. But this addition hath not of long time

Esquire,
Essay.

time had any relation to the office or employment of the person to whom it hath been attributed, as to carrying of arms, &c. but hath been merely a title of dignity, and next in degree to a knight. For those to whom this title is now due, see the article COMMONALTY. Officers of the king's courts, and of the king's household, counsellors at law, justices of the peace, are only *esquires* in reputation; and he who is a justice of peace has this title only during the time he is in commission, and no longer, if he is not otherwise qualified to bear it. A sheriff of a county being a superior officer, bears the title of *esquire* during his life; in respect of the great trust he has in the commonwealth. The chief of some ancient families are *esquires* by prescription; and in late acts of parliament for poll-money, many wealthy persons commonly reputed to be such, were ranked among the *esquires* of this kingdom.

There is a general opinion, that every gentleman of landed property who has L. 300 a-year, is an *esquire*; which is a vulgar error: for no money whatsoever, or landed property, will give a man properly this title, unless he comes within one of the above rules: and no person can ascribe this title where it is not due, unless he pleases; there being no difficulty in drawing the line by the accounts given above and in the article COMMONALTY: but the meaner ranks of people, who know no better, do often basely prostitute this title; and, to the great confusion of all rank and precedence, every man who makes a decent appearance, far from thinking himself any way ridiculed by finding the superscription of his letters thus decorated, is fully gratified by such an address.

ESQUIRES of the King, are such as have that title by creation, wherein there is some formality used, as the putting about their necks a collar of SS, and bestowing on them a pair of silver spurs, &c.

ESSAY, a trial or experiment for proving the quality of any thing; or an attempt to learn, whether or not any invention will succeed.

ESSAY, in literature, a peculiar kind of composition, the character whereof is to be free, easy, and natural; not tied to strict order or method, nor worked up and finished like a formal system.

ESSAYS, in metallurgy, are chemical operations made in small, to determine the quantity of metal or other matter which is contained in minerals, or to discover the value or purity of any mass of gold or silver.

We shall treat here of the latter kind; referring for the former, to METALLURGY.

1. *Essay of the Value of Silver*, to examine its purity, or the quantity of alloy mixed with it. The common method of examining the purity of silver, is by mixing it with a quantity of lead proportionable to the quantity of imperfect metals with which it is supposed to be alloyed; by testing this mixture; and afterwards by weighing the remaining button of silver. The loss of weight which the silver suffers by cupellation shews the quantity of imperfect metals which it contained.

We may hence perceive, that the essay of silver is nothing else than the refining of it by cupellation. The only difference between these two operations is, That when silver is tested merely for the purpose of refining it, its value is generally known; and it is therefore

mixed with the due proportion of lead, and tested without any necessity of attending to the loss of weight it sustains during the operation: whereas, in the essay, all possible methods ought to be employed to ascertain precisely this loss of weight. The first of these operations, or the mere refining of silver, is made in the great, in the smelting of silver ores, and in mints for making money *. The second operation is never made but in small; because the expences of small operations are less than of great, and in the requisite accuracy is more easily attended to. The last operation is our present subject, and is to be performed in the following manner.

We suppose, first, that the mass or ingot of silver, of which an essay is to be made, consists of 12 parts perfectly equal; and these 12 parts are called *penny-weights*. Thus, if the ingot of silver be an ounce weight, each of these 12 parts will be $\frac{1}{12}$ of an ounce; or if it be a mark, each of these will be $\frac{1}{12}$ of a mark, &c. Hence if the mass of silver be free from all alloy, it is called *silver of 12 penny-weights*; if it contains $\frac{1}{12}$ of its weight of alloy, it is called *silver of 11 penny-weights*; if $\frac{2}{12}$ of its weight be alloy, it is called *silver of 10 penny-weights*; and these 10 penny-weights or parts of pure silver are called *fine penny-weights*. Chem. Dist.

We ought to observe here concerning these penny-weights, that essayers give also the name *penny-weight* to a weight equal to 24 real grains: which latter real penny-weight must not be confounded with the former, which is only ideal and proportional; and such a confusion is the more likely to take place, as this ideal penny-weight is also, like the former, divided into 24 ideal grains, which are called *fine grains*.

An ingot of fine silver, or silver of 12 penny-weights, contains then 288 fine grains; if this ingot contains $\frac{1}{12}$ part of alloy, it is said to be *silver of 11 penny-weight and 23 grains*; if it contains $\frac{2}{12}$ of alloy, it is called *silver of 11 penny-weight and 22 grains*; if it contains $\frac{3}{12}$, it is called *silver of 11 penny-weight and 10 grains*; and so on. Lastly, the fine grain has also its fractions, as $\frac{1}{2}$, $\frac{1}{4}$ of a grain, &c.

As essays to discover the value of silver are always made in small, essayers only take a small portion of an ingot for the trial; and the custom in France is to take 36 real grains for this purpose, which is consequently the largest weight they employ, and represents 12 fine penny-weights. This weight is subdivided into a sufficient number of other smaller weights, which also represent fractions of fine penny-weights and grains. Thus 18 real grains, which is half of the quantity employed, represent six fine penny-weights; three real grains represent one fine penny-weight, or 24 fine grains; a real grain and a half represent 12 fine grains; and $\frac{1}{2}$ part of a real grain represents $\frac{1}{2}$ part of a fine grain, which is only $\frac{1}{12}$ part of a mass of 12 penny-weights.

We may easily perceive, that weights so small, and essay-balances, ought to be exceedingly accurate. These balances are very small, suspended and inclosed in a box the sides of which are panes of glass, that they may be preserved from dust, and that their motion may not be affected by agitated air, so as to disorder their action *.

When an essay of a mass or ingot of silver is to be made, the custom is to make a double essay. For this purpose, two fictitious semi-marks, each of which may be

Essay of
Silver.

* See Refining.

* See (Essay-) Balance.

be equal to 36 real grains, are to be cut from the ingot. These two portions of silver ought to be weighed very exactly; and they ought also to have been taken from opposite sides of the ingot.

Persons accustomed to these operations know pretty nearly the value of silver merely by the look of the ingot, and still better by rubbing it on a touchstone. By the judgment they form of the purity of the ingot, they regulate the quantity of lead which is to be added to it, as this quantity must be always proportionable to the quantity of imperfect metal mixed with the silver.

Nevertheless, this proportion of lead to the alloy has not been precisely determined. Authors who treat of this subject differ much. They who direct the largest quantity of lead say, that thereby the alloy is more certainly destroyed; and others who direct a small quantity of lead, pretend, that no more of that metal ought to be used than is absolutely necessary, because it carries off with it always some portion of silver. Every essayer uses his own particular method of proceeding, to which he is attached.

To ascertain these doubtful points, three chemists of the Academy of Sciences at Paris, Messrs Hellot, Tillet, and Macquer, were appointed by the French government. They were directed to ascertain every thing concerning the essay of gold and silver by authenticated experiments, made under the inspection of a minister whose superior knowledge is equal to his desire of public good, and in presence of the officers of the mint.

The experiments made by these chemists, and the consequent regulation, have determined that four parts of lead are requisite for one part of silver of 11 penny-weight and 12 grains, that six parts of lead are requisite for silver of 11 penny-weight, eight parts of lead for silver of 10 penny-weight, 10 parts of lead for silver of nine penny-weight, and so on in the same progression.

Two cupels of equal size and weight are to be chosen. The custom is to use cupels of such a size that their weight shall be equal to that of one half of the lead employed in the essay; because such cupels have been found capable of imbibing all the litharge formed during the operation. These cupels are to be placed together under a muffle in an essay-furnace. The fire is to be kindled, and the cupels are to be made red-hot, and to be kept so during half an hour at least before any metal be put into them. This precaution is necessary to dry and calcine them perfectly; because if they contained any moisture or inflammable matter, an ebullition and effervescence would be occasioned in the essay. When the cupels are heated so as to become almost white, the lead is to be put into them; the fire is to be increased, which is done by opening the door of the ash-hole so as to admit air, till the lead becomes red, smoking, and is agitated by a motion of its parts called its *circulation*, and till its surface becomes smooth and clear.

Then the silver, previously beat into small plates for its easier fusion, is to be put into the cupels; the fire is to be continued, and even increased, by putting hot coals at the mouth of the muffle, till the silver shall have entered the lead, that is, till it have melted and mixed with the lead. When the melted matter circulates well, the heat is to be diminished by taking away,

partly or entirely, the coals put at the mouth of the muffle, and by closing more or less the doors of the furnace.

The heat ought to be regulated so, that the essays in the cupels shall have surfaces sensibly convex, and shall appear ardent, while the cupels are less red; that the smoke shall rise almost to the roof of the muffle; that undulations shall be made in all directions upon the surfaces of the essays, which are called *circulations*; that their middles shall be smooth, and surrounded with a small circle of litharge, which is continually imbibed by the cupels.

The essays are to be kept in this state till the operation is finished, that is, till the lead and alloy have soaked into the cupel; and the surfaces of the buttons of silver being no longer covered with a pellicle of litharge, become suddenly bright and shining, and are then said to *lighten*. If the operation has been well conducted, the two essays ought to become bright nearly at the same time. When the silver has been by this operation well refined, we may see, immediately after it has brightened, the surface of the silver covered with rainbow colours, which quickly undulate and cross each other, and then the buttons become fixed or solid.

The management of the fire is an important article in essays. For if the heat be too great, the lead is scorified and imbibed by the cupel so quickly, that it has not sufficient time to scoriify and carry along with it all the alloy; and if the heat be too little, the litharge is gathered upon the surface, and does not penetrate the cupel. The essayers say then, that the essay is *choaked* or *drowned*. In this case the essay does not advance; because the litharge covering the surface of the metal defends it from the contact of air, which is absolutely necessary for the calcination of metals.

We have above related the marks of a successful essay. The heat may be known to be too great, from the convexity of the surface of the melted metal; from a too strong circulation; from the too vivid appearance of the cupel, so that the colours given to it by the litharge cannot be distinguished; and, lastly, by the smoke rising up to the roof of the muffle, or not being at all visible from its being so ardent and red-hot as not to be distinguishable. In this case, the heat must be diminished by shutting the door of the ash-hole: Some essayers, for this purpose, put round the cupels, small, oblong, cold pieces of baked clay, which they call *instruments*.

If, on the contrary, the melted metal have a surface not very spherical, relatively to its extent; if the cupel appear dark-coloured, and the smoke of the essay do only creep upon the surface; if the circulation be too weak, and the scoria, which appears like bright drops, have but a dull motion, and be not soaked into the cupel; we may be assured that the heat is too weak; much more may we be assured of it when the metal fixes, as the essayers call it. In this case, the fire ought to be increased by opening the door of the ash-hole, and by placing large burning coals at the mouth of the muffle, or even by laying them across upon the cupels.

As soon as the lead is put into the cupels, the fire is to be increased, because they are then cooled by the cold metal; and the lead ought to be quickly melted, to prevent its calx from collecting upon its surface in too

too great quantity before it be formed into litharge; which it would do, and be difficultly fused, if the heat were too weak.

When the silver is added to the lead, the heat must be still increased; not only because the silver cools the mass, but because it is less fusible than lead. And as all these effects ought to be produced as quickly as possible, more heat is at length given than ought to be continued; and therefore, when the silver has entered the lead, the heat is to be diminished till it becomes of a due intensity for the operation.

During the operation, the heat ought gradually to be augmented to the end of it, both because the metallic mixture becomes less fusible as the quantity of lead diminishes; and also because the lead is more difficultly scorifiable, as it is united with a larger proportion of silver. Hence the essays must be rendered very hot before they brighten.

When the operation is finished, the cupels are left in the same heat during some seconds, to give time to the last portions of litharge to be entirely absorbed; because if any of it remained under the buttons of silver, it would stick to them. The fire is then allowed to extinguish, and the cupels to cool gradually, till the buttons have entirely fixed, particularly if they be pretty large; because if they cool too quickly, their surfaces fix and contract before the internal mass, which is thereby so strongly compressed as to burst through the external solid coat and form vegetations, or even to be entirely detached from the rest of the mass, and dissipated. This is called *the vegetation of the button*. It ought to be carefully prevented, because small bits of silver are sometimes thrown out of the cupel.

Lastly, when the buttons are thoroughly fixed, they are to be disengaged from the cupels by a small iron utensil while they are yet hot; otherwise they could not be disengaged clean and free from part of the cupels which strongly adhere to them when the heat is much diminished.

Nothing then remains to complete the essay, but to weigh the buttons. The diminution of weight which they have sustained by cupellation will show the purity or value of the ingot of silver.

We ought to observe, that as almost all lead naturally contains silver, and that after cupellation this silver is mixed with the silver of the ingot in the button of the essay; before we employ any lead in this operation, we ought to know how much silver it contains, that we may subtract this quantity from the weight of the button, when we compute the fineness of the silver of the ingot essayed. For this purpose essayers generally cupel a certain quantity of their lead separately, and weigh accurately the button of silver it yields: or, at the same time when they essay silver, they put into a third cupel, in the muffle, a quantity of lead equal to that employed in both their essays; and when the operation is finished, and the buttons are to be weighed, they throw the small button produced from the lead alone into the scale which contains the weights; and as this exactly counterpoises the small portion of silver which the essay buttons have received from the lead employed in the cupellation, the weights will shew precisely the quantity of silver contained in the ingot, and thus the trouble of calculating is prevented. The small button of silver procured from the cupellation of lead

alone is called the *witnesh*. But to prevent this trouble, essayers generally employ lead which contains no silver, such as that from Willach in Carinthia, which is therefore procured by essayers.

In the second place, we shall observe, that a certain quantity of silver always passes into the cupel, as refiners in the great have long observed, and which happens also in essaying small quantities. The quantity of silver thus absorbed, varies according to the quantity of the lead employed, and the matter and form of the cupels; all which objects will undoubtedly be determined by the above-mentioned chemists.

The cupellation which we have now described is exactly the same for essays by which the produce of a silver ore, or of an ore of another metal containing silver, is determined. But as these ores contain frequently gold, and sometimes in considerable quantity, when these essays are made, the buttons of silver obtained by the essays ought to be subjected to the operation called *parting*. See SILVER, REFINING, FURNACE, MUFFLE, and CUPEL.

M. Tillet has published a memoir, shewing that essays of silver made in the common method are uncertain and not to be depended upon, and that this uncertainty proceeds from the different quantities of silver absorbed by the cupel in different essays, according as the heat and other circumstances happened to vary. He therefore proposes, in order to render essays accurate, to extract from the cupel the quantity of silver it has absorbed during the operation, and to add this particle of silver to the button, as these two contain the whole quantity of silver in the matter essayed.

The variations in the different results of different essayers, or of the same essayer at different times, upon the same mass of silver, are sufficient proofs of the uncertainty mentioned by M. Tillet. These variations are occasioned, according to that author, principally from the following causes: 1. From the inaccuracy of the balances and weights employed. 2. From the faulty fusion of the mass to be essayed; by which means, the contained alloy may be unequally diffused. 3. From the impurity of the lead, especially from its containing silver, which is not always equally diffused through its mass. 4. From the different proportions of lead used by different essayers. 5. From the difference of the intensity of heat: for, if the heat be not sufficiently intense, the silver will still contain a portion of alloy; and if the heat be too intense, too much of the silver will be imbibed by the cupel. 6. From the want of care in picking the small particles of silver, which frequently adhere to the sides of the cupel separately, from the principal button. 7. From the spurting which sometimes happens unobserved by the essayer; and which may further falsify the essays of other pieces included under the same muffle, by the falling of the particles thrown out of one cupel into others adjacent. But, with all the attentions to avoid these causes of error, the author obtained different results from different essays of the same mass of silver. Nor could he, by any method, make his different essays consistent with each other, but by adding to each button the particle extracted from the cupel; and this method he found by accurate experiments to be perfectly exact.

M. Tillet observed, that the quantity of lead directed

ted in the regulations established in consequence of the report made by Messrs Macquer, Hellot, and Tillet, is not sufficient to purify the silver perfectly from its alloy. He nevertheless approves of the said regulation; and considers the weight of the alloy retained by the button, as some compensation for the weight of the silver absorbed by the cupel. And as it is a constant fact, that the more lead is used, the greater is the loss by the absorption of the cupel, he remarks, that a regulation, directing a larger proportion of lead for France, than is used in other countries, would be disadvantageous to that kingdom; as thereby the silver of the same denomination would be required to be finer in that than in other countries where a less proportion of lead was employed. He observes, that the above-mentioned rule, "that the more lead is used, the greater is the loss by the absorption of the cupel," does not extend to quantities of lead much above double the usual quantities. Thus 32 parts of lead to one of silver, will not occasion more absorption than 16 parts of lead. For the refining scarcely takes place till the extraordinary quantity of lead be gone, and the silver is only or chiefly carried into the cupel along with the copper. Accordingly, he found that he could render the silver finer by using four parts of lead at first, and afterwards adding two more parts when the irises began to appear, than by employing all the six parts of the lead at once. By this method of dividing the quantity of lead, the loss of silver by absorption was greater. M. Tillet did not find, that by employing bismuth alone, or mixed with lead, his essays were more certain, than when lead alone was used. He observed, however, that the addition of bismuth made the silver purer, but occasioned a greater absorption by the cupel.

2. *Essay of the Value of Gold.* The fictitious weights used to determine the purity of gold, and to assay this metal, are different from those of silver. See the preceding article. A mass of gold perfectly pure, or which contains no alloy, is ideally divided into 24 parts, called *carats*; this pure gold is therefore called *gold of 24 carats*. If the mass or ingot contains $\frac{1}{24}$ part of its weight of alloy, the gold is then of 23 carats; and if it contains $\frac{2}{24}$, or $\frac{1}{12}$ of alloy, it is gold of 22 carats, &c. Hence we see, that the carat of gold is only a relative and proportional weight, so that the real weight of the carat varies according to the total weight of the mass of gold to be examined. If this mass of gold weighs a mark, the real weight of the carat will be $\frac{1}{24}$ of eight ounces, which is equal to a mark. If the mass weigh an ounce, the carat will be $\frac{1}{24}$ part of an ounce, or 24 grains. If it is only a penny-weight or 24 grains, the real weight of a carat will be one grain; and so on.

For greater accuracy, the carat of gold is divided into 32 parts, which are relative and proportional weights, as the carat itself is. Thus $\frac{1}{32}$ of a carat of gold is $\frac{1}{768}$ of $\frac{1}{24}$, or the $\frac{1}{768}$ of any mass of gold; and the gold which contains an alloy equal to the $\frac{1}{768}$ part of the whole mass is called *gold of 23 carats and $\frac{1}{32}$* ; gold which contains $\frac{2}{768}$ of alloy is *gold of 23 carats and $\frac{1}{16}$* ; and so on.

The real weight now generally used in the operation for determining the purity of gold, is six grains. This weight then represents 24 carats. The half of this weight, or three real grains, represents 12 carats. Ac-

cording to this progression, we shall find that $\frac{1}{2}$ of a real grain represents one carat, and the $\frac{1}{4}$ part of a grain represents the $\frac{1}{8}$ of a carat, or the $\frac{1}{192}$ part of a mass of gold to be assayed.

As these weights are exceedingly small, some assayers employ a weight of 12 grains, which must be very convenient.

When a mass or ingot of gold is to be assayed, six grains are to be cut off, and exactly weighed: also 18 grains of fine silver are to be weighed. These two metals are to be cupelled together with about ten times as much lead as the weight of the gold. This cupellation is conducted precisely like that of the assay to determine the purity of the silver, excepting that the heat must be raised a little more towards the end of the operation when the assay is going to brighten. Then the gold is freed from all alloy but silver. If the quantity of copper or other alloy destructible by cupellation be required to be known, the remaining button is accurately weighed. The diminution of weight from the sum of the weights of the gold and of the silver determines the quantity of this alloy.

The button containing gold and silver is then to be flattened upon a polished piece of steel, and care must be taken to anneal it from time to time, to prevent its splitting and cracking. By this method it is reduced to a thin plate, which is to be rolled up, in order to be parted by aqua fortis*. The diminution found after the parting from the original weight of the gold assayed, shews the whole quantity of alloy contained in that gold. * See Parting.

The assay for determining the purity of gold is then made by two operations: the first, which is cupellation, deprives it of all its imperfect metals; and the second, which is parting, separates all the silver from it. By antimony also gold may be purified, which is a kind of dry parting. By this single operation, all the imperfect metals, and silver with which gold is alloyed, are separated. See PURIFICATION, GOLD, SILVER, REFINING.

ESSAY-Hatch, is the miners term for a little trench or hole, which they dig to search for shoad or ore.

ESSENCE, in metaphysics, that which constitutes the particular nature of each genus or kind, and distinguishes it from all others; being nothing but that abstract idea to which this name is affixed, so that every thing contained in it is essential to that particular kind.

This Mr Locke calls the *nominal essence*; in contradistinction to the real essence, or constitution of substances on which this nominal essence depends. Thus, the nominal essence of gold, is that complex idea the word *gold* stands for; let it be, for instance, a body, yellow, weighty, malleable, fusible, and fixed: but its real essence is the constitution of its insensible parts, on which those qualities and all its other properties depend, which is wholly unknown to us.

ESSENES, or ESSENIANS, in Jewish antiquity, one of the three ancient sects among that people. They allowed a future state, but denied a resurrection from the dead. Their way of life was very singular: they did not marry; but adopted the children of others, whom they bred up in the institutions of their sect: they despised riches, and had all things in common, and never changed their cloaths till they were entirely worn

Essential
||
Elicite.

Esther
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Estremadura.

worn out. When initiated, they were strictly bound not to communicate the mysteries of their sect to others; and if any of their members were found guilty of enormous crimes, they were expelled.

Pliny tells us, that they dwelt on the west side of the lake of Asphaltites; and that they were a solitary kind of men, living without women or money, and feeding upon the fruit of the palm-tree: he adds, that they were constantly recruited by new comers, whom the furies of ill fortune had made weary of the world; in which manner the sect was kept up for several thousands of years, without any being born among them. The reason why we find no mention made of them in the New Testament, may be their reclusive and retired way of life, not less than their great simplicity and honesty, whereby they lay open to no censure or reproach.

ESSENTIAL, something necessarily belonging to a thing, from which it cannot be conceived distinct: thus the primary qualities of bodies, as extension, figure, number, &c. are essential or inseparable from them in all their changes and alterations.

Essential Oil. See **CHEMISTRY**, n° 487.

ESSEX, a county of England, bounded on the east by the sea; on the north by Suffolk and Cambridgeshire, from which it is parted by the Stour; on the south, it is parted from Kent by the Thames; and on the west from Middlesex by the river Lea, and from Hertfordshire by the Stort. It extends from east to west 40 miles in length, 35 in breadth from north to south, and 140 in circumference. It is in the diocese of London, and gives title of earl to the family of Capel. The soil of the inland parts is generally sandy or gravelly, and the air good; but in the low fenny grounds along the Thames, and on the sea-coast, it is aguish and unhealthy. The county in some places produces a great deal of saffron, as about Saffron Walden. It is well supplied both with sea and river fish, wood, and wild-fowl. Vast numbers of oxen, horses, sheep, and cows, are fed and bred in the fens; a great deal of corn is raised, and cheese made; the soil being there as rich as the air is bad. In this county, too, a great sum of money is got by DECOYS.

ESTATE, in law, signifies the title or interest that a person has in lands, tenements, or other effects; comprehending the whole in which a person hath any property, and will pass the same.

Estates are either real or personal; otherwise distinguished into FREEHOLDS, which descend to heirs; or CHATELLE, that go to executors or administrators.

A fee-fee is the amplest estate our law admits of. See **Fee**.

Estates are obtained several ways; as, by descent from a father to a son; by conveyance or grant, from one person to another; by gift or purchase; or by deed or will. See **DESCENT**, **SUCCESSION**, **TENURE**, &c.

ESTATES, in a political sense, is used either to denote the dominions of some prince, or the general classes into which the people are divided.

In Britain, the estates are the king, lords, and commons; or rather the lords and commons, who meet the king in parliament, for reforming abuses, and enacting good and wholesome laws.

ELESTE, in heraldry, denotes the heads of beasts torn off by main force.

VOL. IV.

ESTHER, a canonical book of the Old Testament; containing the history of a Jewish virgin dwelling with her uncle Mordecai at Shushan, in the reign of Ahasuerus one of the kings of Persia.

The great beauty of this maid raised her to the throne of Persia; whereby she had an opportunity to save her countrymen, whose destruction was plotted by Haman, a favourite of that prince.

The learned are not agreed who this Ahasuerus was. Archbishop Usher supposes him to be Darius Hystaspes, and Artystona to be Esther. Scaliger makes him the same with Xerxes, and his queen Hametris to be Esther. Josephus, on the contrary, positively asserts, that the Ahasuerus of the scriptures, is the Artaxerxes Longimanus of profane story; and the Septuagint, throughout the whole book of Esther, translate Ahasuerus by Artaxerxes. Most people subscribe to this last opinion; and, indeed the extraordinary kindness shewed by Artaxerxes to the Jews, can scarce be accounted for otherwise, than by supposing that they had so powerful an advocate as Esther to solicit for them.

ESTOILE'E, or **CROSS ESTOILLE'E**, in heraldry, a star with only four long rays in form of a cross; and, accordingly, broad in the centre, and terminating in sharp points.

ESTRAY, in law, any beast not wild, that is found within a lordship, and owned by nobody: in which case, being cried, according to law, in the two market-towns adjacent, and not claimed in a year and a day by the owner, it becomes the property of the lord of the manor or liberty wherein it was found.

ESTONIA, is a province of the Russian empire, and part of Livonia. It is bounded on the east by the Baltic sea, on the north by the Gulph of Finland, on the west by Ingria, and on the south by Lettonia. It is divided into six districts: 1. Harrien; 2. Wireland; 3. Alentakin; 4. Wich; 5. Jerven; and 6. Odepoa. The principal towns are, Revel, Weisenberg, Borchholm, Narva, Nyssot, Habfal, Derpt, St Ellen, Pernau, and Roderickwick.

In former times the inhabitants of this country carried on a good trade in corn, which was dried in stoves; but wars have much depopulated the country, insomuch that not a fourth part of it is inhabited, and a great number of gentlemen's seats lie in ruins.

ESTREMADURA, a province of Spain, has New Castile on the east, Leon on the north, Andalusia on the south, and Portugal on the west. It is 175 miles in length, and 100 in breadth; and its principal towns are, Calatrava, Menda, and Badajoz, on the river Guadiana; Alcantara, on the Tajo; and Cona and Placentia, to the north of this river.

This province enjoys a very pure and healthful air, and its mountains are full of wild and tame animals; they having woods and forests for the one sort, and pastures for the other. The fields are planted with fruit-trees, which bear all kinds of delicious fruit. The vineyards produce excellent wines of all colours, and the fields yield plenty of corn.

ESTREMADURA, a province of Portugal, near the mouth of the Tagus or Tajo, is bounded on the north by Beira, on the east and south by Alentejo, and on the west by the Atlantic Ocean. It is about 88 miles in length, and 45 in breadth. This province is divided

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into

Etching. into six comarcas, viz. Litria, Lisbon, Tomar, Santaren, and Alanquar, to the north of the Tagus; and that of Setubal, to the south of this river. These are likewise the principal towns. Eltramadura is equal, if not preferable, to any other province in Spain or Portugal. The district of Santaren produces such plenty of corn, and feeds so many flocks of sheep, that it may enter into competition with Sicily. The fruits and the wines are all excellent; and it was here that the sweet oranges brought from China were first planted, and of which there are large quantities transported to foreign parts, with the wines and other fruits. The fields are covered with flowers almost all the year, from which the bees collect large quantities of fine honey. The olive-trees are numerous, from which they have excellent oil. The rivers abound with good fish, and the mountains have quarries of several kinds.

ETCHING, a method of engraving on copper, in which the lines or strokes, instead of being cut with a tool or graver, are eaten in with aquafortis.

Etching is of a later invention, though not very modern, than engraving with the tool; of which it was at first only an imitation, that was practised by painters and other artists, who could much sooner form their hand to, and attain a facility of, working in this way, than with the graver. But being then nevertheless considered as a counterfeit kind of engraving, and therefore inferior to the other, it was cultivated in a very confined manner; the closeness of the resemblance of the work to that performed by the tool, being made the test of its merit, and consequently the principal object of aim in those who pursued it. This servile confinement of the art of etching to the imitation of the original kind of engraving, was a great cause of retarding its advancement towards perfection, as many of the most able masters cramped their talents with the observance of it: which may be seen in the instances of Sadclers, Swaeneberg, Vilamene, and particularly Le Bosse; who, in his treatise on engraving, has laid down as a principle, that the perfection of this kind consists in the close similitude of the work with that done by the tool. This absurd prepossession has been since worn out: and the method of working with aquafortis has been so far improved, that, instead of being now deemed a spurious kind of engraving, it evidently appears the foundation of an excellence in many modern works, that could never have been produced without it: since, though the neatness and uniformity of the hatches, which attend the use of the tool, is more advantageous with respect to portraits; yet the liberty and facility of the other manner give a much greater opportunity to exercise the force of genius and fancy in history-engraving; where the effect of the whole, and not the minute exactness in finishing all the parts, constitutes the principal value. There are two methods practised of engraving in this way; the one with a hard varnish or ground, the other with a soft. The first was formerly much used, being better accommodated to the intention of imitating the engraving with the tool; as the firmness of the body of the varnish gave more opportunity of retouching the lines, or enlarging them with the oval-pointed needles, called by the French *echoppes*, as was practised by Le Bosse and others for that purpose. The latter has now almost wholly superseded the use of the other, by the free

manner of working it admits of; which affords a power of expression incompatible with the greater inflexibility of the hard varnish, that confines the lines and hatches to such a regularity and sameness, as gives a stiffness of manner and coldness of effect to the work.

The mixture of the use of the tool and aquafortis, which are now both employed in many cases, has, however, given that perfection to engraving which it possesses at present. The truth and spirit of the outline, that the method of working with aquafortis affords, and the variety of shades which the different kinds of black produce in this way, as well as other means of expressing the peculiar appearance and character of particular subjects, furnish what was defective in the sole use of the tool; while, on the other hand, the exactness and regularity of the lines, which are required for finishing many kinds of designs, are supplied by the graver; and by a judicious application of both, that complete finishing is obtained, which either of them alone must necessarily want.

The manner by which this art is performed, is the covering the surface of the plate with a proper varnish or ground, as it is called, which is capable of resisting aquafortis; and then scoring or scratching away, by instruments resembling needles, the parts of this varnish or ground, in the places where the strokes or hatches of the engraving are intended to be: then, the plate being covered with aquafortis, the parts that are laid naked and exposed by removing the ground or varnish, are corroded or eaten away by it; while the rest, being secured and defended, remain untouched.

There are two methods of etching, as hath been already observed; the difference of which from each other consists, as well in the difference of the varnish or ground, as in that of the aquafortis, adapted to each kind: but the general methods of performing them are alike in both. These varnishes or grounds are distinguished by the names of *hard* and *soft*: for, in their consistence, or the resistance they give to the needles, lies their essential variation from each other. The hard varnish, it is with good reason conjectured, was not the first in use: but soon took place of the other; and was, for some time, the most received in practice, on account of its admitting the work to be made more like that of the graver: the soft has, however, since, in its turn, prevailed to the exclusion of it in some degree, except in the case of particular subjects; but not so entirely as to take away the expedience of shewing how it is performed. The manner of etching with the soft varnish is now, however, one of the most important objects of the art of engraving; and it is at present in universal use, sometimes alone, but more frequently intermixed with the work of the tool, and, in some cases, with great advantage, even where the whole is intended to pass for being performed by the graver.

Preparation of the soft varnish; according to Mr Lawrence, an eminent English engraver at Paris.

“ Take of virgin’s wax and asphaltum, each two ounces; of black pitch and Burgundy pitch, each half an ounce. Melt the wax and pitch in a new earthenware glazed pot; and add to them, by degrees, the asphaltum finely powdered. Let the whole boil, till such

Etching.

such time as that, taking a drop upon a plate, it will break when it is cold, on bending it double two or three times betwixt the fingers. The varnish being then enough boiled, must be taken off the fire; and, letting it cool a little, must be poured into warm water, that it may work the more easily with the hands, so as to be formed into balls; which must be rolled up, and put into a piece of taffety for use."

It must be observed, first, that the fire be not too violent, for fear of burning the ingredients; a slight simmering will be sufficient: secondly, that while the asphaltum is putting in, and even after it is mixed with them, the ingredients should be stirred continually with the spatula: and thirdly, that the water, into which this composition is thrown, should be nearly of the same degree of warmth with it, to prevent a kind of cracking that happens when the water is too cold.

The varnish ought always to be harder in summer than in winter; and it will become so if it be suffered to boil longer, or if a greater proportion of the asphaltum or brown resin be used. The experiment abovementioned, of the drop suffered to cool, will determine the degree of hardness or softness that may be suitable to the season when it is used.

Preparation of the hard varnish used by Callot, commonly called the Florence varnish.

TAKE four ounces of fat oil very clear, and made of good linseed oil, like that used by painters: heat it in a clean pot of glazed earthen-ware, and afterwards put to it four ounces of mastick well powdered; and stir the mixture briskly, till the whole be well melted; then pass the whole mass through a piece of fine linen, into a glass bottle with a long neck, that can be stopp'd very securely; and keep it for the use that will be below explained.

Method of applying the soft varnish to the plate, and of blackening it.

THE plate being well polished and burnished, as also cleaned from all greasiness by chalk or Spanish white, fix a hand-vice on the edge of the plate where no work is intended to be, to serve as a handle for managing it when warm: then put it upon a chafing-dish, in which there is a moderate fire; observing to hold it so, that it may not burn: keep the plate over the fire till it be so hot, that the varnish being brought into contact with it, may melt: then cover the whole plate equally with a thin coat of the varnish; and while the plate is warm, and the varnish upon it in a fluid state, beat every part of the varnish gently with a small ball or dauber made of cotton tied up in taffety; which operation smoothes and distributes the varnish equally over the plate.

When the plate is thus uniformly and thinly covered with the varnish, it must be blackened by a piece of flambeau, or of a large candle, which affords a copious smoke; sometimes two, or even four, such candles are used together for the sake of dispatch, that the varnish may not grow cold: which if it does during the operation, the plate must then be heated again, that it may be in a melted state when that operation is performed: but great care must be taken not to burn it; which, when it happens, may be easily perceived by the varnish appearing burnt and losing its gloss. The

following expedient is made use of for the more commodiously blackening the varnish, being particularly necessary where the plates are large: Fix a strong hook in the roof of the room, through which pass four pieces of cord of equal length, at the end of which are fixed four iron rings of about four inches diameter, for supporting the corners of the plate. The plate being thus suspended in the air, with the varnished side downwards, may be blackened with great convenience: but this is not, however, absolutely requisite, except in the case of large plates that could not, without difficulty, be held up, unless this, or some other such contrivance, were made use of.

It is proper to be very cautious in keeping the flambeau or candle at a due distance from the plate, lest the wick touch the varnish, which would both fully and mark it. If it appear that the smoke has not penetrated the varnish, the plate must be again placed for some little time over the chafing-dish; and it will be found, that, in proportion as the plate grows hot, the varnish will melt and incorporate with the black which lay above it, in such a manner that the whole will be equally pervaded by it.

Above all things, the greatest caution should be used, in this operation, to keep all the time a moderate fire; and to move frequently the plate, and change the place of all the parts of it, that the varnish may be alike melted every where, and kept from burning. Care must also be taken, that during this time, and even till the varnish be entirely cold, no filth, sparks, or dust, fly on it; for they would then stick fast, and spoil the work.

Method of applying the hard varnish.

THIS is precisely the same as for the soft; being spread equally over the warm plate with the taffety-ball, and smoked in the same manner: only after it is smoked, it must be baked, or dried over a gentle fire of charcoal, till the smoke from the varnish begins to decrease; taking care not to overheat the plate, which would both soften it and burn the varnish.

The plate being thus prepared, and an exact drawing of the outlines of the design made upon thin paper, the other side of the paper must be well rubbed with chalk, or Spanish whitening, or, which is better, with red chalk, scraped to a powder; and the loose chalk is cleared off with a linen rag: then the stained side of the paper is laid upon the varnish, fixing the corners to the plate with wax or wafers, to prevent its shuffling; and with a blunted needle, or pointer, the drawing is slightly traced, and communicates to the varnish an exact outline of the design to be etched.

A variety of pointers is necessary for the work. Those used for the broad large strokes ought to be very blunt, exceeding round, and well polished at the point; the foal of a shoe answers very well for polishing the points. The finest ought to be as sharp as a needle. If any scratches or false strokes happen in the working, they are to be stopped up with a hair-pencil dipped in Venetian varnish, mixed with lamp-black, by which means these places will be defended from the action of the aquafortis.

The next operation is that of eating or corroding the plate with aquafortis; in order to which, a border of soft wax (being a composition of bees-wax melted

Eternity
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and tempered with a little Venice turpentine and tal-
low), must be fastened round the plate about an inch
high, in the form of a little wall or rampart, to contain
the aquafortis. At one of the corners of this border
a gutter is usually made, which serves for pouring com-
modiously the aquafortis off the plate. The plate be-
ing thus bordered, take a due quantity of the refiners
aquafortis; mix it with half its quantity of common wa-
ter; and pour it gently on, till it rise above a finger's
breadth above the surface of the plate: when, if all
things have been rightly conducted, it will be seen that
the aquafortis will soon exert its action in the hatches
which have been strongly touched; but those more
weakly engraved will appear at first clear, and of the
colour of the copper. The menstruum must therefore
be suffered to continue on the plate till its effects be-
come visible on the more tender parts: then the aqua-
fortis should be poured off, the plate washed with clean
water, and dried before the fire: then take a small
pencil dipped into the Venetian varnish, and cover with
it the lighter parts of the plate. This being done, the
aquafortis must again be poured on, and suffered to
continue a longer or shorter time, according to the
strength of the menstruum, or the nature of the engra-
ving; when it must be again poured off as before, and
the plate immediately washed with water.

It may not be improper to observe, that, when the
aquafortis is on the plate, a feather should be used to
cleanse away the foulness of the verdigrease that ga-
thers in the hatches when the aquafortis operates on
them, and to give it more room to exert its action; for
by moving the aquafortis to and fro on the plate by
the feather, and brushing away the black saline matter
where it appears to be formed, the hatches will be
cleaned, and the aquafortis exert its whole force equal-
ly on every part.

The plate being thus sufficiently corroded by the
aquafortis, and well washed with water, it must be
warmed at the fire, and the border of wax removed;
after which, it must be made hotter till the varnish melt:
then it must be well wiped with a linen cloth, and af-
terwards rubbed heartily with oil of olives; when it
will be ready to be retouched and finished by the gra-
ver. See the article ENGRAVING.

ETERNITY, an attribute of God, expressing his
infinite or endless duration.

According to Mr Locke, we come by an idea of
eternity, by being able to repeat any part of time, as
a year, as often as we will, without ever coming to an
end.

ETHELBALD,	} kings of } England.	} See (History of) ENGLAND.
ETHELBERT,		
ETHELRED,		
ETHELWOLF,		

ETHER, is usually understood of a thin, subtle
matter, or medium, much finer and rarer than air; which
commencing from the limits of our atmosphere, pos-
sesses the whole heavenly space.—The word is Greek,
αἰθήρ, supposed to be formed from the verb *αἰθέω*, “to
burn, to flame;” some of the ancients, particularly

† See *Fire*. Anaxagoras, supposing it of the nature of fire †.

The philosophers cannot conceive that the largest
part of the creation should be perfectly void; and there-
fore they fill it with a species of matter under the de-
nomination of *ether*. But they vary extremely as to the

nature and character of this ether. Some conceive it as a
body sui generis, appointed only to fill up the vacuities
between the heavenly bodies; and therefore confined
to the regions above our atmosphere. Others suppose
it of so subtle and penetrating a nature, as to pervade
the air, and other bodies, and possess the pores and
intervals thereof. Others deny the existence of any
such specific matter; and think the air it self, by that
immense tenuity and expansion it is found capable of,
may diffuse itself through the interstellar spaces, and
be the only matter found therein.

In effect, ether, being no object of our sense, but
the mere work of imagination, brought only upon the
stage for the sake of hypothesis, or to solve some phe-
nomenon, real or imaginary; authors take the liberty
to modify it how they please. Some suppose it of an
elementary nature, like other bodies; and only distin-
guished by its tenuity, and the other affections conse-
quent thereon: which is the philosophical ether. O-
thers will have it of another species, and not elemen-
tary; but rather a sort of fifth element, of a purer,
more refined, and spirituous nature, than the substances
about our earth: and void of the common affections
thereof, as gravity, &c. The heavenly spaces being
the supposed region or residence of a more exalted class
of beings, the medium must be more exalted in pro-
portion. Such is the ancient and popular idea of ether,
or ethereal matter. See ETHERIAL.

The term *ether* being thus embarrassed with a va-
riety of ideas, and arbitrarily applied to so many dif-
ferent things; the later and severer philosophers choose
to set it aside, and in lieu thereof substitute other more
determinate ones. Thus, the Cartesians use the term
materia subtilis; which is their ether: and Sir Isaac
Newton, sometimes a *subtile spiritus*, as in the clofe of
his *Principia*; and sometimes a *subtile or ethereal me-
dium*, as in his *Optics*.

The truth is, there are abundance of considerations,
which seem to evince the existence of some matter in
the air, much finer than the air itself. There is an un-
known something, which remains behind when the air
is taken away; as appears from certain effects which
we see produced *in vacuo*. Heat, Sir Isaac Newton
observes, is communicated through a vacuum, almost as
readily as through air: but such communication can-
not be without some interjacent body, to act as a me-
dium. And such a body may be subtle enough to pe-
netrate the pores of glass; and may be very well con-
cluded to permeate those of all other bodies, and con-
sequently be diffused through all the parts of space:
which answers to the full character of an ether †.

† See *Heat*.

The existence of such an ethereal medium being set-
tled, that author proceeds to its properties; inferring
it to be not only rarer and more fluid than air, but
exceedingly more elastic and active: in virtue of which
properties, he shews, that a great part of the pheno-
mena of nature may be produced by it. To the weight,
e.g. of this medium, he attributes gravitation, or the
weight of all other bodies; and to its elasticity, the
elastic force of the air and of nervous fibres, and the
emission, refraction, reflection, and other phenomena
of light; as also, sensation, muscular motion, &c. In
fine, this same matter seems the *primum mobile*, the
first source or spring of physical action in the modern
system.

The

The Cartesian ether is supposed not only to pervade, but adequately to fill, all the vacuities of bodies; and thus to make an absolute plenum in the universe.

But Sir Isaac Newton overturns this opinion, from divers considerations; by shewing, that the celestial spaces are void of all sensible resistance: for, hence it follows, that the matter contained therein must be immensely rare, in regard the resistance of bodies is chiefly as their density; so that if the heavens were thus adequately filled with a medium or matter, how subtle soever, they would resist the motion of the planets and comets much more than quicksilver, or gold.

The late discoveries in electricity have thrown great light upon this subject, and rendered it extremely probable, that the ether so often talked of is no other than the electric fluid, or solar light, which diffuses itself throughout the whole system of nature. See ELECTRICITY, FIRE, HEAT, LIGHT, &c.

ETHER, in chemistry, an exceedingly light, volatile, and inflammable fluid, made by combining ardent spirits with acids. For

ETHER *Marine*. See CHEMISTRY, n° 261.

ETHER *Nitrous*. *Ibid.* n° 218.

ETHER *Saccharine*. *Ibid.* n° 305.

ETHER *Vegetable*. *Ibid.* n° 290.

ETHER *Vitriolic*. *Ibid.* n° 167.

ETHERIAL, ETHERIUS, something that belongs to, or partakes of, the nature of ether. See ETHER. Thus we say, the *etherial space*, *etherial regions*, &c.

Some of the ancients divided the universe, with respect to the matter contained therein, into elementary and ethereal.

ETHERIDGE (Sir George), a celebrated wit and comic genius in the reigns of Charles II. and James II. descended from an ancient family in Oxfordshire, and born in 1636. He travelled in his youth; and, not being able to confine himself to the study of the law, devoted himself to the gayer accomplishments. His first dramatic performance, *The Comical Revenge*, or *Love in a Tub*, appeared in 1664, and introduced him to the leading wits of the time: in 1668, he produced a comedy called *She would if she could*: and, in 1676, he published his last comedy, called *The man of mode*, or *Sir Fopling Flutter*; which is perhaps the most elegant comedy, and contains more of the real manners of high life than any one the English stage was ever adorned with. This piece he dedicated to the beautiful duchess of York, in whose service he then was; and who had so high a regard for him, that when, on the accession of James II. she came to be queen, she procured his being sent ambassador first to Hamburg, and afterwards to Ratibon, where he continued till after his majesty quitted the kingdom. Our author being addicted to certain gay extravagances, had greatly impaired his fortune; to repair which, he paid his addresses to a rich widow: but she, being an ambitious woman, had determined not to condescend to a marriage with any man who could not bestow a title upon her; on which account, he was obliged to purchase a knighthood.

None of the writers have exactly fixed the period of Sir George's death, though all seem to place it not long after the Revolution. Some say, that on this event he followed his master king James into France, and died there; but the authors of the *Biographia Britan-*

nica mention a report, that he came to an untimely death by an unlucky accident at Ratibon; for that after having treated some company with a liberal entertainment at his house there, where he had taken his glass too freely, and being, through his great complaisance, too forward in waiting on his guests at their departure, flushed as he was, he tumbled down stairs and broke his neck, and so fell a martyr to mirth and jollity.

As to Sir George's literary character, he certainly was born a poet, and seems to have been possessed of a genius whose vivacity needed no cultivation; for we have no proofs of his having been a scholar. His works, however, have not escaped censure on account of that licentiousness which in general runs through them, which renders them dangerous to young unguarded minds; and the more so, for the lively and genuine wit with which it is gilded over, and which has therefore justly banished them from the purity of the present stage.

ETHICS, the doctrine of manners, or the science of moral philosophy. The word is formed from *ἠθός*, *ἠθός*, *mores*, "manners;" by reason the scope or object thereof is to form the manners. See MORAL PHILOSOPHY.

ETHIOPIA, a large empire in Africa, formerly bounded on the north, by Egypt; on the west, by Libya Interior; on the east, by the Red Sea; and on the south, by a part of Africa unknown to the ancients; as indeed its boundaries, and the kingdom itself, are to this day very much unknown to our modern geographers. This country had various names given it by the ancients. Sometimes they called it *India*, and the inhabitants *Indians*; which name they applied to many other remote nations. It was likewise denominated *Atlantia* and *Etheria*, and in very early ages *Cephonia*. The most usual name, however, was *Abasene*; a word somewhat resembling *Abassia*, one of the modern names of Ethiopia. On the other hand, we find Chaldaea, Assyria, Persia, &c. styled *Ethiopia* by some authors; and it is certain that the ancients called all those countries extending along the Red Sea, indifferently by the names of *India* and *Ethiopia*. By the Jews it was called *Cush* and *Lulim*.

The history of this country is almost totally unknown, except where its kings had wars with some other nations, as the Egyptians, Jews, or Romans; for an account of which, see the articles EGYPT, JUDAEA, ROME, &c. Concerning the manners and customs of its inhabitants, ancient authors give us the following information.

They had many laws which were very different from those of other nations; especially their laws relating to the election of kings. The priests chose the most reputable men of their body, and drew a large circle around them, which they were not to pass. A priest entered the circle, running and jumping like an *Ægipan* or a satyr. He of those that were inclosed in the circle who first catthed hold of the priest, was immediately declared king; and all the people paid him homage, as a person entrusted with the government of the nation by Divine Providence. The new-elected king immediately began to live in the manner which was prescribed to him by the laws. In all things he exactly followed the customs of the country; he paid

Diod. Sic.
p. 101, 102.

Ethiopia.

Ethiopia.

* Lib. iii.

c. 24.

a most rigid attention to the rules established from the origin of the nation, in dispensing rewards and punishments. The king could not order a subject to be put to death, though he had been capitally convicted in a court of justice. But he sent an officer to him, who showed him the signal of death. The criminal then shut himself up in his house, and was his own executioner. It was not permitted him to fly to a neighbouring country, and substitute banishment for death; a relaxation of the rigour of the law, with which criminals were indulged in Greece.

We have the following extraordinary information with regard to the death of many of their kings.—The priests of Meroë, who had acquired great power there, when they thought proper, dispatched a courier to the king to order him to die. The courier was commissioned to tell him, that it was the will of the gods, and that it would be the most heinous of crimes to oppose an order which came from *them*. Their first kings obeyed these groundless despotical sentences, though they were only constrained to such obedience by their own superstition. Ergamènes, who reigned in the time of Ptolemy the second, and who was instructed in the philosophy of the Greeks, was the first who had the courage to shake off this iniquitous and sacerdotal yoke. Having formed a resolution which was truly worthy of a king, he led an army against Meroë, where, in more ancient times, was the Ethiopian temple of gold. He put all the priests to the sword, and instituted a new worship.

The friends of the king had imposed on themselves a very singular law, which was in force in the time of Diodorus Siculus. When their sovereign had lost the use of any part of his body, by malady, or by any other accident, they inflicted the same infirmity on themselves; deeming it, for instance, shameful to walk straight after a lame king. They thought it absurd not to share with him corporal inconveniences; since we are bound by the ties of mere friendship to participate the misfortunes and prosperity of our friends. It was even customary among them to die with their kings, which they thought a glorious testimony of their constant loyalty. Hence the subjects of an Ethiopian king were very attentive to *his* and their common preservation; and therefore, it was extremely difficult and dangerous to form a conspiracy against him.

The Ethiopians had very particular ceremonies in their funerals. According to Ctesias, after having salted the bodies, they put them into a hollow statue of gold which resembled the deceased; and that statue was placed in a niche on a pillar which they set up for that purpose. But it was only the remains of the richest Ethiopians that were thus honoured. The bodies of the next class were contained in silver statues; the poor were enshrined in statues of earthen ware.

* Lib. iii.
c. 24.

Herodotus * informs us, that the nearest relations of the dead kept the body a year in their houses, and offered sacrifices and first-fruits during that time to their deceased friend; and at the end of the year, they fixed the niche in a place set apart for the purpose, near their town.

The Ethiopians made use of bows and arrows, darts, lances, and several other weapons, in their wars, which they managed with great strength and dexterity. Cir-

cumcision was a rite observed amongst them, as well as among the Egyptians, from very early antiquity; no^t which of these nations first received it, cannot certainly be known. The Ethiopian soldiers tied their arrows round their heads, the feathered part of which touched their foreheads, temples, &c. and the other projected out like so many rays, which formed a kind of crown. These arrows were extremely short, pointed with sharp stones instead of iron, and dipped in the *virus* of serpents, or some other lethiferous poison, inasmuch that all the wounds given by them were attended with immediate death. The bows from which they shot these arrows were four cubits long; and required so much strength to manage them, that no other nation could make use of them. The Ethiopians retreated fighting, in the same manner as the Parthians; discharging volleys of arrows with such dexterity and address whilst they were retiring full-speed, that they terribly galled the enemy. Their lances or darts were of an immense size, which may be deemed a farther proof of their vast bodily strength.

Thus far chiefly with regard to the Ethiopians who lived in the capital, and who inhabited the island of Meroë and that part of Ethiopia which was adjacent to Egypt.

There were many other Ethiopian nations, some of which cultivated the tracts on each side of the Nile, and the islands in the middle of it; others inhabited the provinces bordering on Arabia; and others lived more towards the centre of Africa. All these people, and among the rest those who were born on the banks of the river, had flat noses, black skins, and woolen hair. They had a very savage and ferocious appearance; they were more brutal in their customs than in their nature. They were of a dry austere temperament; their nails in length resembled claws; they were ignorant of the arts which polish the mind: their language was hardly articulate; their voices were shrill and piercing. As they did not endeavour to render life more commodious and agreeable, their manners and customs were very different from those of other nations. When they went to battle, some were armed with bucklers of ox's hide, with little javelins in their hands; others carried crooked darts; others used the bow, and others fought with clubs. They took their wives with them to war, whom they obliged to enter upon military service at a certain age. The women wore rings of copper at their lips.

Diad. Sic.
p. 102.

Some of these people went without clothing. Sometimes they threw about them what they happened to find, to shelter themselves from the burning rays of the sun. With regard to their food, some lived upon a certain fruit, which grew spontaneously in marshy places: some ate the tenderest shoots of trees, which were defended by the large branches from the heat of the sun; and others sowed Indian corn and lots. Some of them lived only on the roots of reeds. Many spent a great part of their time in shooting birds; and as they were excellent archers, their bow supplied them with plenty. But the greater part of this people were sustained by the flesh of their flocks.

The people who inhabited the country above Meroë, made remarkable distinctions among their gods. Some, they said, were of an eternal and incorruptible nature, as the sun, the moon, and the universe; others, having

Ethiopia
Etmüller.

Diod. Sic.
l. 102.

having been born among men, had acquired divine honours by their virtue, and by the good which they had done to mankind. They worshipped Isis, Pan, and particularly Jupiter and Hercules, from whom they supposed they had received most benefits. But some Ethiopians believed that there were no gods; and when the sun rose, they fled into their marshes, execrating him as their cruellest enemy.

These Ethiopians differed likewise from other nations in the honours which they paid to their dead. Some threw their bodies into the river, thinking that the most honourable sepulture. Others kept them in their houses in niches: thinking that their children would be stimulated to virtuous deeds by the sight of their ancestors; and that grown people, by the same objects, would retain their parents in their memory. Others put their dead bodies into coffins of earthen ware, and buried them near their temples. To swear with the hand laid upon a corpse, was their most sacred and inviolable oath.

The savage Ethiopians of some districts gave their crown to him who of all their nation was best made. Their reason for that preference was, that the two first gifts of heaven were monarchy and a fine person. In other territories, they conferred the sovereignty on the most vigilant shepherd; for he, they alleged, would be the most careful guardian of his subjects. Others chose the richest man for their king; for he, they thought, would have it most in his power to do good to his subjects. Others, again, chose the strongest; esteeming those most worthy of the first dignity, who were able to defend them in battle.

Some of the most remarkable of these savage nations the reader may see more particularly described (from the above quoted authors), at the words ACRIOPHAGI, HYLOGONES, HYLOPHAGI, ICHTHYOPHAGI, RHIZOPHAGI, STRUTHOPHAGI, and TROGLODYTES.

The empire of Ethiopia is now called *Abyssinia*; but very little either is or can be known concerning it, because the emperors will not allow any European to enter their dominions. This is entirely owing to the jesuit missionaries, who for some time resided in that country. They were totally expelled about the middle of the last century; no doubt for very good reasons, tho' they themselves did not think proper to relate them. The most probable accounts of the present state of Ethiopia may be seen under the article *ABYSSINIA* and *AFRICA*.

ETHIOPS ANTIMONIAL, MARTIAL, and MINERAL.

See **PHARMACY**, n° 736, b. 752, 804.

ETHMOIDES os. See **ANATOMY**, n° 16.

ETNA, or Mount **GIBELLA**, in Sicily. See **ÆTNA**.

ETMULLER (Michael), a most eminent physician, born at Leipzig in 1646. After having travelled through the greatest part of Europe, he became professor of botany, chemistry, and anatomy; at Leipzig, where he died in 1683. He was a very voluminous writer; his works making no less than 5 vols folio, as printed at Naples in 1728. His son Michael Ernest Etmüller was also an ingenious physician, who published several pieces, and died in 1732.

ETOLIA, a country of ancient Greece, comprehending all that tract now called the *Despotat*, or *Little*

Etolia.

Greece. It was parted on the east by the river Evenus, now the Fidiari, from the Locrenses Ozolæ; on the west, from Acarnania by the Achelous; on the north, it bordered on the country of the Dorians and part of Epirus; and, on the south, extended to the bay of Corinth.

The Etolians were a restless and turbulent people; seldom at peace among themselves, and ever at war with their neighbours; utter strangers to all sense of friendship, or principles of honour; ready to betray their friends upon the least prospect of reaping any advantage from their treachery: in short, they were looked upon by the other states of Greece no otherwise than as outlaws and public robbers. On the other hand, they were bold and enterprising in war; inured to labour and hardships; undaunted in the greatest dangers; jealous defenders of their liberties, for which they were, on all occasions, willing to venture their lives, and sacrifice all that was most dear to them.

They distinguished themselves above all the other nations of Greece, in opposing the ambitious designs of the Macedonian princes; who, after having reduced most of the other states, were forced to grant them a peace upon very honourable terms. The constitution of the Etolian republic was copied from that of the Achæans, and with a view to form, as it were, a counter alliance; for the Etolians bore an irreconcilable hatred to the Achæans, and had conceived no small jealousy at the growing power of that state. The Cleonic war, and that of the allies, called the *social war*, were kindled by the Etolians in the heart of Peloponnesus, with no other view but to humble their antagonists the Achæans. In the latter, they held out, with the assistance only of the Eleans and Lacedæmonians, for the space of three years, against the united forces of Achaia and Macedon; but were obliged at last to purchase a peace, by yielding up to Philip all Acarnania. As they parted with this province much against their will, they watched all opportunities of wresting it again out of the Macedonian's hands; for which reason they entered into an alliance with Rome against him, and proved of great service to the Romans in their war with him: but growing insolent upon account of their services, they made war upon the Romans themselves. By that warlike nation they were overcome, and granted a peace on the following severe terms: 1. The majesty of the Roman people shall be revered in all Etolia. 2. Etolia shall not suffer the armies of such as are at war with Rome to pass through her territories, and the enemies of Rome shall be likewise the enemies of Etolia. 3. She shall, in the space of 100 days, put into the hands of the magistrates of Corcyra all the prisoners and deserters she has, whether of the Romans or their allies, except such as have been taken twice, or during her alliance with Rome. 4. The Etolians shall pay down in ready money, to the Roman general in Etolia, 200 Euboic talents, of the same value as the Athenian talents, and engage to pay 50 talents more within the six years following. 5. They shall put into the hands of the consul 40 such hostages as he shall choose; none of whom shall be under 12, or above 40, years of age: the pretor, the general of the horse, and such as have been already hostages at Rome, are excepted out of this number. 6. Etolia shall renounce all pretensions to the cities and territories which the Ro-

Ro-

Etolia. Romans have conquered, though those cities and territories had formerly belonged to the Etolians. 7. The city of Oenis, and its district, shall be subject to the Acarnanians.

After the conquest of Macedon by Paulus Æmilius, they were reduced to a much worse condition; for not only those among them, who had openly declared for Perseus, but such as were only suspected to have favoured him in their hearts, were sent to Rome, in order to clear themselves before the senate. There they were detained, and never afterwards suffered to return into their native country. Five hundred and fifty of the chief men of the nation were barbarously assassinated by the partisans of Rome, for no other crime but that of being suspected to wish well to Perseus. The Etolians appeared before Paulus Æmilius in mourning habits, and made loud complaints of such inhuman treatment; but could obtain no redress: nay, ten commissioners, who had been sent by the senate to settle the affairs of Greece, enacted a decree, declaring, that those who were killed had suffered justly, since it appeared to them that they had favoured the Macedonian party. From this time those only were raised to the chief honours and employments in the Etolian republic, who were known to prefer the interest of Rome to that of their country; and as these alone were countenanced at Rome, all the magistracies of Etolia were the creatures and mere tools of the Roman senate. In this state of servile subjection they continued till the destruction of Corinth, and the dissolution of the Achæan league; when Etolia, with the other free states of Greece, was reduced to a Roman province, commonly called the *province of Achaia*. Nevertheless, each state and city was governed by its own laws, under the superintendency of the pretor whom Rome sent annually into Achaia. The whole nation paid a certain tribute, and the rich were forbidden to possess lands any-where but in their own country.

In this state, with little alteration, Etolia continued under the emperors, till the reign of Constantine the Great, who, in his new partition of the provinces of the empire, divided the western parts of Greece from the rest, calling them *New Epirus*, and subjecting the whole country to the *præfatus prætorii* for Illyricum. Under the successors of Constantine, Greece was parcelled out into several principalities, especially after the taking of Constantinople by the Western princes. At that time, Theodorus Angelus, a noble Grecian, of the imperial family, seized on Etolia and Epirus. The former he left to Michael his son; who maintained it against Michael Palæologus, the first emperor of the Greeks, after the expulsion of the Latins. Charles, the last prince of this family, dying in 1430, without lawful issue, bequeathed Etolia to his brother's son, named also Charles; and Acarnania to his natural sons, Memnon, Turnus, and Hercules. But, great disputes arising about this division, Amurath II. after the reduction of Thessalonica, laid hold of so favourable an opportunity, and drove them all out in 1432. The Mahometans were afterwards dispossessed of this country by the famous prince of Epirus, George Castriot, commonly called *Scanderbeg*; who, with a small army, opposed the whole power of the Ottoman empire, and defeated those barbarians in 22 pitched battles. This hero, at his death, left

great part of Etolia to the Venetians; but, they not being able to make head against such a mighty power, the whole country was soon reduced by Mohammed II. whose successors hold it to this day.

Etymology
||
Evagrius.

ETYMOLOGY, that part of grammar which considers and explains the origin and derivation of words, in order to arrive at their first and primary signification, whence Quintilian calls it *originatio*.—The word is formed of the Greek *ετυμολογία*, *verus*, "true," and *λογος*, *dico*, "I speak;" whence *λογος*, *discourse*, &c.; and thence Cicero calls the etymology, *notatio*, and *veriloquium*: though Quintilian chooses rather to call it *originatio*.

A judicious inquiry into etymologies, is thought by some of considerable use; because nations, who value themselves upon their antiquity, have always looked on the antiquity of their language as one of the best titles they could plead; and the etymologist, by seeking the true and original reason of the notions and ideas fixed to each word and expression, may often furnish an argument of antiquity, from the traces remaining thereof, compared with the ancient uses. Add, that etymologies are necessary for the thorough understanding of a language. For, to explain a term precisely, there seems a necessity of recurring to its first imposition, in order to speak justly and satisfactorily thereof. The force and extent of a word is generally better conceived when a person knows its origin and etymology.

It is objected, however, that the art is arbitrary, and built altogether on conjectures and appearances; and the etymologists are charged with deriving their words from where they please. And indeed it is no easy matter to go back into the ancient British and Gaulish ages, and to follow, as it were, by the track, the various imperceptible alterations a language has undergone from age to age; and as those alterations have sometimes been merely owing to caprice, it is easy to take a mere imagination or conjecture for a regular analogy: so that it is no wonder the public should be prejudiced against a science which seems to stand on so precarious a footing. It must certainly be owned, that etymologies are frequently so far fetched, that one can scarce see any resemblance or correspondence therein. Quintilian has shewn, that the ancient etymologists, notwithstanding all their learnings, fell into very ridiculous derivations.

The etymologies of our English words have been derived from the Saxon, Welch, Walloon, Danish, Latin, Greek, &c.

In this work the etymologies of terms are generally noted, where their obviousness does not render it unnecessary, or their dubiety or unimportance useless.

EVACUANTS, in pharmacy, are properly such medicines as diminish the animal fluids, by throwing out some morbid or redundant humour; or such as thin, attenuate, and promote the motion and circulation thereof.

EVACUATION, in medicine, the art of diminishing, emptying, or attenuating, the humours of the body.

EVAGRIUS SCHOLASTICUS, a famous historian, born at Epiphania, about the year 536. He practised the profession of an advocate, from which he was called *Scholasticus*, which name was then given to the pleaders

Evangelist
Evaporation.

Evaporation.

pleaders at the bar. He was also tribune and keeper of the prefect's dispatches. He wrote an ecclesiastical history, which begins where Socrates and Theodoret ended theirs; and other works, for which he was rewarded by the emperors Tiberius and Mauricius. M. de Valois published at Paris a good edition of Evagrius's ecclesiastical history, in folio; and it was re-published at Cambridge in 1620, in folio, by William Reading, with additional notes of various authors.

EVANGELIST, a general name given to those who write or preach the gospel of Jesus Christ.

The word is of Greek origin, signifying one who publishes glad tidings, or is the messenger of good news.

According to Hooker, evangelists were presbyters of principal sufficiency, whom the apostles sent abroad, and used as agents in ecclesiastical affairs, wherever they saw need.

The term *evangelist*, however, is at present confined to the writers of the four gospels.

EVANID, a name given by some authors to such colours as are of no long duration, as those in the rainbow, in clouds before and after sun-set, &c.

Evand colours are also called *fantastical* and *emphatical* colours.

EVANDER, a famous Arcadian chief, called the son of Mercury, on account of his eloquence, bought a colony of his people into Italy, about sixty years before the taking of Troy; when Faunus, who then reigned over the Aborigines, gave him a large extent of country, in which he settled with his friends. He is said to have taught the Latins the use of letters, and the art of husbandry.

EVANTES, in antiquity, the priestesses of Bacchus, thus called, by reason, that in celebrating the orgia, they ran about as if distracted, crying, *Évan, évan, ohé évan*. See BACCHANALIA.

EVAPORATION, in natural philosophy, is the dissipation of the parts of any substance either solid or fluid into the air, in the form of smoke, or otherwise, in an invisible manner, so that the substance evaporated then forms a fluid of equal subtilty and transparency with air itself.

When any substance is dissipated slowly and insensibly by simple exposure to the atmosphere, as water, camphor, &c. the evaporation is said to be *spontaneous*.

Evaporation, in all cases, is greatly promoted by heat. Many substances may be made to evaporate by means of a strong fire, which otherwise appear absolutely fixed; and there are but few which can resist the violent action of the focus of a large burning mirror, without being in great part dissipated.

The degree of heat in which different bodies begin sensibly to evaporate is very different. When fluids of all kinds have been heated to a certain degree, their evaporation is attended with great intestine motion called *boiling*; and as then the dissipation becomes much more sensible than before, this degree of heat is called their *evaporific point*; but improperly, for they begin sensibly to evaporate long before.

The boiling point of all fluids is by no means the same; and the degree of heat which would cause the most fusible metal to boil, is prodigiously greater than

what would dissipate the most fixed and ponderous fluid with the utmost rapidity. Vitriolic, and especially nitrous ether, boil with a heat very little greater than that of our atmosphere in summer. Spirit of wine requires Fahrenheit's thermometer to be raised 175 degrees above 0, before it boils; water requires 212 of the same degrees; oil of vitriol 550, oil of turpentine 560, quicksilver and linseed oil 600, before they boil.

The quantity of any substance evaporated is found to depend so much on the degree of heat applied to it, that heat alone is generally reckoned to be the sole cause of evaporation. Many perplexing circumstances, however, occur, when we attempt to explain the manner in which a body, water for instance, naturally 800 times heavier than air, should become so much specifically lighter, as to be carried up by it to a very considerable height. One of the most generally received opinions concerning the formation of vapour is that adopted by Dr Halley. He supposes that a bubble, composed of a particle of air inclosed by a thin film of water is rarefied by heat to such a degree, that it becomes specifically lighter than common air; in consequence of which, such particles, whatever be their number, must ascend, and be suspended in the air when they arrive at such an height as to find the atmosphere precisely of the same specific gravity with themselves. But many objections may be made to such a theory. For though a great quantity of air is dispersed in water, it is not easy to account for the formation of a bubble distinct from the mals of water; nor, though we could account for this, ought it to be taken for granted without sufficient proof; and it remains to be explained by what means these bubbles would ascend into the air; because, by reason of their extreme small size, the cold of the external air would almost instantly reduce the rarefied air-bubble to the same specific gravity with itself. The bubble would then become specifically heavier than the atmosphere, and immediately fall down; so that vapour, instead of rising to the height of two or three miles, could scarce rise to the height of as many feet.

Another theory, from the expansion of water, is adopted by Dr Desaguliers, who reasons as follows: "Water is expanded by heat; and supposing it to be expanded to a bulk more than 800 times greater than in its usual state, it becomes specifically lighter than common air, and must consequently rise in it till it meet with air above its own degree of rarefaction." To illustrate this, he observes, that boiling water, when it becomes vapour, is expanded to a bulk 14,000 times greater than when cold; and to account for evaporation in the ordinary heat of our atmosphere, he takes it for granted, that the degree of expansion is strictly proportioned to the degree of heat; from which he calculates thus. "In Sir Isaac Newton's scale, the heat of boiling water is 34; the mean heat of summer, 5; the mean heat of spring and autumn, 3; and the mean heat of winter, 2. Therefore, if the expansion of water by 34 degrees of heat be 14,000, the expansion by 5 degrees will be 2,058; by 3 degrees 1,235; and by 2, the mean heat of winter, it will be 823; which is sufficient to raise vapour, the usual density of which is to that of air as 800 to 1.

This theory is liable to the same objections with the

Degrees of heat requisite to make different fluids boil.

Evapora-
tion.Evapora-
tion.

former, and indeed to much greater : For if, even by the heat of winter, water is expanded so much that it becomes specifically lighter than air, by what force is it kept below, contrary to the laws of gravity ? Or, supposing it once lodged in the air ; how is it to be kept there ; seeing the superior air must very soon restore it to the same degree of heat with itself ; upon which it must immediately descend ?

4
Lord
Kaims's and
Professor
Hamilton's
theory.

To avoid the difficulties to which the abovementioned theories are liable, another hath been published by lord Kaims and professor Hamilton. They account for evaporation on the principle of elective attraction, and then solve the natural phenomena in the following manner. 1. " By an elective attraction between air and water, there is always a quantity of air in water and of water in air. 2. When water is saturated with air, it will take up no more ; and, in like manner, air saturated with water attracts no more. 3. This power of elective attraction is augmented by heat ; for after air is saturated with water, or water with air, they will attract more by increasing their heat. 4. The air with its moisture being rarefied by heat, ascends to a higher region, giving place to purer air not yet saturated, which accordingly attracts more moisture, and water by that means is diffused thro' the air. 5. The grosser particles of water, swimming in the air, being accumulated by wind, especially contrary winds, become visible clouds, and fall down in rain by the force of gravity overcoming the elective attraction. 6. Cold also contributes its part, by condensing the watery particles, which fall down in snow when the cold is violent ; and by these means a constant circulation of moisture is carried on."

This hypothesis is also liable to be overthrown : for, according to it, evaporation ought not to take place *in vacuo* ; which is contrary to experience.—The answer given by lord Kaims to this objection is a denial of the fact. Professor Hamilton owns the dissipation of water by heat *in vacuo* ; but denies that this is really evaporation, which he maintains to be a true solution of water in air ; and as a proof of this, he put some water well purged of air under the exhausted receiver of an air-pump, and found that it lost only 2½ grains in the same time that an equal quantity exposed to the air lost 35 grains.

5
Mr Watt's
experiment
concerning
the evapo-
ration of
water *in
vacuo*.

That water can be converted into steam *in vacuo*, cannot be denied without the greatest scepticism. It is even found much more easily dissipated *in vacuo* than when exposed to the open air, and boils with much less heat ; 92 or 95 degrees being sufficient to make water boil *in vacuo*, whereas it requires 212° to make it boil when exposed to the air. Concerning this, Dr Black relates the following experiment.

Mr Watt of Glasgow, having formed a project of performing the evaporation of water *in vacuo*, with a view to convert it into steam with less expence of fuel, communicated his scheme to the doctor. The experiment was made with a small still resembling the body of a retort, with a vessel serving as a condenser. The whole apparatus was close, except a little hole at the extremity of the condensing vessel. Into this distilling vessel a quantity of water was put : it was then exhausted of air, by taking the condensing vessel, and holding it up, that the retort might be undermost. Being held over the fire in this position, the

whole was soon filled with steam, which expelled the air ; and upon stopping the little hole, a pretty perfect vacuum was formed in the retort and condensing vessel. The distilling vessel being then set upon the fire, and the condensing vessel plunged in cold water, the water in the still began to boil, as might be known by the noise, with a degree of heat very little greater than that of the human body, and the steam came over, and was condensed in the refrigeratory ; but Mr Watt observed that the evaporation was not quicker *in vacuo*, than when air was admitted.

Thus we see that water may be converted into steam by the effect of heat alone, without the assistance of air ; and thus the hypothesis of lord Kaims falls to the ground. Professor Hamilton's experiment is evidently inconclusive, because it does not appear to have been fairly made. He put a certain quantity of water under an exhausted receiver for 24 hours, and exposed an equal quantity to the air in the same room ; the first lost 2½ grains, the latter 35. From this we can conclude nothing but that the quantity of fluid, whatever it is, which remains after the receiver of an air-pump is exhausted, is capable of taking up 2½ grains of water. As no more of this fluid could be admitted to the water, than the precise quantity contained in the receiver, it is plain, that the other quantity of water which was exposed to the open air of a room, ought to have been included within a receiver of the same size with the first, from which the air was not exhausted : for in the manner wherein this experiment was conducted, an immense quantity of air had access to one vessel, and only as much as could be contained in the receiver of an air-pump, of the medium remaining after the air is exhausted, had access to the other ; so that it would have been very absurd to expect the same result in both cases. Even circumstanced as the experiment is, it makes directly against that hypothesis which the professor is desirous of supporting ; for, as the air-pump he made use of was capable of rarefying the air two and forty times, had the evaporation depended on the small quantity of air which was left in the receiver, only the two and fortieth part ought to have been dissipated of what would have been lost had the water been placed under a receiver full of air. Instead of this, a like quantity of water exposed to the air contained in a large room, lost only 14 times as much. Had the vacuum of the receiver been as large as the room, it is impossible to say how much would have been lost ; and the only conclusion we can draw is, that the air, however necessary to the ascent of vapour, is in reality prejudicial to its first formation.

A very remarkable circumstance concerning the evaporation of fluids is, that some degree of cold is al-
ways produced in consequence of it ; and by means of
some of the more volatile ones, a great degree of cold
is produced. If some vitriolic ether is put into a vial,
set in a small vessel of water, and the whole placed un-
der an air-pump, the ether boils violently as soon as
the air is exhausted, while the water is frozen by the
cold produced in consequence of its evaporation. This
circumstance hath been made use of as a proof that
evaporation is not occasioned by heat ; and the sensible
coldness of vapour has been thought a demonstration
that heat could by no means be concerned in its for-
mation. Dr Black, however, who treats particu-
larly

6
Professor
Hamilton's
experi-
ments in-
conclusive.

7
deduced by e-
vaporation.

Evapora-
tion.

ly of the formation of vapour, hath accounted for this in a very satisfactory manner; and gives heat, in a certain degree, as the cause of evaporation in all cases whatever.

8
Dr Black's
account of
sensible and
latent heat.

This gentleman is of opinion, that all fluid substances, besides the heat contained in them capable of affecting our senses or a thermometer, contain a certain quantity united to them in such a manner as not to be discoverable by either of these methods; which, however, on certain occasions, is apt to break forth, and shew its proper qualities as heat or fire. These two different states of this fluid, he distinguishes by the names of *sensible* and *latent* heat.—A proof that heat exists in this latent state, he gives from a mixture of ice with hot water. He observes, that, when two equal masses of the same matter heated to different degrees, are mixed together, the heat of the mixture ought to be an arithmetical mean betwixt the two extremes. But, on pouring hot water upon ice, he found the case to be considerably different, and that a quantity of heat was entirely lost; which he could account for in no other manner than by supposing, that it entered into the composition of the water, in such a manner as to be in a latent state, and the invisible cause of the fluidity of that element. (See FLUIDITY).

9
Of the for-
mation of
vapour.

What happened in this case, to a mixture of ice and water, the doctor thinks, always happens on the conversion of water into steam or vapour by means of heat: a great quantity of the heat thrown into the fluid enters into it when in the state of vapour, and forms a part of the fluid itself; in which state it is not discoverable either by the thermometer or by the touch, but yet is ready to appear again in its proper form when the vapour is condensed.

The most conclusive experiments, mentioned by Dr Black, as a proof of this theory, are, that hot water put under the exhausted receiver of an air-pump boils with great violence, and a part of it is suddenly dispersed in vapour. During this time the water itself cools remarkably fast, a part of the heat disappears, and is neither to be found in the steam nor in the water. What then has become of it? The doctor concludes it still exists in the steam, though in a latent state, and not to be discovered by the common methods.

In this manner, likewise, he accounts for the above-mentioned experiment of the water freezing under an exhausted receiver, in consequence of the evaporation of the ether.—This fluid being so extremely volatile that it went off in vapour when the temperature of the air was only 50°, absorbed the sensible heat of the surrounding water, which entered into the composition of the ethereal vapour, and there remained in a latent state. Certain it is, that, in this experiment, there was no perceptible increase of heat either in the ether or its vapour; the water indeed lost heat considerably, but neither of these gained it.

The element of fire, however, is so exceedingly subtle, and so much eludes our most diligent search, that we cannot conclude from its disappearance in one place, that it has imperceptibly occupied another; the doctor, therefore, has yet a stronger argument in favour of his theory. He maintains, that, in the condensation of steam by the refrigeratory of a common still, as much heat is communicated to the water in the refrigeratory

as would be sufficient to heat the water which comes over to the heat of red-hot iron, were it all to exist in it in the form of sensible heat. Nevertheless, the steam is at no time hotter than the boiling water which emits it. The excess of heat, therefore, must have existed in the steam in a latent state, and become sensible during the condensation.

The method of calculating this quantity of heat is very easy. For, supposing the refrigeratory to contain 100 pounds of water, and that one pound has been distilled: If the water in the refrigeratory has received 10 degrees of heat during the distillation, we know that the one pound distilled has parted with 1000. If, in passing through the worm of the refrigeratory, it has been reduced to the temperature of 50° of Fahrenheit's; having been at 212 when it entered the worm in form of steam, it has lost only 162° of sensible heat; all the rest of that heat which it communicated to the refrigeratory, amounting to above 800°, was contained in it while in the form of steam, in such a state as not to be indicated by the thermometer.

By calculating in this manner, the doctor generally found, that the heat communicated by the steam was about 800 degrees; which would have been sufficient to render a mass of iron equal in bulk to the water which came over, red-hot. In the experiment made by Mr Watt, no less than 1000 degrees were communicated; though, all the time, the steam came over with a very gentle heat, but little superior to what the hand could bear.

This experiment, no doubt, unanswerably confirms the doctor's theory of heat. It is proper, however, to take notice, that a deception may very easily take place with such as repeat the experiment in a careless manner.—The upper part of the water in a refrigeratory grows very hot, while the under part is quite cold; and if a thermometer is plunged into it without stirring the water, a much greater degree of heat will be thought to be communicated than really there is. To avoid this mistake, it is necessary to stir the water well about, and then measure its degree of heat.

This theory of *sensible* and *latent* heat, so well established, cannot but be looked upon as a valuable discovery in natural philosophy; and will enable us to give a more satisfactory account of the formation of vapour when strong degrees of heat are applied, as well as in the common heat of our atmosphere, than any that hath hitherto been published. We shall begin with the conversion of any fluid, water, for instance, into vapour, when such a degree of heat is applied as to make it boil.

Here, the water has already received the utmost degree of heat which it is capable of containing. When a larger quantity continues still to be thrown in, it must either pass, through the substance of the water and be dissipated in the air, or combine with the aqueous particles in the form of steam. That the extreme agility of heat causes great part of it to pass through the water and be lost, cannot be denied; but it is also evident, that a very considerable part combines with the substance of the water, and is converted into vapour. The action of boiling consists in the ascent of a great number of bubbles from the bottom of the vessel containing the water. These, growing continually larger as they ascend, break on the surface of the water, and

Evapora-
tion.

10
How boiling
water
is converted
into steam.

Evapora-
tion.* See
Boiling.

are found to be composed of steam or vapour *. As they continue till the evaporation of the very last drop of water, long after it has parted with all its air, this cannot be supposed to have any share in their formation. Indeed, Dr Boerhaave and others have proved, that there is no air contained in them; and both Dr Black and Professor Hamilton have shewn, that they are the very fluid which is dissipated in the form of smoke. If, therefore, steam exists, and appears in its own proper form, when the air has no access to it, which it has not till the bubble ascends to the top and breaks in the air, it is impossible that air can have a share in its formation; though by its superior gravity it is the sole cause of its ascent.

If we are inclined, then, to call vapour a solution of water in any thing, it must be in heat, or fire; seeing, according to professor Hamilton himself, it appears in the proper form of vapour before it has had any connection with the air.

11
Spontaneous evaporation accounted for.

* See Congelation, and Fluidity.

Upon the same principles we may easily account for the spontaneous or insensible evaporation of water when a degree of heat much less than that requisite to cause it boil is applied to it. From Dr Black's experiments it appears *, that a certain degree of heat is necessary to keep it in a fluid state; and whatsoever degree is applied to it superior to that absolutely necessary to keep it fluid, appears to be but loosely connected with it, so that the water will very readily part with this superfluous degree of heat to any colder body that comes in contact with it. Water in its fluid state, then, we may consider as a kind of compound, consisting of the pure element, and a certain quantity of heat so loosely combined with it as to affect the thermometer; but it is impossible that two substances having a tendency to mutual union can fail to be united in the closest manner of which they are capable when brought very near or in contact with each other. The water, therefore, having a constant tendency to absorb the sensible heat, and convert it into latent heat, must continue to do so more or less slowly according to the quantity contained in it. By this means there is a proportional quantity of vapour formed; for we must remember, that when heat and water are combined in the most intimate manner, they form a new substance totally different from water in its elementary state. The particles of vapour thus formed, must necessarily ascend to the surface of the water, and thence into the air, for the reasons already mentioned; and thus there will be a constant exhalation from the surface of water, when the atmosphere is of such a temperature as to keep it fluid.

12
Why there is an evaporation from ice.
* See Congelation.

It now remains to account for the evaporation of water from ice; when the atmosphere is of such a nature as to deprive the water of great part of its sensible heat, and reduce it to a solid form. From a very curious experiment *, Dr Black hath shewn, that, in the act of freezing, the latent heat of the water is called forth, and becomes sensible. The ice, therefore, during the process of congelation, is always a little warmer than the external air. In this case then, with regard to the external atmosphere, it may be considered as similar to water having a small fire under it, so as to make it a degree or two warmer than the surrounding atmosphere. The consequence of this would be, that the freezing water would communicate part of

its sensible heat to the air, and another part would intimately combine with the aqueous particles, and form a vapour which would be carried up into the atmosphere. In like manner, the piece of ice, having a degree of sensible heat superior to that of the air, will communicate to it part of that heat; while another part, from its strong tendency to unite with the water, will undoubtedly do so in its passage from the ice into the air, and carry off part of the aqueous particles in an imperceptible vapour.

Thus, according to Dr Black's theory, whether the degree of heat contained in the atmosphere is greater or less than that of water, there must be a continual evaporation of that fluid. There is only one case, upon his principles, where the evaporation must be little or nothing; and that is, when a piece of ice is in the action of melting. Here the water indeed receives heat from the atmosphere; but as fast as it is received, it passes from a sensible into a latent state; and, till the water is saturated with latent heat, very little sensible heat can combine with the aqueous particles, so as to form them into steam. In this instance likewise, the Doctor's theory is verified by experience; for professor Hamilton having inclosed a piece of ice, while thawing, in an exhausted receiver, and likewise in one full of air, found that it lost nothing by evaporation in 24 hours.

From some experiments made by the Abbe Nollet, it appears, that evaporation is promoted by electricity. The consequences of his experiments are as follow.

13
Evaporation promoted by electricity.

1. Electricity augments the natural evaporation of fluids; all that were tried, except mercury and oil, were found to suffer a diminution greater than what could be ascribed to any other cause.

2. Electricity augments the evaporation of those fluids the most, which are most subject to evaporate of themselves; the volatile spirit of sal ammoniac, suffering a greater loss than spirit of wine or oil of turpentine, these two more than common water, and water more than vinegar or the solution of nitre.

3. The effects seemed always to be greater when the vessels containing the fluids were non-electrics.

4. The increased evaporation was more considerable when the vessel which contained the liquor was more open; but the effects did not increase in proportion to the apertures.

5. Electricity was also found to increase the evaporation of moisture from solid bodies, and of consequence to increase the insensible perspiration of animals *.

* See Electricity.

As the electric fluid is generally thought to be the same with the element of fire, it cannot be thought that this discovery can be any objection to Dr Black's theory of the formation of vapour, but must rather tend to confirm it; as the phenomena of electricity present us with fire in a state wherein it has no sensible heat, and which, agreeable to the Doctor's mode of expression, may very properly be called its *latent state*. The very great readiness which this fluid tends to be converted into actual fire, so as even to fuse metals, may also be reckoned a kind of demonstration of the facility wherewith the sensible heat of any body may become latent, or the latent heat sensible.

Evaporation by means of heat, is one of the capital operations in chemistry; and where very great quantities of water are to be dissipated, as in the making of com-

Evapora-
tion.

common salt and green vitriol, it is a matter of no small consequence to contrive the evaporating vessels in such a manner as to dissipate a large quantity of liquid in a short time, and with little fuel. In the warmer countries, salt is made by the heat of the sun alone; and even in the southern parts of England, the heat of the solar rays is advantageously used to concentrate the brine ‡. This, however, can be but very seldom practised, and artificial evaporation is almost the only kind made use of in this country. The two great requisites for promoting this, are, a sufficient degree of heat to form a large quantity of steam, and a current of air to carry it off; for, though the vapour is always formed by the heat, yet if the air stagnates on the surface of the fluid, that part next the surface is heated to such a degree, and so loaded with smoke, that the succeeding quantities of vapour are very considerably retarded in their ascent. For this reason, evaporation is greatly promoted, by having as large a surface of fluid exposed to the air as possible, that the ascent may be very quick; and where it is possible to procure a considerable blast of air along the surface of the vessel containing the fluid, it will very much accelerate the dissipation of it. On the same account, blowing air through the water while evaporating, increases the quantity of vapour to a surprising degree. It is obvious, however, that, by either of these methods, only time can be saved: for as the blast of cold air, whether directed along the surface of the fluid, or into its substance, will diminish the heat considerably; though the evaporation goes on very fast, yet a proportionable quantity of fuel will be required; and it is doubtful whether this method might in the end be attended with all the advantages promised by it at first view.

Broad shallow vessels have likewise been found greatly to contribute to the quickness of evaporation, and thought to lessen the expence of fuel. That they do accelerate the ascent of the vapour is certain, because the air has more free access to the fluid than in a deeper vessel; but it is by no means clear that the quantity of fuel is thus lessened: on the contrary, there is great reason to suspect, that a considerably larger proportion of fuel must be employed to evaporate an equal quantity of fluid in a wide shallow vessel, than in a deeper one. They have moreover this great inconvenience, that, if their size be very large, it is in a manner impossible to make the fire act equally on the bottom of them; and the great expence attending the making of these kind of vessels, together with the danger of the fluid being mixed with accidental impurities from their wide-extended surface, forbids their use, except on particular occasions.

One great objection, however, to quick evaporation in any kind of vessel is, that this process is carried on for the sake of the residuum; and if the liquor is made to boil with great violence, part of this residuum will be carried away and dissipated in the air: what remains also will often be considerably different from what it would have been had the process been conducted in a slow and gentle manner. Vitriolated tartar is remarkably affected by quick evaporation. Neuman relates, that by strong continued boiling, it may be almost entirely dissipated along with the steam; and yet this salt, the most ponderous of all others, is composed of a very fixed acid, viz. the vitriolic, and a fixed alkali.

To obviate this inconvenience, chemical evaporations are generally ordered to be performed with a very gentle heat; by which means the dissipation of the saline matter is in a great measure, though not totally, prevented; for this seems somehow to depend on the action of the air. The great length of time, however, which this takes up, and the difficulty of preserving the liquid from accidental impurities, render evaporations in this manner sufficiently disagreeable.

A very strange difficulty occurs in attempting evaporations in this manner. If a saline solution is put into any kind of vessel wider at top than at bottom, and set to evaporate with a heat below what is sufficient to make it boil, the salt seems to disengage itself from the water, and ascends along the sides of the evaporating vessel in the form of a ring, which grows gradually higher and higher, till it comes to the top: it will then descend on the other side of the vessel, till it has got low enough to form a kind of syphon, from whence a great part of the solution will be insensibly drained off and lost: neither is there a possibility of preventing this saline concretion; for though you put it down ever so often, it very soon forms again. To remedy this inconvenience, Dr Black recommends the use of evaporating vessels wider at bottom than at the top; where some quantity of vapour would always be condensing and running down their sides, so as to dissolve the saline ring as soon as it began to form. It is evident, however, that by this method the evaporation would be rendered still slower than before.

On many accounts, distillation seems to be the most advantageous method of evaporating fluids, particularly as it both prevents any of the salts they may contain from being dissipated, and seems to be the method by which the largest quantities of liquid can be evaporated in the shortest time, and with least fuel. It is well known, that water in a still, or any covered vessel, can be kept boiling with much less heat than an equal quantity in an uncovered vessel. As the quantity of steam is the same that arises from an equal surface of water where the heat is the same, whether the vessel is covered or uncovered; it follows, that if proper vent is given to the steam in a covered vessel, an equal quantity will be raised in a close vessel with less fuel than in an open one; and, with an equal quantity of fuel, much more might be evaporated, in the same time, in a close than in an open vessel. This seems confirmed by what Dr Hales has advanced in his experiments concerning the freshening of sea-water. He has found, that, by blowing air through the water contained in a still, it is made to yield double the quantity which it otherwise would do. By this method, he observes, a still which holds 20 gallons, will yield, in 20 hours, 240 gallons of distilled water; and one which holds only five gallons, may be made to distil 64, in the same time. These are prodigious quantities; and which, we believe, could not be made to arise in an equal time from open vessels of the same size, by any manœuvre whatever. Even deducting one half for the action of the bellows, the quantity is exceedingly great, being upwards of a gallon and an half per hour from a vessel holding only five gallons; and how difficult it would be to make this quantity arise from an open vessel of such a size, those who are much concerned in evaporation will easily know. See Distillation,

Evapora-
tion.

‡ See Salt.

74
Methods of
evaporating
great quan-
tities of li-
quid in a
short time.

16
Distillation
the best me-
thod of eva-
porating.

15
Salts diffi-
culty by
very quick
evapora-
tion.

EVATES
||
Euclid.

Stillation under CHEMISTRY, n° 75.

EVATES, a branch or division of the druids, or ancient Celtic philosophers. Strabo divides the British and Gaulish philosophers into three sects; bards, evates, and druids. He adds, that the bards were the poets and musicians; the evates, the priests and naturalists; and the druids were moralists as well as naturalists: But Marcellus and Hornius reduce them all to two sects, *viz.* the BARDS and DRUIDS.

EUBAGES, an order of priests, or philosophers, among the ancient Cætae or Gauls: some will have the eubages to be the same with the druids and faronidæ of Diodorus; and others, that they were the same with what Strabo calls EVATES.

EUCCHARIST, the sacrament of the Lord's supper, properly signifies *giving thanks*.—The word in its original Greek, *Εὐχαριστία*, literally imports *thanksgiving*; being formed of *eu*, *bene*, "well," and *χαρις*, *gratia*, "thanks."

This sacrament was instituted by Christ himself, and the participation of it is called *communion*.

As to the manner of celebrating the eucharist among the ancient Christians, after the customary oblations were made, the deacon brought water to the bishops and presbyters, standing round the table, to wash their hands; according to that of the psalmist, "I will wash my hands in innocency, and so will I compass thy altar, O Lord." Then the deacon cried out aloud, "Mutually embrace and kiss each other;" which being done, the whole congregation prayed for the universal peace and welfare of the church, for the tranquillity and repose of the world, for the prosperity of the age, for wholesome weather, and for all ranks and degrees of men. After this followed mutual salutations of the minister and people; and then the bishop or presbyter having sanctified the elements by a solemn benediction, he brake the bread, and delivered it to the deacon, who distributed it to the communicants, and after that the cup. Their sacramental wine was usually diluted or mixed with water. During the time of administration, they sang hymns and psalms; and, having concluded with prayer and thanksgiving, the people saluted each other with a kiss of peace, and so the assembly broke up.

EUCCLID of MEGARA, a celebrated philosopher and logician, flourished about 400 B. C. The Athenians having prohibited the Megarians from entering their city on pain of death, this philosopher disguised himself in women's clothes to attend the lectures of Socrates. After the death of Socrates, Plato and other philosophers went to Euclid at Megara, to shelter themselves from the tyrants who governed Athens. Euclid admitted but one chief good; which he sometimes called *God*, sometimes *Spirit*, and sometimes *Providence*.

EUCCLID of Alexandria, the celebrated mathematician, flourished in the reign of Ptolemy Lagus, about 277 B. C. He reduced all the fundamental principles of pure mathematics, which had been delivered down by Thales, Pythagoras, Eudoxus, and other mathematicians before him, into regularity and order, and added many others of his own discovering; on which account he is said to be the first who reduced arithmetic and geometry into the form of a science. He likewise applied himself to the study of mixed mathema-

tics, and especially to astronomy, in which he also excelled. The most celebrated of his works is his Elements of Geometry, of which there have been a great number of editions in all languages; and a fine edition of all his works was printed in 1703, by David Gregory, Savilian professor of astronomy at Oxford.

EUDIOMETER, an instrument for trying the salubrity of air, founded on a fact discovered by Dr Priestley; namely, that nitrous air diminishes the bulk of common atmospheric air in proportion to the salubrity of the latter*.—The Abbe Fontana and Chevalier Landriani, were the first, as it seems, who availed themselves of this discovery. Both proposed to the public an instrument for measuring the salubrity of the air we breathe. They gave to these instruments, called *eudiometers*, different forms, as appears by the printed descriptions that each of them has separately published; and the chevalier Landriani transmitted to England, as a present to Dr Priestley, the very instrument he had made use of to estimate the respective salubrity of the air in different parts of Italy. This eudiometer consists of a glass tube, ground to a cylindrical vessel, with two glass cocks, and a small basin, all fitted in a wooden frame. Quicksilver is there instead of water; and that part of it which replaces the bulk lost by the diminution of the two mixed airs, is conducted either through a kind of glass siphon, or through the capillary holes of a glass funnel: so that, by its fall, the whole mixture of the two kinds of air is more readily made. Dr Falconer of Bath sent, some time ago, to Dr Falconer the royal society of London, a glass tube, neatly provided; by means of which one may be enabled to know the quantity of diminution produced in a certain bulk of the mixture of nitrous air with another air, in order to judge of its salubrity, which Dr Priestley has shewn to be in proportion to the diminution suffered in the sum of their original bulk, after they are mixed together. This method is the readiest of all, when no great nicety is required in observations of this kind; but, in order to determine this matter with the greatest exactness, others have been contrived by J. H. De Magellan, F. R. S. of which he gives the following description in his letter to Dr Priestley. "Of the three eudiometers I have contrived, which are represented fig. 8. 15. and 16*." I think the latter is the easiest in its application, and the most exact in its results. It is represented also (fig. 12. 14. and 17.) in different positions, for the better understanding of its application: and it consists of the following parts, *viz.* a glass tube *m n e d*, fig. 16. about 12 or 15 inches long, and of an equal diameter; with a ground glass-stopper *m*; a vessel *c*, the neck of which is ground airtight to the lower end *d* of the tube; and two equal phials *a* and *b*, whose necks are also ground airtight to the respective mouths of the vessel *c*. Both these phials contain nearly as much as the whole tube *m n e d*. There is, moreover, a sliding brass-ring, marked *z*, which slides in the tube *n d*, and may be made tight at pleasure by a finger-screw; and, lastly, a ruler, either of brass or of wood, represented fig. 11. which is divided into equal parts, and indicates the contents of both the phials *a* and *b*, when thrown into the tube, by the number of parts which is engraved or stamped about the middle of it. The two bent pieces of brass *z t* serve to hold it easily by the side of the tube *n d* fig.

* See Air, n° 36, 37.

Landriani's eudiometer.

Dr Falconer's.

* See Plate Cl.

3 Mr Magellan's first eudiometer.

Eudiometer fig. 14. and 17. keeping it close to its neck *n* by the notch *i*.

Experiments with these eudiometers, which are easily constructed, may be made either with water or with quicksilver; with this difference, that when the last is made use of, the eudiometers (particularly the third, represented fig. 8, which seems the fittest to be used with quicksilver) will be more convenient if made of a still smaller size. Mercury, however, is a fluid that, I think, never ought to be used preferably to water, in the inside of eudiometers; because it suffers a sensible action from the contact with nitrous air, as yourself have observed: and this must have an influence on the result of the experiments. Water, on the contrary, seems less liable to mistakes, although it imbibes some part of the nitrous air. In fact, this effect only takes place in a long time, or with much agitation: and after duly weighing the question on both sides, I should think water might be generally used, without the fear of any sensible error. The weight and the dearth of quicksilver, are likewise two other considerations to give the preference to water in these experiments.

Method of using this instrument.

"*The Process.* In the first place there must be either a trough, as represented fig. 17.; or at least a common tub, nearly filled up with water, unless the tall glass receiver, of which I shall afterwards speak, be at hand. I take out the stopple *m* (fig. 16.) and fill the eudiometer entirely with water, keeping it in the position represented fig. 16. and 17. I then shut it with the stopple *m*, without leaving any bubble of air in the inside; and put the lower part *c* under the surface of the water in the tub (fig. 17.) in an erect position as it is therein seen. I take the phial *a*, filled with water; and keeping its mouth downwards under the surface of the water, I fill it with that air, the salubrity of which I want to ascertain (*a*). This is done either by putting the phial *a* on the shelf *n o* of the tub (fig. 17.) and throwing the air into the glass-funnel *t*, which is there cemented to the shelf; or by holding in the left hand the same phial *a*, together with the glass funnel *B* (which is represented fig. 18. and has no pipe at all) applied to the mouth of the phial, whilst I pour the air with my right hand into it. But lest the heat of my hand should produce any considerable expansion in this air, I generally use in hot weather the wooden tongs represented fig. 21. with two bent wires *xx*, in order to hold the glass funnel *x* close to the mouth of the phials; unless they are made with a solid lump at their bottoms, as represented in the plate.—There are some niceties to be observed in order to fill up exactly any phial intended to serve as a measure of air. The easiest method to succeed is the following: Let a glass funnel *t* (fig. 17.) be cemented under the hole *n* of the shelf *n o* in the trough. In this case I hold the phial *a*, filled with water, with its mouth downwards over the hole *n* of the funnel *t*: I throw the air into the funnel; and, when

the phial is filled with air, I take it sideways, rubbing its mouth along the surface of the shelf, so that the redundant air adhering to the mouth of the phial be got off; and I put it into the mouth of the eudiometer belonging to it. But as the heat of the hand must expand the air contained in the phial, which of course will then contain less air than its real measure in the temperature of the surrounding water, I handle the phial with a kind of pliers or tongs of wood, represented fig. 21. till the neck enters into the proper place of the vessel *c*, where I secure it with the other hand: and, laying aside the wooden tongs, I make it properly tight. But if the phials have a solid knob at their bottoms, as represented in the plate, it will then be enough to handle them by it only, since the heat of the hand cannot be communicated in so short a time to the air in the inside. If I have not the convenience of a trough, prepared with a shelf, and its fixed funnel, as above-mentioned, an assistant holds the funnel under the water in a common tub, whilst I fill up the phial with air: and I take care to hold the phial in such a manner that the end of the funnel be out of the inside of the phial at the last moment, that the air may rush out after it is totally filled; otherwise that part of the phial, occupied by the end of the funnel, will not be totally filled with the air. Even without any assistant but with a little care, a person may hold both the phial and the funnel in the left hand, whilst he throws the air into it with the other; as I have myself frequently done in experiments of this kind: and when I make use of the wooden tongs, I add to it the two bent pieces of wire *xx* (fig. 21.), by means of which the funnel is kept close to the mouth of the phial:

"The phial *a* being filled with that air, the salubrity of which I am to examine, I put it into the mouth of the vessel *c*, making it rather tight: which must be done with some care; for if the phials *a b* are not tight enough to the respective mouths of the vessel *c*, they will slip out, when turned downwards, and of course will be broken; and, if they are too tight, the vessel *c* will be easily cracked, and become unfit for use. The better to avoid these accidents, and to judge of the proper degree of tightness, let the necks of the phials *a b*, and of the vessel *c*, as well as the glass stopple *m*, be always rubbed with tallow, previously to every experiment. When I have done with the phial *a*, I take the other phial *b*, filled with water: by the same method I throw into it as much nitrous air as to be perfectly filled up with it: and I then replace this phial *b* in the other mouth of the vessel *c*.

"No pains or trouble ought to be spared, in order to obtain, at any time, a nitrous air perfectly alike in its contractive power, when mixed with common air. In order to come the nearest to this, I take a phial *D* (fig. 19.) like those you have described in the second volume of your work *On different Kinds of Air*: to the mouth

(*A*) "The case I am speaking of, is when I have a bottle of air, which has been taken at any distant place, and sent for trial. If a glass-bottle, with a ground glass-stopple, is filled with water or with mercury, and emptied in the place whose atmospheric air is intended for being examined, it will, of course, be filled with that air; and, being closely shut with the glass-stopple, may be carried to any distant place for a trial. By this means the atmospheric air of any part of a country may be sent to any distant one, in order to ascertain its comparative salubrity; and many useful inquiries and discoveries may be made hereafter on this subject, with great ease, and at very small expence. But if I only want to try the air of the room, where I have the eudiometer, I then only pour out of the phial *a* the water it contains. I find that, however, after some trials with nitrous air, the atmosphere about me is loaded with phlogistic miasma; and for that reason I always empty the phial *a* out of the window of the room, in order to have nearly the same kind of air in all the experiments."

Eudiometer mouth of which is ground air-tight the crooked tube $n z$ in the shape of an S. I fill the half of this phial with thin brads wire, the thickness of which is equal to $\frac{1}{10}$ of an English inch, nicely cut by a pin-maker to this length. I fill the three quarters of the phial with common water; and the remainder with strong *nitrous acid*. I put the crooked tube $n z$ to the phial: and, as soon as the effervescence causes the liquor to rise to the end z of the tube, I pass it under water into the mouth of the bottle E (fig. 20.) which is filled with water, and inverted with its mouth downwards upon the hole of the shelf $n o$, which appears covered with water within the trough or pan, (fig. 17.) This figure represents the most commodious shape a trough must have for any experiments on different kinds of air. It is made with straight boards of elm-wood *one inch* thick. The inside dimensions are 25 inches long, $13\frac{1}{2}$ wide, and 11 deep, English measure. The two end boards, $c d$ and $e f$, are fitted into a groove cut in the other three boards; this is daubed with thick white painting, as a cement, to keep well the water in: and the whole is fastened with nails from the outside. The shelf $n o$ is eight inches wide, and two inches thick. It has three holes of three tenths of an inch diameter, with as many separate cavities underneath, so as to serve as so many funnels. The figure, however, represents a glass funnel t , cemented to the middle hole n ; which is equally convenient. This shelf is supported by four metallic hooks $V w z z$, which may be raised or lowered at pleasure by the wooden wedges there represented. When the bottle F is entirely filled by the *nitrous air*, I shut it up with its stopple x (fig. 20.) which I pass under the surface of the water, to avoid any communication with the external air: and I push this bottle under the shelf, where I let it remain for a quarter of an hour, to acquire the same temperature of the surrounding water: and the same I always observe with the bottle, containing that atmospheric air which I desire to try, before I put it into the phial b . I must acknowledge, however, that, notwithstanding these precautions, I cannot say that all the results of my experiments, even when made upon the same atmospheric air, have as yet agreed so exactly as I flattered myself they would. Perhaps there was some difference in the strength of the *nitrous air*, the density of which I thought might easily be brought to a settled standard, to be determined by means of a glass hydrometer. Perhaps there was some other little variety in the circumstances of the experiments, the influence of which I was not aware of. But let it be as it may, I very willingly leave this problem to be resolved by abler chemists than I can pretend to be: and I heartily wish they may succeed better than I have done; for, without being assured of getting every where a certain standard *nitrous air*, by which the same atmospheric air may

be equally affected, we cannot draw with certainty any general decisive conclusions from eudiometrical experiments made in distant times or places (a).

"I take afterwards the eudiometer with my left hand, holding it near the lower part d , over the surface of the water in the trough, to avoid breaking any of the phials, if it chances to fall; and, with my right hand, I turn the vessel c upwards, so that the two phials may be downwards, as represented fig. 14. By this operation the two kinds of air come up to x , from the phials $a b$; and there they mix together in the best possible manner; the particles of each having a large room to come into contact with each other; since the foremost ones do not detain those which are behind, as it happens when this mixture is made in a narrow vessel. This being done, I immediately dip the eudiometer in the water of the trough, (fig. 17.) leaving the mouth of the instrument above its surface; so that no more water may enter into it than what it had at first. I then observe with attention the moment when the mixture x (fig. 14.) of the two kinds of air comes to its greatest diminution, after which its bulk will begin to increase again. In order to catch this moment with certainty, I slide down the brads ring z of the instrument, as the surface of the water in the tube falls. This point of the greatest diminution will be easily perceived, by observing when that inside surface is stationary: which will happen in a few minutes, if the *nitrous air* has a proper strength. The bulk of the mixed air will decrease to a certain degree, within a few minutes, according to the strength of the *nitrous air*. Afterwards it will begin to expand again: but this it will do to a very short limit, much below its former bulk. This is a phenomenon which, I think, I have observed the first on these experiments; having made a very great number of them with nice eudiometers, of the kind I am now describing. It certainly deserves the attention of philosophers: and, although I have communicated it to some of my acquaintance, none have as yet, in my humble opinion, given a satisfactory solution of this phenomenon.

"As soon as the diminution of the two kinds of air appears to be stationary, I fill up the whole tube of the eudiometer with water: I shut it up with the stopple m ; and incline the top of the instrument forwards, till the air comes from x (fig. 14.) up to the top n of the tube. I then keep the lower part of the instrument dipped in the water; take off the glass vessel c with the two phials $a b$, and raise or lower the tube of the eudiometer, so as to see the surface of the water, in the inside, even with that in the outside; which I mark by sliding it to the brads ring z . Otherwise I apply the ruler, fig. 11. (without making any use now of the brads ring) to the side of the eudiometer, whilst it is immersed in the water of the trough: and there I see the true

(a) Two striking circumstances relating to *nitrous air* deserve to be remarked. The first is the great quantity produced by the action of *nitrous acid* on metals; which may still be carried to a greater extent, if helped by bringing the flame of a candle to the phial, which contains the solution, when it seems to be nearly done with emitting air. The second is the antiseptic power of *nitrous air* to preserve animal-matters from corruption. A beef-steak, almost entirely putrid, and with an insupportable stench, being put into a jar of *nitrous air*, in less than two days was perfectly restored, and very eatable when dressed. A pigeon was very well preserved above six weeks by the same treatment; and, when roasted, was found so good as to be eat without any dislike. Two other pigeons were kept in it full six months without corruption: they were still very firm and of a good colour; but the flesh had lost all its flavour, and was far from being eatable when dressed. But the *nitrous air* for these economical purposes, which may be of a great advantage at sea as well as at home, must be made out of *nitrous acid* with iron, or other metal less exceptionable than brads or copper, the effluvia of which are pernicious to animals.

true dimension of the remaining bulk of the two kinds of air, already diminished. Perhaps the best method for this observation would be to allow time enough, that the mixed air may take its settled bulk: but this requires sometimes 24 hours. I leave, however, the choice of these two methods to the observer, who may use both if he pleases, provided he keeps distinctly the result of each method in his account of the experiment.

"The number marked about the middle of this ruler (fig. 11.), as for instance, $^{**} = 96$, means that the contents of both phials a and b are equal to 96 divisions of the ruler, when put into the tube of that eudiometer: that is to say, they are equal to a solid cylinder as thick as the inside of the glass tube, and whose length is 96 divisions of the ruler, which has been divided into tenths of an English inch.

"Now if, for instance, this remaining bulk of mixed air corresponds to the 56th division of the ruler, it shews that, out of 96 parts, only 40 ($=96-56$) have been lost or contracted: and, in this case, the wholefomeness of that air, which I call A , will be $\frac{56}{96}$. If another equal quantity of different air, which I shall call B , had also been tried by the same eudiometer, and its residuum was equal to 60 parts of the same ruler, the respective falubrity of the air B will then be to that of the air A , as 36 ($=96-60$) to 40.

"But if the air B had been tried by another eudiometer, whose proportional dimensions, marked about the middle of its ruler, were $^{**} = 108$, then the respective falubrity of these two kinds of air A and B , would be in the compound ratio of $\frac{56}{96}$ to $\frac{40}{108}$

$$\frac{36 \times 96}{108 \times 96} = \frac{3456}{108 \times 96} = 3456 \div 10368 = 54 \text{ to } 67,5 :$$

that is to say, the wholefomeness of the air B would be to that of the air A , as 54 to $67\frac{1}{2}$ (c).

"Nearly the same results would be found, if the ruler (fig. 11.) was applied to the side of the eudiometer, as soon as the inclosed mixture of air came to its utmost diminution, as above-mentioned; because as much water must fall in the tube nd , as corresponds to the diminution suffered by the two mixed airs in x . But there are some varieties, which arise from the different pressure of the column of water, which presses more or less upon the air at x (fig. 14.) as it is longer or shorter: and these varieties ought not to be overlooked in nice experiments.

"Whenever I have at hand a tall glass receiver, like that represented fig. 14. the whole process is then more easily performed: for in this case I dip the eudiometer, inverted as it appears fig. 12. into the water contained in the vessel $V S q$: I then put the two kinds of air into the phials a and b , as above said: I turn the instrument upright, as represented fig. 14. and finish the

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(c) "It is supposed that the inside of the tube is of an uniform diameter; but it often happens, that there are some varieties in different parts of its whole length. When they are not very considerable, we may neglect their influence in the result of these eudiometrical experiments; but, when the contrary happens, it will be very easy to make a proper allowance for them in the calculation. It is for this reason, that I have always ordered that the contents of one single phial be marked also upon the scale of each eudiometer, as well as the contents of both phials; for instance, as in this manner:

$$^{**} = 96$$

$$^{**} = 47$$

Which means, first, that the contents of both phials a and b are equal to a cylinder, whose diameter is the same as that of the inside bore of the tube nd (fig. 16.), and whose height is equal to 96 equal divisions of the ruler: secondly, that the contents of a single phial are equal to 47 divisions in the upper part of the same tube mnd ; and, of course, to 49 divisions ($=96-47$) of its lower part. By this difference it appears, that the tube of such eudiometer is wider in the top than at the bottom, by $\frac{2}{96}$ of the whole.

process, as I have already described.

"I must, however, warn the operator, that, unless every trial, and even almost every part of the process, be made in the same temperature, or at least unless the varieties arising from this cause be accounted for, no reliance can be had on the result of such experiments; it being well known, that air is apt to increase or diminish very considerably in its bulk, by the influence of heat and cold. It is for this reason that I constantly keep a good thermometer K , which hangs by the wire r , and is immerged in the water of the glass vessel fig. 14. or in the trough fig. 17. whenever I make any of these experiments. For the same reason, I take care to leave the eudiometer and the vessels of air, immerged in water time enough, as above-mentioned, to get the same temperature: and I make use of the wooden tongs mentioned p. 2051. par. 2. whenever I handle the phials a b filled with air, chiefly if they have not the solid lump at their bottoms, as represented in the plate; unless I feel the heat of my hands to be the same as that of the water, in the trough, I make use of.

The eudiometer, represented fig. 15. consists of a glass tube tc , two or three feet long, and of an uniform diameter: the end c is bent forwards; and the other end t is wide open, as a funnel, unless a separate one is made use of: this tube is fastened, by two loops, to the brass scale $cwtV$. There is a glass phial n , the neck V of which is ground air-tight to the end t of the tube; and contains only half of the whole inside capacity of the divided tube ct . It has, at the other end c , a large round phial abc , containing three or four times the bulk of the phial n : its neck is also ground air-tight to the mouth c of the tube. The brass scale $cwtV$ is divided into 128 equal parts: this being a number that can be divided to unity in a subduplicate ratio without fraction, by continual bisections; on which account it is one of the numbers the late famous Mr Bird had adopted for his dividing mathematical instruments with the utmost accuracy. These numbers are set out in the scale from t towards c . The contents or capacity of the tube till the number 128 is the double of the capacity of the phial n . Besides this there is a tin vessel $xstdro$ (fig. 15.) which may serve as a packing-case for the whole instrument, and its necessary appendages; and also as a trough, when experiments are made, it being then filled with water. Both the glass tube represented fig. 22. and the glass stopple m (fig. 15.), belong to this eudiometer; and both are fitted in, air-tight, to its mouth V .

"Let the instrument be immerged under the water $z z$ of the tin vessel fig. 15: and let the phial n , filled with water, be put in the inside socket eed of the tin vessel. Let it be filled with nitrous air, as above-described:

16 N

reversed:

Method of using it.

rected : and let this quantity of air be thrown into the phial $a b c$, as directed above, which I fix a little tight to the mouth c of the eudiometer. I afterwards fill the same phial n with the air I want to try : and raising the end c of the instrument, I put it into its mouth V : when this is done, I set the instrument upright, as represented fig. 15, hanging it on the hook w ; and, as soon as this last air goes up to the phial $a b c$, I take off the phial n , that the diminution of the two mixed airs may be supplied from the water in the tin vessel ; which must be the case, as the mouth V of the eudiometer is then under the surface of the water. I then put to the lower end V of the eudiometer, the bent tube fig. 22. to which is fitted the brass ring K , and is filled with water. It is by observing the surface of the water in this small tube (which then forms a true siphon with the tube of the instrument), and by means of the brass ring K , that I can distinguish the stationary state of the diminishing bulk of the two mixed airs, above-mentioned : which being perceived, I take off the small tube $g b$ from the eudiometer, and lay down, for some minutes, the whole instrument, in an horizontal position, under the water of the tin vessel : I shut up the mouth V with the glass stopple m ; and, reversing the instrument, I hang it up by the end V , on the hook w . By this position the whole diminished air of the vessel $a b c$ goes up to the top, where its real bulk is shewn by the number of the scale, facing the inside surface of water. This number being deducted from 128, gives the comparative whollomene of the air already tried, without any further calculation.

“ But this process will be still easier, when the last diminution of the two mixed kinds of air, is only required in the observation : because no use will be then made of the siphon (fig. 22.) In such a case, the instrument is left hanging on the hook w for 48 hours : after which it is laid down under the water of the trough (fig. 15.) in an horizontal position, for 8 or 12 minutes, in order to acquire the same temperature of the water : the mouth V is then shut up with the stopple m ; the instrument is hung by the end V in a contrary position, and the last real bulk of the good mixed air will be then shewn by the number of the brass scale answering to the inside surface of the water. This number being subtracted from 128, will give the comparative salubrity of the air employed in the trial, without any further calculation. I need not say that all the circumstances already mentioned for the better obtaining exact results in these experiments, are to be carefully observed, when this second or the third eudiometers are used : but chiefly that circumstance ought never to be omitted. The thermometer is to be kept dipped in the water of the tin vessel ; and the eudiometer must be kept there immersed some minutes, as I have said just now, before it is raised for the last time, to read off the quantity of the total diminution of the mixed air. The same method must be applied to the third new eudiometer I am going to describe ; and even the first eudiometer, already described, may be treated in the same manner : for if it be laid down in an horizontal position under the water in the tub, before it be shut up with the stopple, there will be no variation produced by the expansion of the air in the inside : because the proper quantity of wa-

ter is then shut up within the glass vessel c of the instrument : so that raising it up, as it is, together with the vessel c , and its phials $a b$ (fig. 14.) the weight of the column of water will press totally upon them, without expanding the inclosed air, or causing any variation beyond the trifling one which may proceed from the natural elasticity of the sides of the glass tube and vessels.

“ I must, however, acknowledge, that the long way through which the air passes, in going at first to the large phial $a b c$, in this second eudiometer, must leave some doubt whether it has not then suffered some sensible change in its quality before it is mixed with the nitrous air ; since, as you have observed, the air that has been long agitated in water, changes for the better from its bad qualities : and this objection must be still greater in the use of the third eudiometer. It is on this account that I have mentioned the first eudiometer, as the least exceptionable of all that we know till the present ; and perhaps the nature of the thing is not capable of a further perfection. Indeed that instrument, I mean my first eudiometer, has not only the advantage of offering a very small way through the water to the two kinds of air, on their going to mix at x in the vessel c (fig. 14.), but they are kept separate till that moment, in the two respective phials a and b , without any other contact with the water, but only in the narrow diameter of the necks of these phials.

“ The third eudiometer consists of a strait glass-tube $e n$ (fig. 8.) of an uniform diameter, about one or two feet long, with a large ball s , and a glass stopple m , fitted air-tight to the mouth n , which ought to be wide open, as a funnel, unless a separate one is made use of. There is also a small siphon (fig. 23.) with a brass ring x : a small phial z (fig. 9.) the contents of which may be received in the third part of the ball s ; and, when put into the glass tube $n s$, must take there no more than the half of its length. Lastly, this instrument has a ruler (fig. 13.) which is divided and stamped like that other already described above ; and a glass funnel, which is ground to the mouth n of the instrument, when this is not wide open, as already said.

“ The use of this instrument is easily understood by what I have already said of the two preceding ones. First, it is filled with water, and set in a vertical position, with the mouth n under the surface of the water in a tub, or in a trough, (fig. 17.) Secondly, the phial z (fig. 9.) is filled, as above, with nitrous air ; and thrown into the tube by means of the glass funnel y (fig. 10.) which is ground to the mouth n of the eudiometer ; unless it be wide enough not to be in need of any funnel. Thirdly, the same phial z is again filled with the air to be tried ; and thrown into the same. Fourthly, the siphon (fig. 23.) is added immediately to the mouth n of the eudiometer, under the surface of the water ; some of which is to be poured into it. Fifthly, the stationary moment of the greatest diminution of the mixed air at s , is watched by means of the ring x , as above-mentioned. Sixthly, when that moment arrives, the siphon $K L$ (fig. 23.) is taken off ; the eudiometer is laid for some minutes under the water, in an horizontal position, or nearly so, but in such a manner that no part of the inclosed air may get out ;

Third eudiometer described.

Method of using it.

Eudiometer out; the mouth *n* is shut up with the glass stopple *m*, and the instrument is inverted with the mouth *n* upwards. Lastly, the space occupied by the residuum of the diminished air, is measured by applying to its side the divided ruler or scale (fig. 13.) and the result is estimated after the manner already explained.

“When I want only to know the last diminution of the mixed air, the process then becomes easier, as no use is made of the siphon (fig. 23.) The method of conducting the process in such a case being respectively the same as that already described, it is unnecessary to describe it here again. The same precautions I have spoken of, must be observed when this eudiometer is made use of, in order to form a true judgment concerning those places, where people will be able to live without danger of hurting their constitutions by breathing and being continually surrounded by noxious air; which they have not yet been able to distinguish from the whole wholesome, except by a long and too late experience.

“The eudiometers already described are the fittest instruments for philosophical experiments on the bulk of air and other fluids, when mixed together; and even when mixed with some solid substances, which can be introduced into the lower vessel *c* of the first of the three eudiometers. It will be better, however, to have them made purposely for such objects, with a tube two or three times longer than I have indicated above. Whenever dephlogisticated air is to be tried by these instruments, proper care is to be taken to observe the precise point of its full saturation, which is that of its greatest diminution by the addition of *nitrous air*. In order to make this experiment with great accuracy, let a narrow glass tube of a uniform diameter (fig. 24.) be provided: let one of the two phials *a* or *b* (fig. 16.) filled with quicksilver, be thrown into it, and the tube cut exactly to that size, so as to contain neither more nor less. Let its whole length be divided into some number of equal parts, by which number the value marked on the ruler (fig. 11.) of this eudiometer, can be divided without any fraction: for instance, the number $\ast \ast = 108$, marked in the ruler, means, that the contents of the two phials *a* and *b*, are equal to a cylinder of 108 divisions long, as those of the ruler: and, of course, it shews that a single phial *a* or *b* contains but 54 of these parts. In this case, this tube (fig. 24.) may be divided either into 27 parts, each containing two of the ruler; or into 54, into 108, &c.

N. B. If the top of the tube is not very flat in the inside, it will be more exact, to divide the weight of the quicksilver in two parts; to put one of them into the tube; to mark the space occupied by it; to divide the part of it which was empty, into half the number intended for this tube; and afterwards to divide the other half into similar equal parts, as the first half, carrying them towards the closed end.

If the dephlogisticated air is very pure, it will require almost double the quantity of nitrous air to be completely saturated. In order to do this without exceeding the necessary quantity, I throw into the tube *nd* (fig. 17.) a second measure *b* or *a* of nitrous air, after I have brought the process to the moment above-mentioned; in this case the whole volume or bulk of the dephlogisticated and nitrous air will be 162 [=108 \times 54:] I observe where the surface of the inside water

in the tube stops, and I mark it by the sliding brass ring *z*. I then fill up the divided tube (fig. 24.) with nitrous air: I throw a small quantity into the eudiometer tube *nd*; and, if it becomes of a reddish colour, the inclosed air will diminish: I then push up the ring *z*; and by this means, I go on throwing in the nitrous air, by little and little, till I see that the whole diminishes no more; which shews me that it is fully saturated. Let us suppose, for example, that the tube (fig. 24.) was divided only into 27 equal parts; and that the saturation of the dephlogisticated air was completed at the eighth division of it: this shews that 19 parts [27—8=19], equal to 38 of those marked in the ruler, have been thrown into the eudiometer; that is to say, that the whole bulk of both kinds of air is equal to 200 [=162+38] such measures as those marked by the divisions of the ruler (fig. 11.) Now if the remaining quantity of air within the eudiometrical tube is only equal to two measures or numbers of the ruler, it is clear that such dephlogisticated air is 99 times of 100 $\left[\frac{200-2}{200} = \frac{198}{200} = \frac{99}{100} \right]$ pure air; since its bulk is reduced, by the combination of nitrous air, to the $\frac{1}{100}$ of the whole.

EUDOSIA, (ATHENIA, before her conversion to Christianity), a celebrated lady, the daughter of Leontius, philosopher of Athens; who gave her such a learned education, that at his death, he left her only a small legacy, saying she was capable to make her own fortune: but pleading at Athens without success against her two brothers, for a share in her father's estate, she carried her cause personally by appeal to Constantinople; recommended herself to Pulcheria, the sister of the emperor Theodosius the younger; embraced Christianity; was baptized by the name of *Eudisia*, and soon after married to the emperor. Their union lasted a considerable time: but a difference at last taking place, on account of the emperor's jealousy excited by Chrysapius the eunuch, she retired to Jerusalem, where she spent many years in building and adorning churches, and in relieving the poor. Dupin says, that she did not return thence till after the emperor's death: but Cave tells us that she was reconciled to him, returned to Constantinople, and continued with him till his death; after which she went again to Palestine, where she spent the remainder of her life in pious works. She died in the year 460, according to Dupin; or 459, according to Cave: the latter observes, that on her death-bed she took a solemn oath, by which she declared herself entirely free from any stains of unchastity. She was the author of a paraphrase on the eight first books of the Old Testament, in heroic verse; and of a great number of poems, which are lost.

EVE, the mother of all mankind; who being deluded by the serpent, occasioned the fall, and all its dismal consequences. See ADAM.

EVELYN (John), a most learned and ingenious writer and natural philosopher, was born at Wotton in Surrey, the seat of his father, in 1620. After making the tour of Europe, he returned to England about the year 1651, and lived very retired at his rural retreat, Say's Court, near Deptford in Kent; where his disgust at the violence and confusion of the times, operated so far upon his studious disposition, that he actually proposed to Mr Boyle, the establishing a kind of college for

Evelyn,
Eugene.

persons of the same turn of mind, where they might associate together without care or interruption. It was owing to Mr Evelyn's gratitude to the place of his education, that Oxford became possessed of the famous Arundelian Marbles; which he persuaded the Lord Henry Howard to bestow on that university. He was very assiduous in transmitting to the royal society whatever fell within the compass of his inquiries; and used humbly to style himself "a pioneer in the service." When the number of books he published is considered, the many he left behind him unfinished and unpublished, and the variety of subjects on which he employed his time, his industry and application are astonishing. "His life, (says the honourable Mr Walpole), was a course of inquiry, study, curiosity, instruction, and benevolence. The works of the Creator, and the mimic labours of the creature, were all objects of his pursuit. He unfolded the perfections of the one, and assisted the imperfections of the other. He adored from examination; was a courtier that flattered only by informing his prince, and by pointing out what was worthy for him to countenance; and was really the neighbour of the Gospel, for there was no man that might not have been the better for him. He was one of the first promoters of the royal society, a patron of the ingenious and indigent, and peculiarly serviceable to the lettered world; for besides his writings and discoveries, he obtained the Arundelian marbles for the university of Oxford, and the Arundelian library for the royal society: nor is it the least part of his praise, that he who proposed to Mr Boyle the erection of a philosophic college for retired and speculative persons, had the honesty to write in defence of active life against Sir George Mackenzie's Essay on Solitude. He knew that retirement in his own hands was industry and benefit to mankind; but in those of others, laziness and inutility." There are five small prints of this gentleman's journey from Rome to Naples, drawn and etched by him; and among his published works are, 1. A Character of England; 2. The State of France; 3. An Essay on the first book of Lucretius de *Rerum Natura*; 4. The French gardener; 5. A Panegyric on king Charles the Second's coronation; 6. *Fumifugum*, or the inconveniences of the air and smoke of London dissipated; 7. The history and art of engraving on copper; 8. A parallel between the ancient architecture and the modern; 9. *Sylva*, or a discourse of forest-trees; and several others. This amiable gentleman died, full of age and honour, in 1706.—His son John Evelyn, born in 1654, distinguished himself by his elegant translations and poems: He was one of the commissioners of the revenue in Ireland; but died early in life, in 1698.

EUGENE (Francis), prince of Savoy, descended from Carignan, one of the three branches of the house of Savoy, and son of Eugene Maurice, general of the Swiss and Grisons, governor of Champagne, and earl of Soissons, was born in 1663. Lewis XIV. to whom he became afterwards so formidable an enemy, thought him too unpromising a youth, that he refused him pre-ferment both in the church and the state, thinking him too much addicted to pleasure to be useful in either. Prince Eugene, in disgust, quitted France; and, retreating to Vienna, devoted himself to the imperial service. The war between the emperor and the Turks afforded the first opportunity of exerting his military talents;

and every campaign proved a new step in his advancement to the highest offices in the army. He gave the Turks a memorable defeat at Zenta; commanded the German forces in Italy, where he foiled marshal Villeroi in every engagement, and at length took him prisoner. Our limits do not allow a detail of his campaigns; but prince Eugene distinguished himself greatly, when the emperor and queen Anne united against the exorbitant power of Lewis XIV. He died at Vienna in the year 1736; and was as remarkable for his modesty and liberality, as for his abilities in the field and the cabinet.

EVERGREEN, in gardening, a species of perennials, which continue their verdure, leaves, &c. all the year: such are hollies, phillyrea's, laurultinus's, bays, pines, firs, cedars of Lebanon, &c.

EVES-DROPPERS. See *EAVES-Droppers*.

EVERLASTING PEA, a genus of plants, otherwise called *Lathyrus*. See *LATHYRUS*.

EVESHAM, a borough-town of Worcestershire, seated on a gentle ascent from the river Avon, over which there is a bridge of seven arches. W. Lon. 2. o. N. Lat. 52. 10.

EUGENIA, the YAMBOO, or *Silver-tree*; a genus of the monogynia order, belonging to the icolandria class of plants. There are two species, both natives of the hot parts of Asia. They rise from 20 to 30 feet high; and bear plumb-shaped fruit, inclosing one nut. They are too tender to live in this country, unless they are constantly kept in a stove.

EVICITION, in law, signifies a recovery of lands, or tenements, by law.

EVIDENCE, that perception of truth which arises either from the testimony of the senses, or from an induction of reason.

EVIDENCE, in law, signifies some *proof*, by testimony of men upon oath, or by writings or records. It is called *evidence*, because thereby the point in issue in a cause to be tried, is to be made *evident* to the jury; for "probationes debent esse evidentes et perspicue." The system of evidence, as now established in our courts of common law, is very full, comprehensive, and refined; far different from, and superior to, any thing known in the middle ages;—as far superior in that as in all other improvements and refinements in science, arts, and manners. Vid. *Blackst. Comment.* iii. 367,—375. iv. 350,—360.

The nature of evidence during the ages of ignorance was extremely imperfect, and the people were incapable of making any rational improvement. Thus it was the imperfection of human reason that caused the invention and introduction of the ORDEAL, as an appeal to the Supreme Being. As men are unable to comprehend the manner in which the Deity carries on the government of the universe, by equal, fixed, and general laws, they are apt to imagine, that, in every case which their passions or interest render important in their own eyes, the Supreme Ruler of all ought visibly to display his power in vindicating innocence and punishing vice. See *Robertson's Charles V.* vol. i. p. 48, &c.

EVIL, in philosophy, &c. is either moral or natural. Moral evil is the disagreement between the actions of a moral agent, and the rule of those actions whatever it is*.—Natural evil, is whatever destroys or in any way disturbs the perfection of natural beings: such as blind-

Evergreen
Evil.* See *Moral Philosophy*.

Evil blindness, diseases, death, &c. See these articles.

Evil
Eunomius.

King's Evil, in medicine, the same with the SCROFULA.

EULOGY, in church-history, a name by which the Greeks call the *panis benedictus*, or bread over which a blessing is pronounced, and which is distributed to those who are unqualified to communicate.

EUMENES, the most worthy of Alexander's successors and generals; was basely delivered up by his own troops to his rival Antigonius, and by him put to death, 315 B. C.

EUMENES II. king of Pergamus, a valiant general, patron of learning, and founder of the famous library at Pergamos, on the model of that at Alexandria. He died 159 B. C. after a reign of 39 years.

EUMENIDES, in antiquity, the same with the FURIES.

EUNAPIUS, a native of Sardis in Lydia, a celebrated sophist, physician, and historian, who flourished in the 4th century, under the emperors Valentinian, Valens, and Gratian. He wrote "The lives of the Philosophers and Sophists," in which he frequently shews himself a bitter enemy to the Christians: also a history of the Cæsars, which he deduced from the reign of Claudius, where Herodian left off, down to that of Arcadius and Honorius. The history is lost; but we have the substance of it in Zosimus, who is supposed to have done little more than copy it.

EUNOMIANS, in church-history, Christian heretics in the 4th century. They were a branch of Arians, and took their name from EUNOMIUS bishop of Cyzicus; whose confession of faith here follows, extracted from Cave's *Historia Literaria*, vol. i. p. 223. "There is one God uncreate and without beginning; who has nothing existing before him, for nothing can exist before what is incarnate; nor with him, for what is uncreate must be one; nor in him, for God is a simple and uncompounded being. This one simple and eternal being is God, the creator and ordainer of all things: first indeed and principally of his only begotten Son; and then, through him, of all other things. For God begot, created, and made, the Son, only by his direct operation and power, before all things, and every other creature; not producing, however, any being like himself, or imparting any of his own proper substance to the Son: for God is immortal, uniform, indivisible; and therefore cannot communicate any part of his own proper substance to another. He alone is unbegotten; and it is impossible that any other being should be formed of an unbegotten substance. He did not use his own substance in begetting the Son, but his will only: nor did he beget him in the likeness of his substance, but according to his own good pleasure. He then created the Holy Spirit, the first and greatest of all spirits, by his own power indeed and operation mediately, yet by the immediate power and operation of the Son. After the Holy Spirit he created all other things in heaven and in earth, visible and invisible, corporeal and incorporeal, mediately by himself, by the power and operation of the Son, &c.

EUNOMIUS, a famous herefarch of the 4th century, the disciple of Elius, but abundantly more subtil than his master, as well as more bold in propagating the opinions of his sect, who after him are called EUNOMIANS. He was ordained bishop of Cyzicus; but

gave so much disturbance by the intemperance of his zeal, that he was deposed more than once: and, tired at length with being tossed about, he petitioned to retreat to the place of his birth, Dacora in Cappadocia; where he died very old about the year 394, after experiencing a variety of sufferings. The greatest part of his works are lost. There is, however, besides two or three small pieces, a confession of his faith remaining, which Cave inserted in his *Historia Literaria*, from a manuscript in archbishop Tennaion's library. See the preceding article.

EUNUCH, a castrated person. See the article CASTRATION.—The word is formed from *εὖν* *χῆν*, q. d. *lesti curam habet*, "guardian or keeper of the bed."

In Britain, France, &c. eunuchs are never made but upon occasion of some disease, which renders such an operation necessary: but in Italy, they make great numbers of children, from one to three years of age, eunuchs, every year, to supply the operas and theatres of all Europe with singers; though it is not one in three, that, after having lost his virility, has a good voice for a recompense. In the eastern parts of the world, they make eunuchs in order to be guards or attendants on their women. The seraglio of the eastern emperors are chiefly served and guarded by eunuchs; and yet, from good authority, we learn, that the rich eunuchs in Persia and other countries keep seraglios for their own use. Those who, out of an imprudent zeal to guard themselves from sensual pleasures, made themselves eunuchs, were, by the council of Nice, condemned and excluded from holy orders. There are several severe prohibitions in Germany against the making of eunuchs; and in France an eunuch must not marry, nor even with the consent of the woman.

EUNUCHS, in church-history, a sect of heretics, in the third century, who were mad enough to castrate, not only those of their own persuasion, but even all others they could lay hold of. They took their rise from the example of Origen, who, misunderstanding the following words of our Saviour, "and eunuchs who made themselves eunuchs for the kingdom of heaven," castrated himself.

EVOCATI, among the Romans, soldiers who having served their time in the army, went afterwards volunteers at the request of some favourite general.

EVOCATION (*Evocatio*), among the Romans, a religious ceremony always observed by them at the undertaking a siege, wherein they solemnly called upon the gods and goddesses of the place to forsake it and come over to them. Without the performance of this ceremony, they either thought that the place could not be taken, or that it would be a sacrilege to take the gods prisoners. They always took it for granted that their prayer was heard, and that the gods had deserted the place and come over to them, provided they were able to make themselves masters of it.

EVOLUTION, in algebra. See ALGEBRA, n° 9.

EVOLUTION, in the art of war, the motion made by a body of troops, when they are obliged to change their form and disposition, in order to preserve a post, or occupy another, to attack an enemy with more advantage, or to be in a condition of defending themselves the better.

It consists in doublings, counter-marches, conversion,

Eunuch
Evolution.

Euo-
nymus
||
Euphorbia.

Euphor-
bium
||
Euphrates.

flons, &c. A battalion doubles the ranks, when attacked in front or rear, to prevent its being flanked or surrounded; for then a battalion fights with a larger front. The files are doubled, either to accommodate themselves to the necessity of a narrow ground, or to resist an enemy that attacks them in flank. But if the ground will allow it, conversion is much preferable; because, after conversion, the battalion is in its first form, and opposes the file-leaders, which are generally the best men, to the enemy; and likewise, because doubling the files in a new or not well-disciplined regiment, they may happen to fall into disorder. See DOUBLING.

EUONYMUS, the SPINDLE-TREE; a genus of the monogynia order, belonging to the pentandria class of plants. There are two species. 1. The *europæus*, hath an upright woody stem 10 or 15 feet high, garnished with oblong opposite leaves: from the sides of the branches proceed small bunches of greenish quadrid flowers, succeeded by pentagonal capsules, enclosing their seeds in a beautiful manner in autumn. 2. The *americanus*, or evergreen spindle-tree, hath a shrubby stem, dividing into many opposite branches, rising six or eight feet high, garnished with spear-shaped evergreen leaves growing opposite, and from the sides and ends of the branches. The flowers are quinquefid and whitish, and come out in small bunches, succeeded by roundish, rough, and protuberant capsules, which rarely perfect their seeds in this country. Both these species are hardy, and will succeed in any soil or situation.—The berries of the first sort vomit and purge very violently, and are fatal to sheep. If powdered and sprinkled upon hair, they destroy lice. If the wood is cut when the plant is in blossom, it is tough and not easily broken; and in that state it is used by watch-makers for cleaning watches, and for making skewers and tooth-pickers. Cows, goats, and sheep, eat this plant; horses refuse it.

EUPATORIUM, HEMP-AGRIMONY; a genus of the polygamia æqualis order, belonging to the syngnesia class of plants. There are 13 species, many of them herbaceous showery perennials, producing annual stalks, from two to three or five feet high, terminated by clusters of compound flowers of a red, purple, or white colour. They are easily propagated by seeds, or parting the roots in autumn or spring. One species, viz. the *cannabinum*, or water hemp-agrimony, is a native of Britain. It grows by the banks of rivers and brooks, and has pale-red blossoms. The whole plant hath a very bitter taste. A decoction of the roots operates as a violent emetic and cathartic; and is sometimes taken by the lower classes of people, to cure the jaundice, dropsy, &c. Dr Boerhaave used an infusion of this plant to foment ulcers and putrid sores. Tournefort informs us, that the Turks cure the scurvy with it. An ounce of the juice or a dram of the extract is a dose.

EUPHYMISM. See ORATORY, n° 56.

EUPHORBIA, SPURGE; a genus of the trigynia order, belonging to the dodecandria class of plants. There are 62 species, six of which are natives of Great Britain. They are mostly shrubby and herbaceous succulents, frequently armed with thorns, having stalks from 10 or 12 inches to as many feet in height, with quadripetalous flowers of a whitish or yellow colour. They are easily propagated by cuttings; but the fo-

reign kinds must be always kept in pots in a stove. If kept dry, they may be preferred for several months out of the ground, and then planted; when they will as readily take root as though they had been fresh. The juice of all the species is so acrid, that it corrodes and ulcerates the body wherever it is applied; so that physicians have seldom ventured to prescribe it internally. Warts, or corns, anointed with the juice, presently disappear. A drop of it put into the hollow of an aching tooth, gives relief, like other corrosives, by destroying the nerve. Some people rub it behind the ears, that it may blister. One of the foreign species, named *efula*, is such a violent corrosive, that, if applied to any part of the body, it produces a violent inflammation, which is soon succeeded by a swelling that degenerates into a gangrene, and proves mortal. *IPECACUANHA* is the root of another species. A third hath obtained the name of *ferculia*, or dirt-wood, from its smell, which is said exactly to resemble human excrements.

EUPHORBUM, in the materia medica; a gum resin, brought us always in loose, smooth, and glossy gold-coloured drops or granules. It is the produce of the *euphorbium antiquorum verum*, which grows to 10 or 12 feet high. Its principal use is externally in sinapisms, and plasters applied to the feet, which are intended to stimulate, but not absolutely to raise blisters; for it is observed by Avicenna, that, when taken internally in large doses, it has been found to exulcerate the intestines, and bring on death itself after the most terrible symptoms.

EUPHORION of CHALCIS, a poet and historian, born in the 126th Olympiad. Suetonius says that Tiberius composed verses in imitation of Euphorion, Rianus, and Parthenius; with whom he was charmed to such a degree, that he ordered their writings and their pictures to be kept in all the public libraries, among the ancient and celebrated authors.

EUPHRASIA, EYE-BRIGHT; a genus of the angiospermia order, belonging to the didynamia class of plants. There are seven species; two of which, viz. the officinalis and odontites, are natives of Britain. The first of these, which hath blue flowers, is a weak alstrigent, and was formerly much celebrated in disorders of the eyes; but the present practice hath not only disregarded its internal, but also its external use. This plant will not grow but when surrounded by others taller than itself. Cows, horses, goats, and sheep, eat it; swine refuse it.

EUPHRATES, a river universally allowed to take its rise in Armenia Major; but in what particular spot, or in what direction it afterwards shapes its course, there is the greatest disagreement. Strabo says, that the Euphrates rises in mount Abus, which he joins with, or accounts a part of, mount Taurus; that its beginning is on the north side of mount Taurus; and that running, first westward, through Armenia, then striking off to the south, it forces its way through that mountain; and thus it rises in the south of Armenia, mount Taurus being the boundary on that side; and runs through its south part, quite to Cappadocia, conterminal with Armenia Minor; or quite to this last, or to its south limit; to reach which, it must bend its west course a little north; because the Taurus, from which it rose, lies lower, or more to the south, and almost parallel

parallel with Melitene: and that then it turns to the south, in order to break through the Taurus, and escape to Syria, and then take a new bend to Babylonia. To this account of Strabo, Pliny runs quite counter; adding eye-witnesses, who carry the Euphrates from north to south in a right line, till it meets mount Taurus; placing the springs together with mount Abus, or Aba, which inclines to the west, to the north of Taurus, all counter to Strabo. Ptolemy strikes a middle course between both, placing the springs to the east, as Strabo does; whence, he says, it runs in a long course westward, before it bends south; and that it rises not from mount Taurus, but far to the north of it; and he makes it run straight west from its rise, then turn south spontaneously, without any interposing obstacle, in a manner quite different from Strabo, Mela, and others, who make the Taurus the cause of this turn. No wonder then that the springs of the Nile are unknown, if a river almost at the door is so little understood. The Euphrates naturally divides into two channels, one through Babylon, and the other through Seleucia, besides the several artificial cuts made between it and the Tigris about Babylon: and these cuts or trenches are what the Palmist calls the rivers of Babylon, on the willows of which the captives hung their harps. It is probable, that the Euphrates naturally poured into the sea at one particular mouth, before these cuts were made. A thing appearing so evident to the ancients, that Pliny has set down the distance between the mouths of the Euphrates and the Tigris: and he says, some made it 25, and others 7, miles; but that the Euphrates being for a long time back intercepted in its course by cuts, made for watering the fields, only the branch called the *Pasitigris* fell into the sea, the rest of it into the Tigris, and both together into the Persian Gulf. Overflowing the country through which it runs, at stated times of the year, like the Nile, it renders it fertile.

EUPOLIS, an Athenian comic poet, flourished about the 85th Olympiad. He took the freedom of the ancient comedy in lashing the vices of the people. He lost his life in a sea-fight between the Athenians and Lacedæmonians; and his fate was so much lamented, that, after his death, it was enacted, that no poet should serve in the wars. Some say Alcibiades put him to death for his satirical freedom.

EVREMOND (Charles de St Denis), born at St Denis le Guast in Lower Normandy in 1613, was designed for the gown, and entered on the study of the law; but he soon quitted that, and was made an ensign before he was 16. A military life did not hinder him from cultivating polite literature; and he signalized himself by his politeness and wit as much as by his bravery. The king made him a marshal of camp, and gave him a pension of 3000 livres per annum. He served under the duke of Candale in the war of Guienne; and in Flanders, till the suspension of arms was agreed on between France and Spain: he afterwards accompanied cardinal Mazarine when he went to conclude the peace with Don Lewis de Haro, the king of Spain's first minister. He wrote, as he had promised, a long letter to the marquis de Crequi, of this negotiation; in which he shewed, that the cardinal had sacrificed the honour of France to his own private interest, and rallied him in a very satirical manner. This letter falling

into the hands of the cardinal's creatures some time after his death, was represented as a state-crime, and he was obliged to fly to Holland. He had too many friends in England, (whither he had taken a tour the year before, with the count de Soissons, sent to compliment Charles II. upon his restoration) to make any long stay in Holland; and therefore passed over into England, where he was received with great respect, and admitted into intimate friendship with several persons of distinction. The king gave him a pension of 300l. a-year. He had a great desire to return to his native country; and, after the peace of Nimeguen, wrote a letter in verse to the king of France to ask leave, but in vain. Upon the death of king Charles, he lost his pension. He did not rely much on king James, though that prince had shewn himself extremely kind to him. The revolution was advantageous him. King William, who had known him in Holland, gave him substantial marks of his favour. He died of a strangury in 1703, aged 90; and was interred in Westminster-abbey, where a monument is erected to his memory. His behaviour was engaging, his humour cheerful, and he had a strong disposition to satire: he professed the Romish religion, in which he was born; but at the bottom was certainly a freethinker. He always spoke of his disgrace with the resolution of a gentleman; and whatever strong desire he had to return to his country, he never solicited the favour with meanness: therefore, when this leave was signified to him unexpectedly in the decline of his life, he replied, that the infirmities of age did not permit him to leave a country where he lived agreeably. There have been many editions of his works: but the best is that of Amsterdam in 1726, in 5 vols 12mo, to which is prefixed his life by Doctor Des Maizeaux; who has also given an accurate English translation of them in 3 vols 8vo.

EURIPIDES, one of the Greek poets who excelled in tragedy, was born about 486 B. C. in the isle of Salamis, whither his father and mother had retired a little before Xerxes entered Attica. He learnt rhetoric under Prodicus, morality under Socrates, and natural philosophy under Anaxagoras; but at 18 years of age abandoned philosophy, in order to apply himself to dramatic poetry. He used to shut himself up in a cave to compose his tragedies, which were extremely applauded by the Greeks. The Athenian army, commanded by Nicias, being defeated in Sicily, the soldiers purchased their lives and liberties by reciting the verses of Euripides; such esteem and veneration had the Sicilians for the pieces wrote by this excellent poet. Socrates, the wisest of the philosophers, set such a value upon them, that they were the only tragedies he went to see acted; and yet his performances seldom gained the prize. Euripides frequently interperes through them moral sentences, and severe reflections on the fair-sex; whence he was called the *Woman-hater*. He was, nevertheless, married: but the scandalous lives of his two wives drew upon him the raillery of Aristophanes, and other comic poets; which occasioned his retiring to the court of Archelaus, king of Macedonia, where he was well received. That prince was fond of learned men, and drew them to him by his liberality. If we may believe Solinus, he made Euripides his minister of state, and gave him other extraordinary proofs of his esteem. He had, however, passed

Eurinus
||
Europe.

passed but a few years there, when an unhappy accident put an end to his life. He was walking in a wood, and, according to his usual manner, in deep meditation; when, unfortunately happening upon Archelaus's hounds, he was by them torn in pieces. It is not certain whether his death happened by chance, or through envy of some of the great courtiers. However, Archelaus buried him with great magnificence; and the Athenians were so much afflicted at his death, that the whole city went into mourning. Of 92 tragedies which he composed, only 19 are remaining: the most valuable editions of which are those of Aldus, in 1503, 8vo; of Plantin, in 1570, feximo; of Commelin, in 1597, 8vo; of Paul Stevens, in 1604, 4to; and of Joshua Barnes, in 1694, folio.

EURIPUS, now the NEGROPONT, a canal or strait which divides the island of Eubœa from the continent of Greece. In one place it is so narrow, that a galley can scarce pass through it. The agitations of the Euripus were much spoken of by the ancients. Some say that the canal has a flux and reflux six times in 24 hours; others, that it ebbs and flows seven times a day; but Livy does not allow this flux and reflux to be so regular. Father Babin, a Jesuit of great learning, who made many observations on the spot during his long abode in the island of Negropont, tells us, that the Euripus is regular in its ebbing and flowing the first eight days of the moon: the same regularly he observed from the 14th to the 20th day inclusive, and in the three last days; but in the other days of the lunar month, it is not so regular; for it sometimes ebbs and flows 11, 12, 13, and 14 times in the space of a natural day.

EUROPA, in fabulous history, daughter of Agenor, king of Phœnicia; with whom Jupiter being in love, transformed himself into a bull, and ran away with her into this part of the world, which from her is called *Europe*.

EUROPE, one of the quarters of the world, bounded on the north by the Frozen Ocean, on the west by the Western Ocean, on the south by the Mediterranean, which separates it from Africa, and by the Archipelago, which divides it in part from Asia, as also by the Black Sea, then by the river Don, till it comes near the river Volga or Wolga, and then it is parted from Asia by this last, and afterwards by the river Ob. Europe is situated between Long. 9. 35. W. and 72. 25. E. and Lat. 35° and 72° N. It is about 3300 miles in length, from Cape St Vincent in Portugal, to the river Ob in Russia; and 2200 miles in breadth, from Cape Matapan in the Morea, to the North Cape of Norway. We may judge by this, that it is much less than Asia and Africa; but it is in many things more considerable than both.

Europe, excepting a small part of Lapland and Muscovy, is situated in the temperate zone; in so much, that we neither feel the extremities of heat nor cold. We cannot boast of rich mines of gold, silver, and precious stones; nor does it produce sugar or spices, nor yet elephants, camels, &c. which we can do without; but produces abundance of corn, pulse, fruits, animals, &c. the most necessary for the use of mankind. In general, it is better peopled and better cultivated than the other quarters; it is more full of cities, towns, and villages, great and small, and its buildings are more solid and

more commodious than those of Africa and Asia. The inhabitants are all white; and incomparably more handsome than the Africans, and even than most of the Asiatics. The Europeans surpass both in arts and sciences, especially in those called the *liberal*; in trade, navigation, and in military and civil affairs; being, at the same time, more prudent, more valiant, more generous, more polite, and more sociable than they: and though we are divided into various sects, yet, as Christians, we have infinitely the advantage over the rest of mankind. There are but few places in Europe where they sell each other for slaves; and none where robbery is a profession, as it is in Asia and Africa.

There are several sorts of governments in Europe; as the two empires of Germany and Russia, the kingdoms of England, France, Spain, Portugal, Denmark, Sweden, Poland, Prussia, Sardinia, and the Two Sicilies. The commonwealths are Holland, Switzerland, Venice, Genoa, Ragusa, Lucca, and Geneva. The dukedoms, Lucania, Savoy, Modena, Mantua, Parma, and Courland, &c.

There are five sorts of religions in Europe, viz. the Mahomedan, which is professed in Turkey in Europe; the Greek, of which there are many in the same parts, in all Muscovy, and in several parts of Polish Russia; the Roman Catholic in Spain, Portugal, France, and Italy; the Protestant, though with a considerable difference, in Great Britain, Denmark, Sweden, and Norway. There is a mixture of both the last, in Ireland, Switzerland, Germany, Poland, Hungary, and the Low Countries: besides many Jews, and some idolaters in Lapland and the northern parts of Muscovy.

There are three general languages in Europe: the Latin, of which the Italian, the French, and the Spanish, are dialects; the Teutonic, which is spoken, tho' differently, in Germany, Hungary, Denmark, Sweden, and Great Britain; the Slavonic, which is spoken, tho' greatly disguised, in Muscovy, Poland, Bohemia, and Turkey in Europe. There are some of less extent: as, the Greek; the Proper Hungarian; the Basque; the British, which is spoken in Wales and Bretagne in France; the Irish; and the Laponic.

Europe may be divided into 11 great parts, including their dependencies: 1. Sweden; 2. Denmark and Norway; 3. Russia; 4. Poland; 5. Germany; 6. France; 7. Spain; 8. Italy; 9. Turkey in Europe; 10. Little Tartary; and, 11. The European islands, of which the chief are Great Britain and Ireland. The greatest cities in Europe are, London, Paris, Amsterdam, Constantinople, Moscow, and Rome.

EURYDICE, the wife of Orpheus. See ORPHEUS.

EURYTHYMI, in architecture, painting, and sculpture, is a certain majesty, elegance, and easiness, appearing in the composition of divers members, or parts of a body, painting, or sculpture, and resulting from the fine proportion of it.

EUSDEN (Laurence), an Irish clergyman, rector of Conesby in Lincolnshire, and poet laureat after the death of Mr Rowe. His first patron was the eminent lord Halifax; whose poem, on the battle of the Boyne, he translated into Latin, and dedicated to his lordship. He was elemeated by the duke of Newcastle, who rewarded an epithalamium he wrote on his marriage, with the place of poet laureat. He was the author of many poetical

Europe
Eudæna.

Eusebius
||
Eustathians

poetical pieces, though but little known before his per-
formance: he died in 1730.

EUSEBIUS, surnamed Pamphilus, a celebrated
bishop of Cæsarea in Palestine, and one of the most
learned men of his time, was born in Palestine about
the latter end of the reign of Gallienus. He was the
intimate friend of Pamphilus the Martyr; and, after
his death, took his name in honour to his memory. He
was ordained bishop of Cæsarea in 313. He had a con-
siderable share in the contest relating to Arius; whose
cause he, as well as several other bishops of Palestine,
defended, being persuaded that Arius had been un-
justly persecuted by Alexander bishop of Alexandria.
He assisted at the council of Nice in 325; when he
made a speech to the emperor Constantine on his coming
to the council, and was placed next him on his right
hand. He was present at the council of Antioch, in
which Eustathius bishop of that city was deposed; but
though he was chosen by the bishop and people of
Antioch to succeed him, he absolutely refused it. In
335, he assisted at the council of Tyre, held against
Athanadius; and at the assembly of bishops at Jerusa-
lem, at the time of the dedication of the church there.
By these bishops he was sent to the emperor Constantine
to defend what they had done against Athanasius;
when he pronounced the panegyric made on that em-
peror during the public rejoicings in the beginning of
the 30th year of his reign, which was the last of his
life. Eusebius survived the emperor but a short time,
for he died in 338. He wrote, 1. An Ecclesiastical
History, of which Valetius has given a good edition in
Greek and Latin. 2. The life of Constantine. 3. A
treatise against Hierocles. 4. *Chronicon*. 5. *Prepara-
tiones Evangelicæ*. 6. *De demonstratione Evangelicæ*,
of which there are but 10 books extant out of 20;
and several other works, most of which are lost.

EUSTACHIUS (Bartholomew), physician and
anatomist at Rome, flourished about the year 1550.
His Anatomical Plates were discovered there in 1712,
and published in 1714.

EUSTATHIANS, a name give to the Catholics of
Antioch in the 4th century, on occasion of their re-
fusal to acknowledge any other bishop beside S. Eusta-
thius, deposed by the Arians.

The denomination was given them during the epis-
copate of Paulinus, whom the Arians substituted to S.
Eustathius, about the year 330, when they began to
hold their assemblies apart. About the year 350,
Leontius of Phrygia, called the *eunuch*, who was
an Arian, and was put in the see of Antioch, de-
sired the Eustathians to perform their service in his
church; which they accepting, the church of Antioch
served indifferently both the Arians and Catholics.

This, we are told, gave occasion to two institutions,
which have subsisted in the church ever since. The first
was psalmody in two choirs; though M. Baillet thinks,
that if they instituted an alternate psalmody between
two choirs, it was between two Catholic choirs, and
not by way of response to an Arian choir. The second
was the doxology, *Glory be to the Father, and the
Son, and the Holy Ghost*. See DOXOLOGY.

This conduct, which seemed to imply a kind of com-
munion with the Arians, gave great offence to abun-
dances of Catholics, who began to hold separate meet-
ings; and thus formed the schism of Antioch. Upon

Eustathius
||
Eutropius.

this, the rest, who continued to meet in the church,
ceased to be called *Eustathians*, and that appellation
became restrained to the dissenting party. S. Flavianus,
bishop of Antioch in 381, and one of his succe-
ssors, Alexander, in 482, brought to pass a coalition, or
reunion, between the Eustathians and the body of the
church of Antioch, described with much solemnity by
Theodoret, *Ecl. l. iii. c. 2*.

EUSTATHIUS, bishop of Thessalonica, in the
12th century, under the reigns of the emperors Eman-
uel, Alexander, and Andronicus Comnenus. He was
a very eminent grammarian; and wrote commentaries
upon Homer, and Dionysius the geographer. The
best edition of his Commentaries on Homer is that of
Rome, printed in Greek, in 1542, in four volumes,
folio. His Commentaries on the Periegesis of Diony-
sius were printed by Mr Hudson, at Oxford, in 1697,
8vo. Eustathius appears to have been alive in the
year 1194.

EUSTATIA, or ST EUSTATIA, one of the Car-
ibbean islands, belonging to the Dutch, and situated in
W. Long. 62. 56. N. Lat. 17. 29. It is about 15
miles in compass; and is little else than a huge moun-
tain, which formerly has, in all probability, been a
volcano. Its situation is so strong, that it has but one
landing place; and that is fortified in such a manner
as to be almost impregnable. Tobacco is the chief
product of the island, and that is cultivated to the very
top of the pyramid, which terminates in a large plain
surrounded with woods; but having a hollow in the
middle, which serves as a large den for wild beasts.
No fewer than 5000 white people, and 15,000 ne-
groes, subsist on this spot, where they rear hogs, kids,
rabbits, and all kinds of poultry, in such abundance,
that they can supply their neighbours, after having
served themselves.

The first Dutch colony sent to this island consisted
of about 1600 people. They were dispossessed by the
English from Jamaica in 1665. Soon after, the Dutch
and French becoming confederates, the English were
expelled in their turn. The French continued to hold
a garrison in the island till the treaty of Breda, when
it was restored to the Dutch. Soon after the revolu-
tion, the French drove out the Dutch, and were in
their turn driven out by the English under Sir Tim-
othy Thornhill, with the loss of no more than eight men
killed and wounded, though the fort they took mount-
ed 16 guns, and was in every other respect very strong.
Sir Timothy found it necessary, for the protection of
the Dutch, to leave a small English garrison in the
fort; but he granted the French no terms of capitu-
lation, except for their lives and baggage. By the
peace of Ryswic, the entire property of this island was
restored to the Dutch, who have ever since remained
undisturbed masters of it.

EUSTYLE, in architecture, a sort of building in
which the pillars are placed at the most convenient dis-
tance one from another, the intercolumniations being
just two diameters and a quarter of the column, except
those in the middle of the face, before and behind,
which are three diameters distant.

EUTROPIUS (Flavius), a Latin author, in the
4th century, was secretary to Constantine the Great,
and afterwards bore arms under the emperor Julian,
and followed that prince in his expedition against the

Per-

Eutropius

Perfians. He wrote an Abridgment of the Roman History, from the foundation of Rome to the reign of Valens; the best edition of which is that of Miss Le Fevre, afterwards Madam Dacier, published at Paris for the use of the Dauphin, in 4to, in the year 1683.

EUTROPIUS, a famous eunuch, who, in the reign of Arcadius, was raised to the most distinguished posts, and even to the consulship; but rendered himself odious by his crimes and debaucheries, and had even the insolence to threaten the empress Eudoxia with causing her to be divorced: but Gainas having demanded his head, he took sanctuary in a church, which he had deprived of its immunities; when St Chrysostom saved him from the fury of the populace, and pronounced on that occasion a sermon, which is justly esteemed a master-piece of eloquence. Eutropius was afterwards banished to the island of Cyprus, and was beheaded at Chalcodon in 399.

EUTYCHES, a Constantinopolitan abbot, who, contending with Nestorius, fell into a new heresy, affirming Christ to be one thing, and the Word another. His followers were called *Eutychians*. Being condemned in the synod of Constantinople, convened by Flavianus the bishop, he appealed to the emperor. After which, by the assistance of Dioscurus bishop of Alexandria, and Chrysostom, he obtained a synod at Ephesus, called *Lafrica*, or the *Assembly of Thieves and Robbers*, wherein he got his heresy to be approved. However, in the second oecumenical council of Chalcedon, under Martin, his errors were a second time condemned.

EUTYCHIANS, in church-history, heretics in the 5th century, who embraced the errors of the monk Eutyches. See **EUTYCHES**.

EUTYCHIUS, patriarch of Alexandria, lived about the ninth age; and wrote annals in the Arabic language, printed at Oxford in 1658, with a Latin version by Mr Pocock. Selden had printed something of his before.

EUXINE or **BLACK SEA**, forms part of the boundary betwixt Europe and Asia. It receives the Nieper, the Danube, and other large rivers; and extends from 28 to 40 degrees of E. Long. and from 40 to 46 of N. Lat. The ancients imagined this sea to have been originally only a lake or standing pool, which broke first into the Propontis, and then into the Egean, washing away by degrees the earth which first kept it within bounds, and formed the two channels of the Bosphorus Thracicus and Hellepont, now the *Dardanelles*.—It was anciently called the *Axenus*, supposed to be from Aſhenaz, the son of Gomer, who is said to have settled near it. This original being forgot in length of time, the Greeks explained it by *inhospitable*, which the word *Axenus* literally signifies; and therefore, when they came to consider the inhabitants of these coasts as more civilized and hospitable, they changed the name into *Euxinus*, which it still retains.

* See *Ovis*. **EWE**, the English name of a female sheep*.

EWRY, in the British customs, an office in the king's household, to which belongs the care of the table-linen, of laying the cloth, and serving up water in silver ewers after dinner.

EX OFFICIO, among lawyers, signifies the power a person has, by virtue of his office, to do certain acts without being applied to. Thus a justice of peace

may *ex officio*, at his discretion, take surety of the peace, without complaint made by any person whatsoever.

There was formerly an oath *ex officio*, whereby a supposed offender was compelled in the ecclesiastical court to confess, accuse, or clear himself of a crime; but this law is repealed.

EX POST FACTO, in law, something done after another: thus an estate granted may be good by matter *ex post facto*, that was not so at first, as in case of election.

EXACERBATION. See **PAROXYSM**.

EXACTION, in law, a wrong done by an officer, or a person in pretended authority, in taking a reward or fee that is not allowed by law.

A person guilty of exaction may be fined and imprisoned. It is often confounded with **EXTORTION**.

EXÆRESIS, in surgery, the operation of extracting or taking away something that is hurtful to the human body.

EXAGGERATION, in rhetoric, a kind of hyperbole, whereby things are augmented or amplified, by saying more than the truth, either as to good or bad.

EXAGGERATION, in painting, a method by which the artist, in representing things, changes them too much, or makes them too strong, either in respect of the design or colouring. It differs from *caricaturing*, in that the latter perverts or gives a turn to the features of a face, &c. which they had not; whereas exaggeration only heightens or improves what they had.

EXAMINERS, in chancery, two officers of that court, who examine, upon oath, witnesses produced in causes depending there, by either the complainant or defendant, where the witnesses live in London or near it. Sometimes parties themselves, by particular order, are examined. In the country, above twenty miles from London, on the parties joining in commission, witnesses are examined by commissioners, being usually counsellors or attorneys not concerned in the cause.

EXAMPLE, in rhetoric, denotes an imperfect kind of induction, or argumentation; whereby it is proved, that a thing which has happened on some other occasion will happen again on the present one, from the similitude of the cases. As, "The war of the Thebans, against their neighbours the Phocians, was ruinous; consequently, that of the Athenians against their neighbours, will likewise be fatal."

EXANTHEMA, among physicians, denotes any kind of efflorescence or eruption, as the measles, purple spots in the plague, or malignant fevers, &c.

EXARCH, in antiquity, an officer sent by the emperors of the east into Italy, in quality of vicar, or rather prefect, to defend that part of Italy which was yet under their obedience, and particularly the city of Ravenna, against the Lombards. The exarch resided at Ravenna; which place, with Rome, was all that was left to the emperors of their Italian dominions. The first exarch was under Justin the younger, in the year 567, after Belisarius and Narses had driven the barbarians out of Italy. The last was Eutychius, defeated by Adolphus king of the Lombards in 752.

Ex
||
Exarch.

Excalceation
||
Exchange.

EXCALCEATION, among the Hebrews, was a particular law, whereby a widow, whom her husband's brother refused to marry, had a right to summon him to a court of justice; and, upon his refusal, might excalceate him, that is, pull off one of his shoes, and spit in his face; both of them actions of great ignominy.

EXCELLENCY, a title anciently given to kings and emperors, but now to ambassadors and other persons who are not qualified for that of *highness*, and yet are to be elevated above the other inferior dignities.

EXCENTRIC, in geometry, a term applied to circles and spheres which have not the same centre, and consequently are not parallel; in opposition to concentric, where they are parallel, having one common centre.

EXCENTRICITY, in astronomy, is the distance of the centre of the orbit of a planet from the centre of the sun; that is, the distance between the centre of the ellipsis and the focus thereof.

EXCEPTION, something reserved, or set aside, and not included in a rule.

It is become proverbial, that there is no rule without an *exception*; intimating, that it is impossible to comprehend all the particular cases, under one and the same maxim. But it is dangerous following the exception, preferably to the rule.

EXCEPTION, in law, denotes a stop or stay to an action; and is either dilatory or peremptory, in proceedings at common law; but in chancery it is what the plaintiff alleges against the sufficiency of an answer, &c.

An exception is no more than the denial of what is taken to be good by the other party, either in point of law or pleading. The counsel in a cause are to take all their exceptions to the record at one time, and before the court has delivered any opinion of it.

EXCERPTA, in matters of literature. See **EXTRACT**.

EXCESS, in arithmetic and geometry, is the difference between any two unequal numbers or quantities, or that which is left after the lesser is taken from or out of the greater.

EXCHANGE, in a general sense, a contract or agreement, whereby one thing is given or exchanged for another.

EXCHANGE, in commerce, is the receiving or paying of money in one country for the like some in another, by means of bills of exchange.

The security which merchants commonly take from one another when they circulate their business, is a bill of exchange, or a note of hand: these are looked upon as payment. See **BILL**, and **Mercantile Laws**.

The punctuality of acquitting these obligations is essential to commerce; and no sooner is a merchant's accepted bill protested, than he is considered as a bankrupt. For this reason, the laws of most nations have given very extraordinary privileges to bills of exchange. The security of trade is essential to every society; and were the claims of merchants to linger under the formalities of courts of law when liquidated by bills of exchange, faith, confidence, and punctuality, would quickly disappear, and the great engine of commerce would be totally destroyed.

A regular bill of exchange is a mercantile contract, in which four persons are concerned, viz. 1. The drawer, who receives the value: 2. His debtor, in a distant place, upon whom the bill is drawn, and who must accept and pay it: 3. The person who gives value for the bill, to whose order it is to be paid: and, 4. The person to whom it is ordered to be paid, creditor to the third.

By this operation, reciprocal debts, due in two distant parts, are paid by a sort of transfer, or permutation of debtors and creditors.

(A) in London is creditor to (B) in Paris, value 100*l*. (C) again in London is debtor to (D) in Paris for a like sum. By the operation of the bill of exchange, the London creditor is paid by the London debtor, and the Paris creditor is paid by the Paris debtor; consequently, the two debts are paid, and no money is sent from London to Paris, nor from Paris to London.

In this example, (A) is the drawer, (B) is the acceptor, (C) is the purchaser of the bill, and (D) receives the money. Two persons here receive the money, (A) and (D); and two pay the money, (B) and (C); which is just what must be done when two debtors and two creditors clear accounts.

This is the plain principle of a bill of exchange. From which it appears, that reciprocal and equal debts only can be acquitted by them.

When it therefore happens, that the reciprocal debts of London and Paris (to use the same example) are not equal, there arises a balance on one side. Suppose London to owe Paris a balance, value 100*l*. How can this be paid? Answer, It may either be done with or without the intervention of a bill.

With a bill, if an exchanger, finding a demand for a bill upon Paris for the value of 100*l*. when Paris owes no more to London, sends 100*l*. to his correspondent at Paris in coin, at the expence (suppose) of 1*l*. and then, having become creditor on Paris, he can give a bill for the value of 100*l*. upon his being repaid his expence, and paid for his risk and trouble.

Or it may be paid without a bill, if the London debtor sends the coin himself to his Paris creditor, without employing an exchanger.

This last example shews of what little use bills are in the payment of balances. As far as the debts are equal, nothing can be more useful than bills of exchange; but the more they are useful in this easy way of business, the less profit there is to any person to make a trade of exchange, when he is not himself concerned either as debtor or creditor.

When merchants have occasion to draw and remit bills for the liquidation of their own debts, active and passive, in distant parts, they meet upon 'Change; where, to pursue the former example, the creditors upon Paris, when they want money for bills, look out for those who are debtors to it. The debtors to Paris again, when they want bills for money, seek for those who are creditors upon it.

This market is constantly attended by brokers, who relieve the merchant of the trouble of searching for those he wants. To the broker every one communicates his wants, so far as he finds it prudent; and by going about among all the merchants, the broker discovers the side upon which the greater demand lies.

Exchange. for money, or for bills.

He who is the demander in any bargain, has constantly the disadvantage in dealing with him of whom he demands. This is no where so much the case as in exchange, and renders secrecy very essential to individuals among the merchants. If the London merchants want to pay their debts to Paris, when there is a balance against London, it is their interest to conceal their debts, and especially the necessity they may be under to pay them; from the fear that those who are creditors upon Paris would demand too high a price for the exchange over and above par.

On the other hand, those who are creditors upon Paris, when Paris owes a balance to London, are as careful in concealing what is owing to them by Paris, from the fear that those who are debtors to Paris would avail themselves of the competition among the Paris creditors, in order to obtain bills for their money, below the value of them, when at par. A creditor upon Paris, who is greatly pressed for money at London, will willingly abate something of his debt, in order to get one who will give him money for it.

From the operation carried on among merchants upon 'Change, we may discover the consequence of their separate and jarring interests. They are constantly interested in the state of the balance. Those who are creditors on Paris, fear the balance due to London; those who are debtors to Paris, dread a balance due to Paris. The interest of the first is to dissemble what they fear; that of the last, to exaggerate what they wish. The brokers are those who determine the course of the day; and the most intelligent merchants are those who dispatch their business before the fact is known.

Now, how is trade in general interested in the question, Who shall outwit, and who shall be outwitted, in this complicated operation of exchange among merchants?

The interest of trade and of the nation is principally concerned in the proper method of paying and receiving the balances. It is also concerned in preserving a just equality of profit and loss among all the merchants, relative to the real state of the balance. Unequal competition among men engaged in the same pursuit, constantly draws along with it bad consequences to the general undertaking; and secrecy in trade will be found, upon examination, to be much more useful to merchants in their private capacity, than to the trade they are carrying on.

Merchants endeavour to simplify their business as much as possible; and commit to brokers many operations which require no peculiar talents to execute. This of exchange is of such a nature, that it is hardly possible for a merchant to carry on the business of his bills, without their assistance, upon many occasions. When merchants come upon Change, they are so full of fear and jealousies, that they will not open themselves to one another, lest they should discover what they want to conceal. The broker is a confidential man, in some degree, between parties, and brings them together.

Besides the merchants who circulate among them-

selves their reciprocal debts and credits arising from Exchange, their importation and exportation of goods, there is another set of merchants who deal in exchange; which is the importation and exportation of money and bills.

Were there never any balance on the trade of nations, exchangers and brokers would find little employment: reciprocal and equal debts would easily be transacted openly between the parties themselves. No man feigns and dissembles, except when he thinks he has an interest in so doing.

But when balances come to be paid, exchange becomes intricate; and merchants are so much employed in particular branches of business, that they are obliged to leave the liquidation of their debts to a particular set of men, who make it turn out to the best advantage to themselves.

Whenever a balance is to be paid, that payment costs, as we have seen, an additional expence to those of the place who owe it, over and above the value of the debt.

If, therefore, this expence be a loss to the trading man, he must either be repaid this loss by those whom he serves, that is, by the nation; or the trade he carries on will become less profitable.

Every one will agree, that the expence of high exchange upon paying a balance, is a loss to a people, no way to be compensated by the advantages they reap from enriching the few individuals among them who gain by contriving methods to pay it off; and if an argument is necessary to prove this proposition, it may be drawn from this principle, *viz.* whatever renders the profit upon trade precarious or uncertain, is a loss to trade in general: this loss is the consequence of high exchange; and although a profit does result from it upon one branch of trade, the exchange-business, yet that cannot compensate the loss upon every other.

We may, therefore, here repeat what we have said above, that the more difficulty is found in paying a balance, the greater is the loss to a nation.

The Course of Exchange.

THE course of exchange is the current price betwixt two place, which is always fluctuating and unsettled, being sometimes above and sometimes below par, according to the circumstances of trade.

When the course of exchange rises above par, the country where it rises may conclude for certain, that the balance of trade runs against them. The truth of this will appear, if we suppose Britain to import from any foreign place goods to the value of 100,000*l.* at par, and export only to the value of 80,000*l.* In this case, bills on the said foreign place will be scarce in Britain, and consequently will rise in value; and after the 80,000*l.* is paid, bills must be procured from other places at a high rate to pay the remainder, so that perhaps 120,000*l.* may be paid for bills to discharge a debt of 100,000*l.*

Though the course of exchange be in a perpetual flux, and rises or falls according to the circumstances of trade; yet the exchanges of London, Holland, Hamburgh, and Venice, in a great measure regulate those of all other places in Europe.

I. Exchange with Holland.

MONEY-TABLE.

	Par in Sterling.	s.	d.
8 Pennings, or 2 duytes,	1 groat or penny	=	0 0.54
2 Groats, or 16 pennings,	1 stiver	=	0 1.09
6 Stivers, or 12 pence,	1 schilling	=	0 6.56
20 Schillings,	1 pound Flemish	=	10 11.18
20 Stivers, or 40 pence,	1 guilder or florin	=	1 9.86
6 Guilders, or florins,	1 pound Flemish	=	10 11.18
2½ Guilders, or florins,	1 rixdollar	=	4 6.66

In Holland there are two sorts of money, bank and current. The bank is reckoned good security; demands on the bank are readily answered; and hence bank-money is generally rated from 3 to 6 *per cent.* better than the current. The difference between the bank and current money is called the *agio*.

Bills on Holland are always drawn in bank-money; and if accounts be sent over from Holland to Britain in current money, the British merchant pays these accounts by bills, and in this case has the benefit of the *agio*.

PROB. I. To reduce bank-money to current money.

RULE. As 100 to 100+*agio*, so the given guilders to the answer.

EXAMPLE. What will 2210 guilders in bank-money amount to in Holland currency, the *agio* being 3½ *per cent.*?

Guild.		
As 100 : 103½ :: 2210		
8	8	825
800	825	41050
		4420
		17680
Guild. st. pen.		
8 00	18232 50	(2279 1 4 cur.
	16	20
	22	10 00
	16	8
	63	2
	56	16
	72	32
	72	32

Or, by practice,

50)2210	
44.2	= 2 <i>per cent.</i>
22.1	= 1 <i>per cent.</i>
2.7625	= ½ <i>per cent.</i>
2279.0625	

If the *agio* only be required, make the *agio* the middle term, thus:

As 100 : 3½ :: 2210 : 69 1 4 *agio*. Or, work by practice, as above.

Guild. st. pen.

PROB. II. To reduce current money to bank-money.

RULE. As 100+*agio* to 100, so the given guilders to the answer.

EXAMPLE. What will 2279 guilders 1 stiver 4 pennings, Holland currency, amount to in bank-money, the *agio* being 3½ *per cent.*?

Guild.	Guild.	Guild. st. pen.
As 103½ : 100 :: 2279 1 4		
8	8	20
825	800	45581
20		16
16500		273490
16		45581
990		729100
165		800
8)264 000	8)583440 000	
3)33	3)72930	Guild.
11	11)24310	(2210 bank.

In Amsterdam, Rotterdam, Middleburgh, &c. books and accounts are kept by some in guilders stivers and pennings, and by others in pounds shillings and pence Flemish.

Britain gives 1 l. Sterling for an uncertain number of shillings and pence Flemish. The par is 1 l. Sterling for 36.59 s. Flemish; that is, 1 l. 16 s. 7.08 d. Flemish.

When the Flemish rate rises above par, Britain gains and Holland loses by the exchange, and *vice versa*. Sterling money is changed into Flemish, by saying, As 1 l. Sterling to the given rate, So is the given Sterling to the Flemish sought. Or, the Flemish money may be cast up by practice. Dutch money, whether pounds, shillings, pence Flemish, or guilders, stivers, pennings, may be changed into Sterling, by saying,

As the given rate to 1 l. Sterling,
So the given Dutch to the Sterling sought.

Ex-

EXAMPLE. I. A merchant in Britain draws on Amsterdam for 782l. Sterling: How many pounds Flemish, and how many guilders, will that amount to, exchange at 34s. 8d. per pound Sterling?

Decimally.		Decimally.	
L.	s. d.	L.	s. d.
If 1 :	34 8 ::	782	
12		782	
416		692	
782		27733	
832		242666	
3328		210)27109.3	
2912		L.1355 9 4 Flem.	
12)325312	d.		
210)27109 4			
L. 1355 9 4 Flem.			

By practice.

L.	s. d.
782	
391	
156 8	
26 1 4	
1355 9 4 Fl.	

Or thus:

L.	s. d.
782	
547 8	
26 1 4	
1355 9 4 Fl.	

Multiply the Flemish pounds and shillings by 6, and the product will be guilders and stivers; and if there be any pence, multiply them by 8 for pennings; or, divide the Flemish pence by 40, and the quot will be guilders, and the half of the remainder, if there be any, will be stivers, and one penny odd will be half a stiver, or 8 pennings, as follows,

L.	s. d.	Flem. pence.
1355	9 4	410)32531 2(32 rem.
6		
Guild. 8132 16 fliv.		Guild. 8132 16 fliv.

2. Change 591l. 5s. Flemish into Sterling money, exchange at 37s. 6d. Flemish per l. Sterling?

Flem.	Ster.	Flem.
s. d.	L.	s. d.
If 37 6 :	1 ::	591 5
2		20
5)75		11025
4)15		2
3		5)23650
		5)4730
		3)946

L. s. d.
Ans. 315 5 8 Ster.

Decimally.

5) L.	L. 5) L.
If 1.875 :	1 :: 591.25
5) .375	5) 118.25
5) .075	5) 23.65
.015	.015) 4.73(313.3
	45
	23
	15
	80
	75
	50
	45
	* 5

Holland exchanges with other nations as follows, viz. with

	Flem. d.
Hamburgh, on the dollar,	= 66½
France, on the crown,	= 54
Spain, on the ducat,	= 109½
Portugal, on the crusade,	= 50
Venice, on the ducat,	= 93
Genoa, on the pezzo,	= 100
Leghorn, on the piastra,	= 100
Florence, on the crown,	= 120
Naples, on the ducat,	= 74½
Rome, on the crown,	= 136
Milan, on the ducat,	= 102
Bologna, on the dollar,	= 94½

Exchange between Britain and Antwerp, as also the Austrian Netherlands, is negotiated the same way as with Holland; only the par is somewhat different, as will be described in article 2d, following.

II. Exchange with Hamburgh.

MONEY-TABLE.

	Par in Sterling.	s. d.
12 Pennings	1 schilling-lub	= 0 1½
16 Schilling-lubs	1 mark	= 1 6
2 Marks	1 dollar	= 3 0
3 Marks	1 rixdollar	= 4 6
6½ Marks	1 ducat	= 9 4½

Books and accounts are kept at the bank, and by most people in the city, in marks, schilling-lubs, and pennings; but some keep them in pounds, schillings, and groots Flemish.

The agio at Hamburgh runs between 20 and 40 per cent. All bills are paid in bank-money.

Hamburgh exchanges with Britain by giving an uncertain number of schillings and groots Flemish for the pound Sterling. The groot or penny Flemish here, as also at Antwerp, is worth ⅔ of a penny Sterling; and so something better than in Holland, where it is only ⅔ d. Sterling.

6 Pennings	} make {	<i>Flemish.</i>
6 Schilling-lubs		1 groat or penny
1 Schilling-lub		1 schilling
1 Mark		2 pence or groats
7½ Marks		32 pence or groats
		1 pound.

The par with Hamburg, and also with Antwerp, is 35s. 6½d. Flemish for 1 l. Sterling.

EXAMPLES. 1. How many marks must be received at Hamburg for 300 l. Sterling, exchange at 35s. 3d. Flemish *per* l. Sterling.

$$\begin{array}{r} L. \quad s. \quad d. \quad L. \\ \text{If } 1 : 35 \quad 3 :: 300 \\ 12 \end{array}$$

$$\begin{array}{r} 423 \\ 300 \\ \hline 32) 126900 (3965 \quad 10 \\ 96000 \\ \hline \end{array}$$

$$\begin{array}{r} 309 \\ 288 \\ \hline \end{array}$$

$$\begin{array}{r} 210 \\ 192 \\ \hline \end{array}$$

$$\begin{array}{r} 180 \\ 160 \\ \hline \end{array}$$

$$\begin{array}{r} (20) \\ 16 \\ \hline \end{array}$$

$$\begin{array}{r}) 320 \\ 32 \\ \hline \end{array}$$

$$(0)$$

Decimally.

Flem. l. Marks. Flem. l.

$$\text{If } 20 : 7.5 :: 35.25$$

$$4 : 1.5 :: 35.25$$

$$1.5$$

$$17625$$

$$3525$$

$$4) 52.875$$

$$\begin{array}{r} \text{Marks in 1 l. Sterling} \quad 13.21875 \\ 300 \\ \hline \end{array}$$

$$\begin{array}{r} \text{Marks in 300 l. Sterling} \quad 3965.62500 \\ 16 \\ \hline \end{array}$$

$$3750$$

$$625$$

$$\text{Schilling-lubs } 10.000$$

2. How much Sterling money will a bill of 3965 mark 10 schilling-lubs amount to, exchange at 35s. 3d. Flemish *per* l. Sterling?

$$\begin{array}{r} Fl. l. \quad d. \quad L. St. Mk. \quad sch. \\ \text{If } 35 \quad 3 : 1 :: 3965 \quad 10 \\ 12 \quad 32 \quad 2 \\ \hline 423 \quad 7930 \quad 20d. \\ 11897 \end{array}$$

$$423) 126900 (300 l. ster. \\ 1269$$

Decimally.

$$4 : 1.5 :: 35.25$$

$$1.5$$

$$17625$$

$$2525$$

$$\begin{array}{r} 4) 52.875 (13.21875 \\ 13.21875) 3965.62500 (300 l. ster. \\ 3965625 \end{array}$$

III. Exchange with France.

MONEY-TABLE.

	<i>Par in Ster.</i>	<i>s. d.</i>
12 deniers	} make {	1 fol = 0 0 $\frac{1}{8}$
20 fols		1 livre = 0 9 $\frac{1}{2}$
3 livres		1 crown = 2 5 $\frac{1}{4}$

At Paris, Rouen, Lyons, &c. books and accounts are kept in livres, fols, and deniers; and the exchange with Britain is on the crown, or ecu, of 3 livres, or 60 fols Tournois. Britain gives for the crown an uncertain number of pence, commonly between 30 and 34, the par, as mentioned above, being 29½d.

EXAMP. 1. What Sterling money must be paid in London to receive in Paris 1978 crowns 25 fols, exchange at 31¼d. *per* crown!

$$\begin{array}{r} Sols. \quad d. \quad Cr. \quad fols. \\ \text{If } 60 : 31\frac{1}{4} :: 1978 \quad 25 \end{array}$$

$$253$$

$$118705$$

$$253$$

$$356115$$

$$593525$$

$$237410$$

$$60) 300323615 \text{ Rem.}$$

$$8) 500539 \quad 3$$

$$12) 62567 \quad 11$$

$$20) 5213 \quad 13$$

$$L. 260 \quad 13 \quad 11\frac{1}{4} \text{ Ans.}$$

By

By Practice.

		<i>Cr. Sols.</i>	
<i>d.</i>		1978	25, at $31\frac{1}{2}$ d.
30 = $\frac{1}{2}$	247	5	0
$1\frac{1}{2} = \frac{3}{2}$	12	7	3
$\frac{1}{2} = \frac{1}{2}$	1	0	$7\frac{1}{2}$
<i>Sols</i> 20 = $\frac{1}{2}$	0	0	$10\frac{1}{2}$
5 = $\frac{1}{4}$	0	0	$2\frac{1}{2}$
		260	13 $11\frac{1}{2}$

If you work decimally, say,

Cr. d. Ster. Cr. d. Ster.

As 1 : 31.625 :: 1978.416 : 62567.427083

2. How many French livres will L. 121 : 18 : 6 Sterling amount to, exchange at $32\frac{1}{2}$ d. per crown?

d. Liv. L. s. d.
If $32\frac{1}{2} : 3 :: 121$ 18 6

263	8	20
24	2438	12
	29262	24
	117048	
	58524	

Liv. sols. den.

263)702288(2670 5 11 *Ans.*

Rem. (78 = 5 sols 11 deniers.

IV. Exchange with Portugal.

MONEY-TABLE.

		<i>Par in Ster. s. d. f.</i>	
400 rees	} make	1 ree	= 0 0 0.27
1000 rees		1 cruade	= 2 3
		1 millree	= 5 $7\frac{1}{2}$

In Lisbon, Oporto, &c. books and accounts are generally kept in rees and millrees; and the millrees are distinguished from the rees by a mark set between them thus, 485 v 372; that is, 485 millrees and 372 rees.

Britain, as well as other nations, exchanges with Portugal on the millree; the par, as in the table, being 67 $\frac{1}{2}$ d. Sterling. The course with Britain runs from 63 d. to 68 d. Sterling per millree.

EXAMPLES. I. How much Sterling money will pay a bill of 827 v 160 rees, exchange at $63\frac{1}{2}$ d. Sterling per millree?

<i>Rees.</i>	<i>d.</i>	<i>Rees.</i>
If 1000 : $63\frac{1}{2}$:: 827.160		
8		507
8000	507	579012
		413580
		Rem.
8000)419370.120		2
12)52421		— 5 d.
20)4368		— 8 s.
		L. 218 8 $5\frac{1}{2}$ <i>Ans.</i>

By Practice.

		<i>Rees.</i>	
<i>d.</i>		827.160,	at $63\frac{1}{2}$ d.
60 = $\frac{1}{2}$	206.790		
3 = $\frac{1}{2}$	10.3395		
$\frac{3}{4} = \frac{1}{2}$.861625		
$\frac{1}{4} = \frac{1}{2}$.4308125		

218.4219375

The rees being thousandth-parts of the millrees, are annexed to the integer, and the operation proceeds exactly as in decimals.

2. How many rees of Portugal will 500 l. Sterling amount to, exchange at 5 s. 4 $\frac{1}{2}$ d. per millree?

		<i>d. Rees. L.</i>	
If $64\frac{1}{2} : 1000 :: 500$			
8	20		
517	8000	100000	

12

120000

8000

Rees.

517)960000000(1856.866 *Ans.*

V. Exchange with Spain.

MONEY-TABLE.

		<i>Par in Ster. s. d.</i>	
34 mervadies	} make	1 rial	= 0 5 $\frac{1}{2}$
8 rials		1 piafre	= 3 7
375 mervadies		1 ducat	= 4 11 $\frac{1}{2}$

In Madrid, Bilbao, Cadiz, Malaga, Seville, and most of the principal places, book and accounts are kept in piaftres, called also *dollars*, rials, and mervadies; and they exchange with Britain generally on the piaftre, and sometimes on the ducat. The course runs from 35 d. to 45 d. Sterling for a piaftre or dollar of 8 rials.

EXAMP. 1. London imports from Cadiz, goods to the value of 2163 piaftres and 4 rials: How much Sterling will this amount to, exchange at $38\frac{1}{2}$ d. Sterling per piaftre?

		<i>Piaft. Rials.</i>	
<i>d.</i>		2163	4, at $38\frac{1}{2}$ d.
24 = $\frac{1}{2}$	216	6	
12 = $\frac{1}{2}$	108	3	
2 = $\frac{1}{2}$	18	0 6	
$\frac{2}{3} = \frac{1}{2}$	2	5 0 $\frac{1}{2}$	
$\frac{1}{3} = \frac{1}{2}$	1	2 6 $\frac{1}{2}$	
		345	17 $1\frac{1}{2}$
			1 7 $\frac{1}{2}$

L. 345 18 8 $\frac{1}{2}$ *Ans.*

2. London remits to Cadiz 345 l. 18 s. 8 $\frac{1}{2}$ d. How much Spanish money will this amount to, exchange at $38\frac{1}{2}$ d. Sterling per piaftre?

Exchange,	<i>d. Piaſt. L. s. d.</i>		2. How many ducats at Venice are equal to 385l.	Exchange,
If 38 $\frac{1}{2}$: 1 :: 345 18 8 $\frac{1}{2}$			128. 6d. Sterling, exchange at 4s. 4d. per ducat?	
	20	614) 1328389 (2163 piaſtres.	<i>L. Duc. L.</i>	
307		1228	If .216 : 1 :: 385.625	
2	6918		.216) 385.625	
	12		21 385625	
614		1003	<i>Duc.</i>	
	83024	614	195) 347062.5 (1779.8 <i>Anſ.</i>	
	16		195	
		3898		
		3684	1520	
	498149		1365	
	83024			
Carried up	1328389	2149	1556	
		1842	1365	
		307	1912	
		8	1755	
<i>Piaſt. Riats.</i>		614) 2456 (4 riats.	1575	
<i>Anſ.</i> 2163 4		2456	1569	

VI. *Exchange with Venice.*

MONEY-TABLE.

$\frac{5\frac{1}{2}}{24}$ Soldi } make $\frac{1}{1}$ $\frac{\text{gros}}{\text{ducat}} = 50\frac{1}{4}$ d. Sterling.
 "The money of Venice is of three sorts, viz. two of bank money, and the picoli money. One of the banks deals in banco money, and the other in banco current. The bank money is 20 per cent. better than the banco current, and the banco current 20 per cent. better than the picoli money. Exchanges are always negotiated by the ducat banco, the par being 4s. 2½ d. Sterling, as in the table.

Though the ducat be commonly divided into 24 gros, yet bankers and negotiators, for facility of computation, usually divide it as follows, and keep their books and accounts accordingly.

12 Deniers d'or } make { 1 fol d'or
20 Sols d'or } { 1 ducat = $50\frac{1}{4}$ d. Sterling.
The course of exchange is from 45 d. to 55 d. Sterling per ducat.

EXAMP. I. How much Sterling money is equal to 1459 ducats 18 sols 1 denier, bank money of Venice, exchange at $52\frac{3}{4}$ d. Sterling per ducat?

<i>Duc. d.</i>	<i>Duc. fol. den.</i>		<i>d.</i>
If 1 : 52 :: 1459 18	1		52 $\frac{1}{2}$ rate.
	52 $\frac{1}{2}$	<i>Sols.</i>	
	10 =		26 $\frac{1}{2}$
	2918		13 $\frac{1}{2}$
	7295		5 $\frac{1}{2}$
			2 $\frac{1}{2}$
<i>d.</i> 75868			0 $\frac{1}{2}$
$\frac{1}{2}$ = 729		<i>den.</i> 1 = $\frac{1}{18}$	
$\frac{1}{2}$ = 364			47 $\frac{1}{2}$

$$\begin{array}{r} 76962\frac{2}{8} \\ 47\frac{5}{8} \\ \hline \text{Rem.} \\ 12)77010(64. \end{array}$$

2|0)641|7(17s.

L. 320 17 6 Sterling. *Anf.*

Vol. IV.

2. How many ducats at Venice are equal to 385*l.* Exchange, 12*s.* 6*d.* Sterling, exchange at 4*s.* 4*d.* *per* ducat?

$$\begin{array}{r}
 L. \quad \quad \quad \text{Duc.} \quad \quad L. \\
 \text{If } .21\phi : 1 :: 385.625 \\
 \quad .21\phi)385.625 \\
 \quad \quad 21 \quad 385625 \\
 \hline
 195)347062.5(1779.8 \quad \text{Ans.} \\
 \quad \quad 195
 \end{array}$$

1520
1365

1556
1365

1912
1755

1575
1560

(15)

Bank money is reduced to current money, by allowing for theagio, as was done in exchange with Holland; viz. fays, As 100 to 120, or as 10 to 12, or as 5 to 6, so the given bank money to the current sought. And current money is reduced to bank money by reverting the operation. And in like manner may piccol money be reduced to current or to bank money, and the contrary.

100 ducats banco of Venice.

In Leghorn = 93 pezzos	In Lucca = 77 crowns
In Rome = 68½ crowns	In Francfort = 139½ florins

VII. *Exchange with Genoa.*

MONEY-TABLE.

12 Denari } make { 1 foldi s. d.
20 Soldi } { 1 pezzo = 4 6 Sterling.

Books and accounts are generally kept in pezzos, foldi, and denari: but some keep them in lires, foldi, and denari; and 12 such denari make 1 foldi, and 20 foldi make 1 lire.

The pezzo of exchange is equal to $5\frac{1}{4}$ liras; and, consequently, exchange money is $5\frac{1}{4}$ times better than the lire money. The course of exchange runs from 47 d. to 58 d. Sterling *per pezzo*.

EXAMP. How much Sterling money is equivalent to 3390 pezzos 16 foldi, of Genoa, exchange at $51\frac{1}{4}$ d. Sterling per pezzo?

<i>Soldi.</i>	<i>d.</i>	<i>Pez.</i>	<i>foldi.</i>
If 20 :	51 $\frac{7}{8}$::	3390	16
8	<u> </u>	20	

$$\begin{array}{r} 160 \quad 415 \\ \hline 67816 \\ 415 \end{array}$$

339080
67816
271264

$\frac{272204}{160} \cdot 28143640 (175897\frac{1}{2} = 732 \cdot 18 \cdot 1\frac{1}{2})$

If Sterling money be given, it may be reduced or changed into pezzos of Genoa, by reversing the former operation.

16 P

Ex-

Exchange. Exchange money is reduced to lire money, by being multiplied by $5\frac{1}{2}$, as follows:

<i>Pez. foldi.</i>	<i>Decimally.</i>
3390 16	3390.8
$5\frac{1}{2}$	5.75
<hr/>	
16954 0	169540
$\frac{1}{2}$ = 1695 8	237356
$\frac{1}{4}$ = 847 14	169540.

Lires 19497 2 Lires 19497.100
And lire money is reduced to exchange money by dividing it by $5\frac{1}{2}$

In Milan, 1 crown	= 80
In Naples, 1 ducat	= 86
In Leghorn, 1 piaſtre	= 20
In Sicily, 1 crown	= $127\frac{1}{2}$

VIII. Exchange with Leghorn.

MONEY-TABLE.

12 Denari	$\frac{1}{2}$ foldi	<i>s. d.</i>
20 Soldi	$\frac{1}{2}$ make	1 piaſtre = 4 6 <i>Ster.</i>

Books and accounts are kept in piaſtres, foldi, and denari. The piaſtre here conſiſts of 6 lires, and the lire contains 20 foldi, and the foldi 12 denari, and conſequently exchange money is 6 times better than lire money. The courſe of exchange is from 47 d. to 58 d. Sterling per piaſtre.

EXAMPLE. What is the Sterling value of 731 piaſtres, at $55\frac{1}{2}$ d. each.

<i>s. d.</i>	731 piaſtres, at $55\frac{1}{2}$ d.
4 or 48 = $\frac{1}{2}$	146 4
6 = $\frac{1}{4}$	18 5 6
$1\frac{1}{2}$ = $\frac{3}{4}$	4 11 4 $\frac{1}{2}$

L. 169 0 10 $\frac{1}{2}$ *Anſ.*

Sterling money is reduced to money of Leghorn, by reverſing the former operation; and exchange money is reduced to lire money by multiplying by 6, and lire money to exchange money by dividing by 6.

100 piaſtres of Leghorn are

In Naples = 134 ducats. | In Geneva = $185\frac{1}{2}$ crowns.

Soldi of Leghorn.

In Sicily, 1 crown = 133 $\frac{1}{2}$

In Sardinia, 1 dollar = 95 $\frac{1}{2}$

The above are the chief places in Europe with which Britain exchanges directly; the exchanges with other places are generally made by bills on Hamburgh, Holland, or Venice. We ſhall here, however, ſubjoin the par of exchange betwixt Britain and moſt of the other places in Europe with which ſhe has any commercial intercourſe.

	<i>Par in Sterling L. s. d.</i>
Rome	1 crown = 6 1 $\frac{1}{2}$
Naples,	1 ducat = 3 4 $\frac{1}{2}$
Florence,	1 crown = 5 4 $\frac{1}{2}$
Milan,	1 ducat = 4 7
Bologna	1 dollar = 4 3
Sicily,	1 crown = 5 0
Vienna	1 rixdollar = 4 8
Auſburgh,	1 florin = 3 1 $\frac{1}{2}$
Francfort,	1 florin = 3 0
Bremen	1 rixdollar = 3 6
Breſlau,	1 rixdollar = 3 3

	<i>Par in Sterling L. s. d.</i>
Berlin,	1 rixdollar = 4 0
Stetin,	1 mark = 1 6
Emden	1 rixdollar = 3 6
Bolſenna	1 rixdollar = 3 8
Dantzic,	13 $\frac{1}{2}$ florins = 1 0 0
Stockholm,	34 $\frac{1}{2}$ dollars = 1 0 0
Ruſſia,	1 ruble = 4 5
Turkey,	1 aſper = 4 6

The following places, viz. Switzerland, Nuremburgh, Leipſic, Drefden, Ofnaburgh, Brunſwic, Cologn, Leige, Straſburgh, Cracow, Denmark, Norway, Riga, Revil, Narva, exchange with Britain, when direct exchange is made, upon the rixdollar, the par being 4 s. 6 d. Sterling.

IX. Exchange with America and the Weſt Indies.

In North America and the Weſt Indies, accounts, as in Britain, are kept in pounds, ſhillings, and pence. In North America they have few coins circulating among them, and on that account have been obliged to ſubſtitute a paper-currency for a medium of their commerce; which having no intrinsic value, is ſubjected to many diſadvantages, and generally ſuffers a great diſcount. In the Weſt Indies coins are more frequent, owing to their commercial intercourſe with the Spaniſh ſettlements.

Exchange betwixt Britain and America, or the Weſt Indies, may be computed as in the following examples:

1. The neat proceeds of a cargo from Britain to Boſton amount to 845 l. 17 s. 6 d. currency: How much is that in Sterling money, exchange at 80 per cent.?

If 180 : 100	<i>L. s. d.</i>
18 : 10	L. 17 6
9 : 5	17 6
	5
<hr/>	
9)4229	7 6

L. 469 18 7 $\frac{1}{2}$ *Ster. Anſ.*

2. Boſton remits to Britain a bill of 469 l. 18 s. 7 $\frac{1}{2}$ d. Sterling: How much currency was paid for the bill at Boſton, exchange at 80 per cent.?

If 100 : 180	<i>L. s. d.</i>
5 : 9	2 : 469 18 7 $\frac{1}{2}$
	9

5)4229	7 6
	845 17 6

3. How much Sterling money will 1780 l. Jamaica currency amount to, exchange at 40 per cent.?

If 140 : 100	<i>L.</i>
14 : 10	7 : 5 : 1780
	5
<hr/>	
7)8900	

s. d.
1271 8 6 $\frac{1}{2}$ *Ster. Anſ.*

Bills of exchange from America, the rate being high, is an expenſive way of remitting money to Britain; and therefore merchants in Britain generally chooſe to have the debts due to them remitted home in fugar, rum, or other produce.

X. *Exchange with Ireland.*

At Dublin, and all over Ireland, books and accounts are kept in pounds, shillings, and pence, as in Britain; and they exchange on the 100l. Sterling.

The par of one shilling Sterling is one shilling and one penny Irish: and to the par of 100l. Sterling is 108l. 6s. 8d. Irish. The course of exchange runs from 6 to 15 per cent.

EXAMP. 1. London remits to Dublin 586l. 10s. Sterling: How much Irish money will that amount to, exchange at $9\frac{1}{2}$ per cent.?

$$\begin{array}{r} \text{L} \\ \text{If } 100 :: 109\frac{1}{2} :: 586.5 \\ 8 \quad \quad \quad 877 \\ \hline 800 :: 877 \quad 41055 \\ \quad \quad \quad 41055 \\ \quad \quad \quad 46920 \\ \hline 800)514360.5 \end{array}$$

642.950625
Ans. 642l. 19s. Irish.

By practice.

$$\begin{array}{r} \text{p. cent.} \\ 10 = \frac{1}{10} \\ 2 = \frac{1}{5} \\ \hline 586.5 \\ 58.65 \\ 11.73 \text{ sub.} \\ \hline 46.92 \\ 5.865 \\ 2.9325 \\ .733125 \\ \hline 9\frac{1}{2} \\ 56.450625 \text{ add.} \\ \hline 642.950625 \end{array}$$

2. How much Sterling will 625l. Irish amount to, exchange at $10\frac{1}{4}$ per cent.?

$$\begin{array}{r} \text{If } 110\frac{1}{4} :: 100 :: 625 \\ 8 \quad \quad \quad 800 \\ \hline 883 \quad 800 \quad 883)500000(566 \quad 5 \quad 0\frac{1}{4} \text{ Ster. Ans.} \end{array}$$

XI. *Exchange between London and other places in Britain.*

THE several towns in Britain exchange with London for a small premium in favour of London; such as, 1, $1\frac{1}{2}$, &c. per cent. The premium is more or less, according to the demand for bills?

EXAMP. Edinburgh draws on London for 860l. exchange at $1\frac{1}{2}$ per cent.: How much money must be paid at Edinburgh for the bill?

$$\begin{array}{r} \text{L.} \\ 860 \\ \hline \text{per cent.} \\ 1 = \frac{1}{100} \\ \frac{1}{2} = \frac{1}{200} \\ \frac{1}{4} = \frac{1}{400} \\ \hline 8 \quad 12 \\ 2 \quad 3 \\ 1 \quad 1 \quad 6 \\ \hline 11 \quad 16 \quad 6 \text{ premium.} \\ \hline 817 \quad 16 \quad 6 \text{ paid for the bill.} \end{array}$$

To avoid paying the premium, it is an usual practice to take the bill payable at London a certain number of days after date; and in this way of doing, 73 days is equivalent to 1 per cent.

XII. *Arbitration of Exchanges.*

THE course of exchange betwixt nation and nation naturally rises or falls according as the circumstances and balance of trade happen to vary. Now to draw upon and remit to foreign places, in this fluctuating state of exchange, in the way that will turn out most profitable, is the design of arbitration. Which is either simple or compound.

I. *Simple Arbitration.*

In simple arbitration the rates or prices of exchange from one place to other two are given; whereby is found the correspondent price between the said two places, called the *arbitrated price*, or *par of arbitration*: and hence is derived a method of drawing and remitting to the best advantage.

EXAMP. 1. If exchange from London to Amsterdam be 33s. 9d. per l. Sterling; and if exchange from London to Paris be 32 d. per crown; what must be the rate of exchange from Amsterdam to Paris, in order to be on a par with the other two?

$$\begin{array}{r} \text{Ster. Flem. Ster.} \\ \text{s. s. d. d.} \\ \text{If } 20 :: 33 \quad 9 :: 32 \\ 12 \quad 12 \\ \hline 240 \quad 405 \\ \quad \quad 32 \\ \hline 810 \\ 1215 \end{array}$$

240)12960(54 d. Flem. per crown. Ans.

2. If exchange from Paris to London be 32 d. Sterling per crown; and if exchange from Paris to Amsterdam be 54 d. Flemish per crown; what must be the rate of exchange between London and Amsterdam, in order to be on a par with the other two?

$$\begin{array}{r} \text{Ster. Flem. Ster.} \\ \text{d. d. d.} \\ \text{If } 32 :: 54 :: 240 \\ 240 \\ \hline 216 \\ 108 \end{array}$$

12)12960(405 (33 9 Flem. per l. Ster. Ans.)

From these operations it appears, that if any sum of money be remitted, at the rates of exchange mentioned, from any one of the three places to the second, and from the second to the third, and again from the third to the first, the sum so remitted will come home entire, without increase or diminution.

From the par of arbitration thus found, and the course of exchange given, is deduced a method of drawing and remitting to advantage, as in the following example.

3. If exchange from London to Paris be 32 d. Sterling *per* crown, and to Amsterdam 405 d. Flemish *per* l. Sterling; and if, by advice from Holland to France, the course of exchange between Paris and Amsterdam is fallen to 52 d. Flemish *per* crown; what may be gained *per cent.* by drawing on Paris, and remitting to Amsterdam?

The par of arbitration between Paris and Amsterdam in this case, by Ex. 1. is 54 d. Flemish *per* crown. Work as under.

L. St. Cr. L. St. Cr.

If 32 : 1 :: 100 : 750 debit at Paris

Cr. d. Fl. Cr. d. Fl.

If 1 : 52 :: 750 : 39000 credit at Amsterdam.

d. Fl. L. St. d. Fl. L. s. d. Ster.

If 405 : 1 :: 39000 : 96 5 11 $\frac{1}{2}$ to be remitted.
100

3 14 0 $\frac{5}{8}$

But if the course of exchange between Paris and Amsterdam, instead of falling below, rise above the par of arbitration, suppose to 56 d. Flemish *per* crown; in this case, if you propose to gain by the negotiation, you must draw on Amsterdam, and remit to Paris. The computation follows.

L. St. d. Fl. L. St. d. Fl.

If 1 : 405 :: 100 : 40500 debit at Amsterdam.

d. Fl. Cr. d. F. Cr.

If 56 : 1 :: 40500 : 723 $\frac{1}{4}$ credit at Paris.

Cr. d. St. Cr. L. s. d. Ster.

If 1 : 32 :: 723 $\frac{1}{4}$: 96 8 6 $\frac{1}{2}$ to be remitted.
100

3 11 5 $\frac{1}{4}$ gained *per cent.*

In negotiations of this sort, a sum for remittance is afforded out of the sum you receive for the draught; and your credit at the one foreign place pays your debt at the other.

II. Compound Arbitration.

In compound arbitration the rate or price of exchange between three, four, or more places, is given, in order to find how much a remittance passing through them all will amount to at the last place; or to find the arbitrated price, or par of arbitration, between the first place and the last. And this may be done by the following

RULES. I. Distinguish the given rates or prices into antecedents and consequents; place the antecedents in one column, and the consequents in another on the right, fronting one another by way of equation.

II. The first antecedent, and the last consequent to which an antecedent is required, must always be of the same kind.

III. The second antecedent must be of the same kind with the first consequent, and the third antecedent of the same kind with the second consequent, &c.

IV. If to any of the numbers a fraction be annexed, both the antecedent and its consequent must be multiplied into the denominator.

V. To facilitate the operation, terms that hap-

pen to be equal or the same in both columns, may be dropped or rejected, and other terms may be abridged.

VI. Multiply the antecedents continually for a divisor, and the consequents continually for a dividend, and the quot will be the answer or antecedent required.

EXAMP. 1. If London remit 1000 l. Sterling to Spain, by way of Holland, at 55 s. Flemish *per* l. Sterling; thence to France, at 58 d. Flemish *per* crown; thence to Venice, at 100 crowns *per* 60 ducats; and thence to Spain, at 360 mervadies *per* ducat; how many pialtres, of 272 mervadies, will the 1000 l. Sterling amount to in Spain?

Antecedents.	Consequents.	Abridged.
1 l. Sterling =	35 s. or 420 d. Fl.	1 : 210
58 d. Flemish =	1 crown France	29 = 1
100 crowns France =	60 ducats Venice	1 : 30
1 ducat Venice =	360 mervadies Spain	1 = 45
272 mervadies =	1 pialtre	17 = 1
How many pialtres =	1000 l. Sterling	= 10

In order to abridge the terms, divide 58 and 420 by 2, and you have the new antecedent 29, and the new consequent 210; reject two ciphers in 100 and 1000; divide 272 and 360 by 8, and you have 34 and 45; divide 34 and 60 by 2, and you have 17 and 30; and the whole will stand abridged as above.

Then, $29 \times 17 = 493$ divisor; and $210 \times 30 \times 45 \times 10 = 2835000$ dividend; and, $493 \div 2835000 = 5750\frac{1}{2}$ pialtres. *Ans.*

Or, the consequents may be connected with the sign of multiplication, and placed over a line by way of numerator; and the antecedents, connected in the same manner, may be placed under the line, by way of denominator; and then abridged, as follows:

$$\frac{420 \times 60 \times 360 \times 100}{58 \times 100 \times 272} = \frac{210 \times 60 \times 360 \times 10}{29 \times 17 \times 272}$$

$$= \frac{210 \times 60 \times 45 \times 10}{29 \times 34 \times 45 \times 10}$$

$$= \frac{2835000}{493}$$

And, $493 \div 2835000 = 5750\frac{1}{2}$ pialtres. *Ans.*

The placing the terms by way of antecedent and consequent, and working as the rules direct, save so many statings of the rule of three, and greatly shortens the operation. The proportions at large for the above question would stand as under.

<i>L. St. d. Fl.</i>	<i>L. St.</i>	<i>d. Fl.</i>
If 1 : 420 ::	1000	: 420000
<i>d. Fl. Cr.</i>	<i>d. Fl.</i>	<i>Cr.</i>
If 58 : 1 ::	420000	: 7241 $\frac{1}{2}$
<i>Cr. Duc.</i>	<i>Cr.</i>	<i>Duc.</i>
If 100 : 60 ::	7241 $\frac{1}{2}$: 4344 $\frac{3}{4}$
<i>Duc. Mer.</i>	<i>Duc.</i>	<i>Mer.</i>
If 1 : 360 ::	4344 $\frac{3}{4}$: 1564137 $\frac{1}{2}$
<i>Mer. Pial.</i>	<i>Mer.</i>	<i>Pial.</i>
If 272 : 1 ::	1564137 $\frac{1}{2}$: 5750 $\frac{1}{2}$

If we suppose the course of direct exchange to Spain to be 42 $\frac{1}{2}$ d. Sterling *per* pialtre, the 1000 l. remitted would only amount to 5647 $\frac{1}{2}$ pialtres; and, consequently, 103 pialtres are gained by the negotiation; that is, about 2 *per cent.*

Exchange.

Exchange.
Exchequer.

2. A banker in Amsterdam remits to London 400l. Flemish; first to France at 56d. Flemish *per* crown; from France to Venice, at 100 crowns *per* 60 ducats; from Venice to Hamburg, at 100d. Flemish *per* ducat; from Hamburg to Lisbon, at 50d. Flemish *per* crusade of 400 rees; and, lastly, from Lisbon to London at 64d. Sterling *per* millree: How much Sterling money will the remittance amount to? and how much will be gained or saved, supposing the direct exchange from Holland to London at 36s. 10d. Flem. *per* l. Sterling?

Antecedents. Consequents.

56d. Flem. = 1 crown
100 crowns = 60 ducats.
1 ducat = 100 d. Flem.
50 d. Flem. = 400 rees.
1000 rees = 64d. Sterling.

How many d. Ster. = 400l. or 96000 d. Flemish?

This, in the fractional form, will stand as follows.

$$\frac{60 \times 100 \times 400 \times 64 \times 96000}{56 \times 100 \times 50 \times 1000} = \frac{368640}{7}, \text{ and}$$

$$7) 368640 (52622 \frac{2}{7} \text{ d. Ster.} = 219 \text{ l. } 8 \text{ s. } 6 \frac{2}{7} \text{ d. St. Anf.}$$

To find how much the exchange from Amsterdam directly to London, at 36s. 10d. Flemish *per* l. Sterling, will amount to, say,

s.	d.	d. Fl.	L. St.	d. Fl.	L.	s.	d.	St.
36	10	If 442 :	1 ::	96000 :	217	3	10	$\frac{1}{2}$
12					219	8	6	$\frac{1}{2}$

442 Gained or saved, 2 4 8 $\frac{1}{2}$

In the above example, the par of arbitration, or the arbitrated price, between London and Amsterdam, *viz.* the number of Flemish pence given for 1l. Sterling, may be found thus:

Make 64d. Sterling, the price of the millree, the first antecedent; then all the former consequents will become antecedents, and all the antecedents will become consequents. Place 240, the pence in 1l. Sterling, as the last consequent, and then proceed as taught above, *viz.*

Antecedents. Consequents.

64 d. Ster. = 1000 rees.
400 rees = 50 d. Flem.
100d. Flem. = 1 ducat.
60 ducats = 100 crowns.
1 crown = 56d. Flem.

How many d. Flem. = 240d. Ster.?

$$\frac{1000 \times 50 \times 100 \times 56 \times 240}{64 \times 400 \times 100 \times 60} = \frac{875}{2}, \text{ and}$$

$$2) 875 (437 \frac{1}{2} \text{ d.} = 36 \text{ s. } 5 \frac{1}{2} \text{ d. Flem. per l. Ster. Anf.}$$

Or the arbitrated price may be found from the answer to the question, by saying

d. Ster. d. Flem. d. St.
If $36 \frac{10}{16} \text{ s.} = 96000 :: 240$

7
672000
240

2688

1344

d. s. d. Flem.

$$368640) 161280000 (437 \frac{1}{2} = 36 \text{ s. } 5 \frac{1}{2} \text{ as before.}$$

The work may be proved by the arbitrated price thus: As 1l. Sterling to 36s. 5 $\frac{1}{2}$ d. Flemish, so 219l. 8s. 6 $\frac{2}{7}$ d. Sterling to 400l. Flemish.

The arbitrated price compared with the direct course shows whether the direct or circular remittance will be most advantageous, and how much. Thus the banker at Amsterdam will think it better exchange to receive 1l. Sterling for 36s 5 $\frac{1}{2}$ d. Flemish, than for 36s. 10d. Flemish.

EXCHANGE signifies also a place in most considerable trading cities, wherein the merchants, negociants, agents, bankers, brokers, interpreters, and other persons concerned in commerce, meet on certain days, and at certain times thereof, to confer and treat together of matters relating to exchanges, remittances, payments, adventures, assurances, freightments, and other mercantile negociations, both by sea and land.

EXCHEQUER, in the British jurisprudence, an ancient court of record, in which all causes concerning the revenues and rights of the crown are heard and determined, and where the crown revenues are received.

It took this name from the cloth that covered the table of the court, which was party-coloured, or chequered.

This court is said to have been erected by William the conqueror, its model being taken from a like court established in Normandy long before that time. Anciently its authority was so great, that it was held in the king's palace, and the acts thereof were not to be examined or controverted in any other of the king's courts; but, at present, it is the last of the four courts at Westminster.

In the exchequer, some reckon seven courts, *viz.* those of pleas, accounts, receipts, exchequer-chamber (which is an assembly of all the judges on difficult matters in law), errors in the exchequer, errors in the king's bench, and, lastly, the court of equity in the exchequer.

But the exchequer, for the dispatch of business, is generally divided into two parts; one of which is chiefly conversant in the judicial hearing and deciding of all causes relating to the king's coffers, formerly termed the *exchequer of accounts*; the other is called the *receipt of the exchequer*, as being principally employed in receiving and paying of money.

Officers of the receipt may take one penny in the pound, as their fee for sums issued out; and they are obliged, without delay, to receive the money brought thither; and the money received is to be put into chests under three different locks and keys, kept by three several officers. All sheriffs, bailiffs, &c. are to account in the exchequer; and in the lower part, termed the receipt, the debtors of the king, and persons in debt to them, the king's tenants, and the officers and ministers of the court, are privileged to sue one another, or any stranger, and to be sued in the like actions as are brought in the courts of king's bench and common-pleas.

The judicial part of the exchequer, is a court both of law and equity. The court of law is held in the office of pleas, according to the course of common law, before the barons: in this court, the plaintiff ought to be a debtor or accountant to the king; and the leading process is either a writ of subpoena, or quo minus, which last goes into Wales, where no process

out

Exchequer, out of courts of law ought to run, except a *capias utlagatum*.

Excise.

The court of equity is held in the exchequer chamber before the treasurer, chancellor, and barons; but, generally, before the barons only; the lord chief baron being the chief judge to hear and determine all causes. The proceedings in this part of the exchequer are by English bill and answer, according to the practice of the court of chancery; with this difference, that the plaintiff here must set forth, that he is a debtor to the king, whether he be so or not. It is in this court of equity that the clergy exhibit bills for the recovery of their tithes, &c. Here too the attorney-general exhibits bills for any matters concerning the crown; and a bill may be exhibited against the king's attorney by any person aggrieved in any cause prosecuted against him on behalf of the king, to be relieved therein: in which case, the plaintiff is to attend on the attorney-general, with a copy of the bill, and procure him to give in an answer thereto; in the making of which he may call in any person interested in the cause, or any officer, or others, to instruct him, that the king be not prejudiced thereby, and his answer is to be put in without oath.

But, besides the business relating to debtors, farmers, receivers, accountants, &c. all penal punishments, intrusion, and forfeitures upon popular actions, are matters likewise cognizable by this court; where there also sits a justice-baron, who administers the oaths to high sheriffs, bailiffs, auditors, receivers, collectors, comptrollers, surveyors, and searchers of all the customs, &c.

The exchequer in Scotland has the same privileges and jurisdiction as that of England; and all matters competent to the one, are likewise competent to the other.

Black Book of the Exchequer, a book containing a description of the court of England in 1175, and its officers, with their ranks, wages, privileges, perquisites, &c. also the revenues of the crown, both in money and cattle.

EXCHEQUER-BILLS. By statute 5 Ann. c. 13. the lord-treasurers may cause exchequer bills to be made of any sums not exceeding 1,500,000 *l.* for the use of the war; and the duties upon houses were made chargeable with 4 *l.* 10 *s.* *per cent. per annum* to the bank for circulating them. The bank not paying the bills, actions to be brought against the company, and the money and damages recovered: and if any exchequer-bills be lost, upon affidavit of it before a baron of the exchequer, and certificate from such baron, and security to pay the same if found, duplicates are to be made out: also when bills are defaced, new ones shall be delivered. The king, or his officers in the exchequer, by former statutes, might borrow money upon the credit of bills, payable on demand, with interest after the rate of 3 *d.* *per diem* for every 100 *l.* bill. And by 8 & 9 W. 3. c. 20. an interest of 5 *d.* a-day was allowed for every 100 *l.* But 12 W. 3. c. 1. lowered the interest on these bills to 4 *d.* a-day *per cent.* And by 12 Ann. c. 11. it is sunk to 2 *d.* a-day.—Forging exchequer bills, or the indorsements thereof, is felony.

EXCISE, (from the *Belgic accise*, tributum, "tribute," an inland duty or imposition, paid some

times upon the consumption of the commodity, or frequently upon the wholesale, which is the last stage before the consumption. This is doubtless, impartially speaking, the most economical way of taxing the subject; the charges of levying, collecting, and managing the excise-duties, being considerably less in proportion, than in other branches of the revenue. It also renders the commodity cheaper to the consumer, than charging it with customs to the same amount would do; for the reason just now given, because generally paid in a much later stage of it. But, at the same time, the rigour and arbitrary proceedings of excise-laws seem hardly compatible with the temper of a free nation. For the frauds that might be committed in this branch of the revenue, unless a strict watch is kept, make it necessary, wherever it is established, to give the officers a power of entering and searching the houses of such as deal in excisable commodities, at any hour of the day, and in many cases, of the night likewise. And the proceedings, in case of transgressions, are so summary and sudden, that a man may be convicted in two days time in the penalty of many thousand pounds, by two commissioners or justices of the peace; to the total exclusion of the trial by jury, and disregard of the common law. For which reason, tho' lord Clarendon tells us, that to his knowledge the earl of Bedford (who was made lord treasurer by king Charles I. to oblige his parliament) intended to have set up the excise in England, yet it never made a part of that unfortunate prince's revenue; being first introduced, on the model of the Dutch prototype, by the parliament itself after its rupture with the crown. Yet such was the opinion of its general unpopularity, that when in 1642 "afterwards were cast by malignant persons upon the house of commons, that they intended to introduce excises, the house for its vindication therein did declare, that these rumours were false and scandalous, and that their authors should be apprehended and brought to condign punishment." It original establishment was in 1643, and its progress was gradual; being at first laid upon those persons and commodities where it was supposed the hardship would be least perceivable, viz. the makers and venders of beer, ale, cyder, and perry; and the royalists at Oxford soon followed the example of their brethren at Westminster, by imposing a similar duty: both sides protesting, that it should be continued no longer than to the end of the war, and then be utterly abolished. But the parliament at Westminster soon after imposed it on flesh, wine, tobacco, sugar, and such a multitude of other commodities, that it might be fairly denominated *general*: in pursuance of the plain laid down by Mr Pymme (who seems to have been the father of the excise) in his letter to Sir John Hotham, signifying, "that they had proceeded in the excise to many particulars, and intended to go on farther; but that it would be necessary to use the people to it by little and little." And afterwards, when the nation had been accustomed to it for a series of years, the succeeding champions of liberty boldly and openly declared "the impost of excise to be the most easy and indifferent levy that could be laid upon the people;" and accordingly continued it during the whole usurpation. Upon king Charles's return, it having then been long established and its produce well known, some part of it was given to the crown

Excise.

Black.
Comment.

Excise. crown, in 12 CAR. II. by way of purchase for the feudal tenures and other oppressive parts of the hereditary revenue. But, from its first original to the present time, its very name has been odious to the people. It has, nevertheless, been imposed on abundance of other commodities in the reigns of king William III. and every succeeding prince, to support the enormous expences occasioned by our wars on the continent. Thus brandies and other spirits are now excised at the distillery; printed silks and linens, at the printer's; starch and hair powder, at the maker's; gold and silver wire, at the wire-drawer's; all plate whatsoever, first in the hands of the vendor, who pays yearly for a license to sell it, and afterwards in the hands of the occupier, who also pays an annual duty for having it in his custody; and coaches and other wheel-carriages, for which the occupier is excised; tho' not with the same circumstances of arbitrary strictness with regard to plate and coaches, as in the other instances. To these we may add coffee and tea, chocolate and cocoa paste, for which the duty is paid by the retailer; all artificial wines, commonly called *sweetts*; paper and pasteboard, first when made, and again if stained or printed; malt, as before-mentioned; vinegars; and the manufacture of glass; for all which the duty is paid by the manufacturer; hops, for which the person that gathers them is answerable; candles and soap, which are paid for at the maker's; malt liquors brewed for sale, which are excised at the brewery; cyder and perry, at the vender's; and leather and skins, at the tanner's. A list, which no friend to his country would wish to see farther encreased.

The excise was formerly farmed out; but is now managed for the king by commissioners in both kingdoms, who receive the whole product of the excise, and pay it into the exchequer. These commissioners are nine in number in England, and four in Scotland. The former have a salary of 1000*l.* a-year, the latter 500*l.* They are obliged by oath to take no fee or reward but from the king himself; and from them there lies an appeal to five other commissioners called *commissioners of appeals*.

If any brewers do not make true entries of their liquors brewed once a-week at the excise office, they forfeit 10*l.* but this is subject to mitigation, so as not to be less than double the duty; and the retailers of beer and ale and strong waters, neglecting to make their entries once a-month of what liquors they retail, are liable to 40*s.* penalty. In case any brewer erects or alters any back, copper, cooler, &c. or keeps a private store-house, or if any maltster keeps any private vessel for steeping barley, without giving proper notice to the officers of excise, such brewer or maltster forfeits 50*l.* and where they bribe a gauger, it is 10*l.* The officers of excise may go on board ships, and search for any excisable liquors, as officers of the customs do, and seize commodities forfeited, &c. and complaints made at the chief office of excise are to be heard by three or more commissioners; but two justices of the peace have the power to determine in seizures out of the limits of the excise-office in London. See further, *Table* to the quarto edition of the *Statutes at Large*; also an account of the method of charging the duties of excise, &c. at the end of *Gill. Exch.* edit. 1758, p. 293.

EXCLAMATION. See ORATORY, n° 85.

EXCLUSION, or *Bill of Exclusion*, a bill proposed about the close of the reign of king Charles II. for excluding the duke of York, the king's brother, from the throne, on account of his being a Papist.

EXCLUSIVE, is sometimes used adjectively, thus: *A patent carrier with it an exclusive privilege*; and sometimes adverbially; as, *he sent him all the numbers from n° 145 to n° 247 exclusive*; that is, all between these two numbers, which themselves were excepted.

EXCOMMUNICATION, an ecclesiastical penalty or censure, whereby such persons as are guilty of any notorious crime or offence, are separated from the communion of the church, and deprived of all spiritual advantages.

Excommunication among the Jews, according to Elias, a German rabbin, was distinguished into three kinds: 1. *Niddui*, which was a separation of but a few days; 2. *Cherem*, a separation attended with execration and malediction; and, 3. *Shammatha*, which was the last and greater excommunication. But Selden says, that *niddui* and *shammatha* are the same thing; and therefore that there were but two kinds of excommunication among the Jews, viz. the greater and the lesser. They made also another distinction in excommunication, into total or universal, by which a man was excommunicated with regard to all men; and partial, by which a man was excommunicated in one city, and with regard to certain persons, and not others.

It is observable, that not only the judges had the power of excommunicating, but that each particular person in conversation might excommunicate another, and himself likewise; and this excommunication, if well grounded, was of force: nay, if a man dreamed that he was excommunicated by himself or by another, he was considered as an excommunicated person, because this dream was supposed to be sent from God.

As to the effects of the Jewish excommunication, the lesser excluded the excommunicated person from the society of men; that is, he was not to come nearer them than four cubits, neither he, his wife, children, or domestics, according to Buxtorf. The greater absolutely sequestered the person from the conversation of others; and sometimes he was shut up in a small chamber or prison, where he lived alone. Baronius and Beza pretend, that the greater excommunication excluded men from the use of sacred things. Selden, on the contrary, affirms that they were allowed to be present in the temple, and partake of the public worship. Buxtorf, who is of the same opinion, adds, that whereas others came into the temple at the right hand, and went out at the left, the excommunicated were obliged both to go in and out at the left.

Excommunication, among the modern Jews, is attended with the most terrible consequences. The excommunicated person is refused all human assistance; if there be a corpse in his house, or a child to be circumcised, none must help him. He is cursed by the book of the law, by the curse of Joshua against Jericho, by that of Elisha against the children, by heaven and earth, and God is besought that a whirlwind may dash him to pieces. He is pelted with stones if he appear in the streets: and if he obtains absolution, it is upon the most mortifying conditions; for he is publicly tied

Exclamation
||
Excommunication.

Excommu-
nication.

to a post and whipped, after which he lays himself down at the door of the synagogue, and all those who go out pass over him. This was the very case of the famous Jew Acosta.

In the ancient Christian church, the power of excommunication, as well as other acts of ecclesiastical discipline, was lodged in the hands of the clergy, who distinguished it into the *greater* and *lesser*. The lesser excommunication, simply called *aphorismus*, separation or suspension, consisted in excluding men from the participation of the eucharist, and the prayers of the faithful. But they were not expelled the church; for they had the privilege of being present at the reading of the Scriptures, the sermons, and the prayers of the catechumens and penitents. This excommunication was inflicted for lesser crimes; such as neglecting to attend the service of the church, misbehaviour in it, and the like.

The greater excommunication, called *panteles aphorismus*, total separation and anathema, consisted in an absolute and entire exclusion from the church and the participation of all its rites. When any person was thus excommunicated, notice was given of it by circular letters to the most eminent churches all over the world, that they might all confirm this act of discipline, by refusing to admit the delinquent to their communion. The consequences of this latter excommunication were very terrible. The excommunicated person was avoided in civil commerce and outward conversation. No one was to receive him into his house, nor eat at the same table with him; and when dead, he was denied the solemn rites of burial. It has been a question, whether the ancient church used to add execration to her censures. Grotius thinks this was done, though very seldom, as in the case of Julian the apostate, for whose destruction, he says, the ancient Christians absolutely prayed to God. St Chrysostom was utterly against this practice, affirming that we ought not to pray against the sinner, but against his opinions or actions.

The Romish pontifical takes notice of three kinds of excommunication. 1. The minor, incurred by those who have any correspondence with an excommunicated person. 2. The major, which falls upon those who disobey the commands of the holy see, or refuse to submit to certain points of discipline; in consequence of which they are excluded from the church militant and triumphant, and delivered over to the devil and his angels. 3. Anathema, which is properly that pronounced by the pope against heretical princes and countries. In former ages, these papal fulminations were most terrible things; but at present, they are formidable to none but a few petty states of Italy.

Excommunication, in the Greek church, cuts off the offender from all communion with the 318 fathers of the first council of Nice, and with the saints; consigns him over to the devil, and the traitor Judas; and condemns his body to remain after death as hard as a flint or piece of steel, unless he humbles himself and makes atonement for his sins by a sincere repentance. The form abounds with dreadful imprecations; and the Greeks assert, that if a person dies excommunicated, the devil enters into the lifeless corpse; and therefore, in order to prevent it, the relations of the deceased cut his body in pieces, and boil them in wine. It is a cu-

stom for the patriarch of Jerusalem annually to excommunicate the pope and the church of Rome; on which occasion, together with a great deal of idle ceremony, he drives a nail into the ground with a hammer, as a mark of malediction.

The form of excommunication in the church of England anciently ran thus: "By the authority of God the Father Almighty, the Son and Holy Ghost, and of Mary the blessed mother of God, we excommunicate, anathematize, and sequester from the pale of holy mother church, &c." The causes of excommunication in England are, contempt of the bishop's court, heresy, neglect of public worship and the sacraments, incontinency, adultery, simony, &c. It is described to be twofold. The less is an ecclesiastical censure, excluding the party from the participation of the sacraments: the greater proceeds farther, and excludes him not only from these, but from the company of all Christians. But, if the judge of any spiritual court excommunicates a man for a cause of which he hath not the legal cognizance, the party may have an action against him at common law, and he is also liable to be indicted at the suit of the king.

Heavy as the penalty of excommunication is, considered in a serious light, there are, notwithstanding, many obkinate or profligate men, who would despise the *brutum fulmen* of mere ecclesiastical censures, especially when pronounced by a petty surrogate in the country, for railing or contumelious words, for non-payment of fees or costs, or other trivial cause. The common law, therefore, compassionately steps in to their aid, and kindly lends a supporting hand to an otherwise tottering authority. Imitating herein the policy of the ancient Britons, among whom, according to Cesar, whoever were interdicted by the druids from their sacrifices, "In numero impiorum ac sceleratorum habentur: ab iis omnes decedunt, auditum eorum sermonemque defugiunt, ne quid ex contagione incommodi accipiant: neque iis petentibus jus redditur, neque honos ullus communicatur." And so with us, by the common law, an excommunicated person is disabled to do any act that is required to be done by one that is *probus et legalis homo*. He cannot serve upon juries; cannot be a witness in any court; and, which is the worst of all, cannot bring an action, either real or personal, to recover lands or money due to him. Nor is this the whole: for if, within 40 days after the sentence has been published in the church, the offender does not submit and abide by the sentence of the spiritual court, the bishop may certify such contempt to the king in chancery. Upon which there issues out a writ to the sheriff of the county, called from the bishop's certificate a *significavit*; or from its effect, a writ *de excommunicato capiendo*: and the sheriff shall thereupon take the offender and imprison him in the county jail, till he is reconciled to the church, and such reconciliation certified by the bishop; upon which another writ *de excommunicato deliborando*, issues out of chancery to deliver and release him.

EXCORIATION, in medicine and surgery, the galling, or rubbing off of the cuticle, especially of the parts between the thighs and about the anus. In adults, it is occasioned by riding, much walking, or other vehement exercise, and may be cured by vulnerary applications. In children there is often an excoriation,

not

Excommu-
nication,
Excoriation

Excrement, not only of the parts near the pudenda, chiefly of the groin and scrotum, but likewise in the wrinkles of the neck, under the arms, and in other places; proceeding from the acrimony of urine and sweat; and occasioning itching, pains, crying, watching, restlessness, &c. To remedy this, the parts affected may be often washed with warm water, and sprinkled with drying powders, as chalk, hartshorn, but especially tutty, lapis calaminaris, and cerufs, which may be tied loosely in a rag, and the powder shook out on the disordered places. If the parts tend to a real ulceration, it will be proper to add a little sugar of lead to the powder, or to anoint the place with *unguent. alb. camphorat.*

EXCREMENT, whatever is discharged out of the body of animals after digestion; or the fibrous part of the aliment, mixed with the bile, saliva, and other fluids. Urine and the feces are the gross excrements that are discharged out of the bladder or belly. Other excrements are the various humours that are secreted from the blood through the different trainers in the body, and which serve for several uses; such as the saliva, sweat, bile, the pancreatic juice, lymph, the semen, nails, the hair, the horns and hoofs of animals.

Alchemists who have sought every where for their *great work*, as they called it, have particularly operated much on the excrements of men and other animals; but philosophical chemistry has acquired no knowledge from all these alchemical labours, from the obscurity with which their authors have described them. The philosophic chemists have not much examined animal excrements. Of these, Homberg is the only one who has particularly analysed and examined human ordure; and this was done to satisfy an alchemical project of one of his friends, who pretended that from this matter a white oil could be obtained, without smell, and capable of fixing mercury into silver. The oil was found by Homberg, but mercury was not fixed by it.

The labours of this able chemist were not however useless, like those of the alchemists; because he has clearly related the experiments he made on this matter, in the memoirs of the academy of sciences. These experiments are curious, and teach several essential things concerning the nature of excrements. The result of these experiments is as follows. Fresh human feces, being distilled to dryness in a water bath, furnish a clear, watery, insipid liquor, of a disagreeable smell, but which contains no volatile alkali; which is a proof that this matter, although nearly in a putrefactive state, is not however putrefied; for all substances really putrid furnish with this degree of heat a manifest volatile alkali*.—The dry residuum of the foregoing experiment, being distilled in a retort with a graduated fire, furnishes a volatile alkaline spirit and salt, a fetid oil, and leaves a residuous coal. These are the same substances which are obtained from all animal matters.

Human feces, diluted and lixiviated in water, furnish by filtration and evaporation of the water an oily salt of a nitrous nature, which deffagrates like nitre upon ardent coals, and which inflames in close vessels when heated to a certain degree.—This same matter yielded to Homberg, who treated it by a complete fermentation or putrefaction, excited by a digestion during 40 days in a gentle water-bath heat, and who afterwards distilled it, an oil without colour, and without bad smell, and such as he endeavoured to find; but

which did not, as we said before, fix mercury into silver. **Exercence**

Excution.

EXCRESCENCE, in surgery, denotes every preternatural tumour which arises upon the skin, either in the form of a wart or tubercle. If they are born on a person, as they frequently are, they are called *naevi materni*, or marks from the mother; but if the tumour is large, so as to depend from the skin, like a fleshy mass, it is then called a *sarcoma*. See **SURGERY**.

EXCRETION, or **SECRETION**, in medicine, a separation of some fluid, mixed with the blood, by means of the glands. Excretions, by which we mean those that evacuate superfluous and heterogeneous humours, purify the mass of blood: the humours which are generated in the blood are excreted by the glands, and are replaced by a sufficient quantity of aliment.

EXCRETORY, in anatomy, a term applied to certain little ducts or vessels, destined for the reception of a fluid, secreted in certain glandules, and other viscera, for the excretion of it in the appropriated places.

LETTERS of EXCULPATION, in Scots law, a writ or summons issued by authority of the court of judicatory, at the instance of a pannel, for citing witnesses to prove his defences, or his objections to any of the jury or witnesses cited against him.

EXCURSION, in astronomy, is used in a synonymous sense with **ELONGATION**.

EXECRATION, in antiquity, a kind of punishment, consisting of direful curses and marks of infamy: such was that used against Philip king of Macedonia, by the Athenians. A general assembly of the people being called, they made a decree, that all the statues and images of that king, and of all his ancestors, should be demolished, and their very names razed; that all the festivals, sacred rites, priests, and whatever else had been instituted in honour of him, should be prophaned; that the very places where there had been any monument or inscription to his honour, should be detestable; that nothing should be set up, or dedicated in them, which could be done in clean places: and, lastly, that the priests, as often as they prayed for the Athenian people, allies, armies, and fleets, should as many times detest and execrate Philip, his children, kingdom, land and sea forces, and the whole race and name of the Macedonians.

EXECUTION, in a general sense, the act of accomplishing, finishing, or achieving any thing.

Execution, in law, the completing or finishing some act, as of judgment, deed, &c. and it usually signifies the obtaining possession of any thing recovered by judgment of law.

Sir Edward Coke observes, that there are two sorts of executions: the one final; and the other a quousque, that tends to an end. An execution final, is that which makes money of the defendant's goods; or extends to his lands, and delivers them to the plaintiff, who accepts the same in satisfaction; and this is the end of the suit, and the whole that the king's writ requires to be done. The writ of execution with a quousque, tho' it tends to an end, yet is not final, as in the case of a *capias ad satisfaci.* where the defendant's body is to be taken, in order that the plaintiff may be satisfied for his debt. See **CAPIAS**.

Executions are either in personal, real, or mixed actions. In a personal action, the execution may be made

* See Putrefaction.

Execution. three ways, viz. by the writ of *capias ad satisfaciendum*, against the body of the defendant; *fiery facias*, against his goods; or *elegit*, against his lands. See *FIERY FACIAS*, and *ELEGIT*.

* See Habeas.

In a real and mixed action, the execution is by writ of *habere facias seisinam*, and *habere possessionem**. Writs of execution bind the property of goods only from the time of delivery of the writ to the sheriff; but the land is bound from the day of the judgment obtained: and here the sale of any goods for valuable consideration, after a judgment, and before the execution awarded, will be good. It is otherwise as to lands of which execution may be made, even on a purchase after the judgment, though the defendant sell such land before execution. Likewise, sheriffs may deliver in execution all the lands whereof others shall be seised in trust for him, against whom execution is had on a judgment, &c.

When any judgment is signed, the execution may be taken out immediately thereon; but if it be not issued within a year and a day after, where there is no fault in the defendant, as in the case of an injunction, writ of error, &c. there must be a *fiore facias*, to revive the judgment; though, if the plaintiff sues out any writ of execution within the year, he may continue it after the year is expired. After judgment against the defendant, in an action wherein special bail is given, the plaintiff is at liberty to have execution against such defendant, or against his bail: but this is understood where the defendant does not tender himself, according to law, in safeguard of the bail: and execution may not regularly be sued forth against a bail, till a default is returned against the principal: also if the plaintiff takes the bail, he shall never take the principal. It is held that an execution may be executed after the death of the defendant: for his executor, being privy thereto, is liable, as well as the testator. The execution is an entire thing, so that he who begins must end it: therefore, a new sheriff may distrain an old one, to sell the goods seised on a distringas, and to bring the money into court.

§ See Judgment. Execution, in criminal cases, the completion of human punishment. This follows judgment ‡; and must in all cases, capital as well as otherwise, be performed by the legal officer, the sheriff or his deputy; whose warrant for so doing was anciently by precept under the hand and seal of the judges, as it is still practised in the court of the lord high steward, upon the execution of a peer: though, in the court of the peers in parliament, it is done by writ from the king. Afterwards it was established, that, in case of life, the judge may command execution to be done without any writ. And now the usage is, for the judge to sign the calendar or list of all the prisoners names, with their separate judgments in the margin, which is left with the sheriff. As, for a capital felony, it is written opposite to the prisoner's name, "let him be hanged by the neck;" formerly, in the days of Latin and abbreviation, "*sus. per coll.*" for "*suspendatur per collum.*" And this is the only warrant that the sheriff has, for so material an act as taking away the life of another. It may certainly afford matter of speculation, that in civil causes there should be such a variety of writs of execution to recover a trifling debt, issued in the king's name, and under the seal of the

court, without which the sheriff cannot legally stir one Execution. step; and yet that the execution of a man, the most important and terrible task of any, should depend upon a marginal note.

The sheriff, upon receipt of his warrant, is to do execution within a convenient time; which in the country is also left at large. In London, indeed, a more solemn and becoming exactness is used, both as to the warrant of execution, and the time of executing thereof: for the recorder, after reporting to the king in person the case of the several prisoners, and receiving his royal pleasure, that the law must take its course, issues his warrant to the sheriffs, directing them to do execution on the day and at the place assigned. And in the court of king's bench, if the prisoner be tried at the bar, or brought there by *habeas corpus*, a rule is made for his execution; either specifying the time and place, or leaving it to the discretion of the sheriff. And, throughout the kingdom, by statute 25 Geo. II. c. 37. it is enacted that, in case of murder, the judge shall in his sentence direct execution to be performed on the next day but one after sentence passed. But, otherwise, the time and place of execution are by law no part of the judgment. It has been well observed, that it is of great importance, that the punishment should follow the crime as early as possible; that the prospect of gratification or advantage, which tempts a man to commit the crime, should instantly awake the attendant idea of punishment. Delay of execution serves only to separate these ideas: and then the execution itself affects the minds of the spectators rather as a terrible sight, than as the necessary consequence of transgression.

The sheriff cannot alter the manner of the execution, by substituting one death for another, without being guilty of felony himself. It is held also by Sir Edward Coke and Sir Matthew Hale, that even the king cannot change the punishment of the law, by altering the hanging or burning into beheading; though, when beheading is part of the sentence, the king may remit the rest. And, notwithstanding some examples to the contrary, Sir Edward Coke stoutly maintains, that *judicandum est legibus, non exemplis*. But others have thought, and more justly, that this prerogative, being founded in mercy, and immemorably exercised by the crown, is part of the common law. For hitherto, in every instance, all these exchanges have been for more merciful kinds of death; and how far this may also fall within the king's power of granting conditional pardons, (viz. by remitting a severe kind of death, on condition that the criminal submits to a milder) is a matter that may bear consideration. It is observable, that when Lord Stafford was executed for the popish plot in the reign of king Charles II. the then sheriffs of London, having received the king's writ for beheading him, petitioned the house of lords, for a command or order from their lordships, how the said judgment should be executed: for, he being prosecuted by impeachment, they entertained a notion (which is said to have been countenanced by Lord Russell), that the king could not pardon any part of the sentence. The lords resolved, that the scruples of the sheriffs were unnecessary; and declared, that the king's writ ought to be obeyed. Disappointed of raising a flame in that assembly, they immediately

Blackst. Comment.

Execution
||
Exemplar.

ly signified to the house of commons by one of the members, that they were not satisfied as to the power of the said writ. That house took two days to consider of it; and then fully resolved, that the house was *content* that the sheriff do execute Lord Stafford by severing his head from his body. It is farther related, that when afterwards the same Lord Russell was condemned for high treason upon indictment, the king, while he remitted the ignominious part of the sentence, observed, "that his Lordship would now find he was possessed of that prerogative, which in the case of Lord Stafford he had denied him." One can hardly determine (at this distance from those turbulent times), which molt to disapprove of, the indecent and sanguinary zeal of the subject, or the cool and cruel sarcasm of the sovereign.

To conclude: it is clear, that if, upon judgment to be hanged by the neck till he is dead, the criminal be not thoroughly killed, but revives, the sheriff must hang him again. For the former hanging was no execution of the sentence; and, if a false tenderness were to be indulged in such cases, a multitude of collusions might ensue. Nay, even while abjurations were in force, such a criminal, so reviving, was not allowed to take sanctuary and abjure the realm; but his fleeing to sanctuary was held an escape in the officer.

EXECUTION, in the law of Scotland. See LAW, Part III. n^o cxxxv. 52. cxxxvi. 15.

EXECUTIVE POWER. The supreme executive power of these kingdoms is vested by our laws in a single person, the king or queen for the time being. See the article KING.

The executive power, in this state, hath a right to a negative in parliament, *i. e.* to refuse assent to any acts offered; otherwise the other two branches of legislative power would, or might, become despotic.

EXECUTOR, in Scots law, signifies either the person intitled to succeed to the moveable estate of one deceased, or who by law or special appointment is intrusted with the administration of it.

EXECUTORY, in law, is where an estate in fee, that is made by deed or fine, is to be executed afterwards by entry, livery, or writ. Leases for years, annuities, conditions, &c. are termed inheritances executory.

EXECUTRY, in Scots law, is the moveable estate falling to the executor. Under executry, or moveables, is comprehended every thing that moves itself, or can be moved; such as corns, cattle, furniture, ready money, &c.

EXEDRÆ, in antiquity, a general name for such buildings as were distinct from the main body of the churches, and yet within the limits of the church taken in its largest sense. Among the exedræ the chief was the BAPTISTERY.

EXEGESIS, a discourse by way of explanation or comment upon any subject. In the Scotch universities, there is an exercise among the students in divinity, called an *exegetis*, in which a question is stated by the respondent, who is then opposed by two or three other students in their turns; during which time the professor moderates, and solves the difficulties which the respondent cannot overcome.

EXEMPLAR, denotes much the same with model. See MODEL.

EXEMPLIFICATION of LETTERS-PATENT, a transcript or duplicate of them, made from the inrollment thereof, and sealed with the great seal.

EXEMPTION, in law, a privilege to be free from some service or appearance: thus, barons and peers of the realm are, on account of their dignity, exempted from being sworn upon inquests; and knights, clergymen, and others, from appearing at the sheriff's turn. Persons of 70 years of age, apothecaries, &c. are also by law exempted from serving on juries; and justices of the peace, attorneys, &c. from parish-offices.

EXERCISE, among physicians, such an agitation of the body as produces salutary effects in the animal economy.

Exercise may be said to be either active or passive. The active is walking, hunting, dancing, playing at bowls, and the like; as also speaking, and other labour of the body and mind. The passive is riding in a coach, on horseback, or in any other manner. Exercise may be continued to a beginning of weariness, and ought to be used before dinner in a pure light air; for which reason, journeys, and going into the country, contribute greatly to preserve and re-establish health.

Exercise increases the circulation of the blood, attenuates and divides the fluids, and promotes a regular perspiration, as well as a due secretion of all the humours; for it accelerates the animal-spirits, and facilitates their distribution into all the fibres of the body, strengthens the parts, creates an appetite, and helps digestion. Whence it arises, that those who accustom themselves to exercise are generally very robust, and seldom subject to diseases.

Boerhaave recommends bodily exercise in diseases of a weak and lax fibre. By riding on horseback, says his commentator, the pendulous viscera of the abdomen are shaken every moment, and gently rubbed as it were one against another, while in the mean time the pure air acts on the lungs with greater force. But it is to be observed, that a weak man should not ride with a full stomach, but either before dinner, or after the digestion is near finished; for when the stomach is distended, weak people do not bear these concussions of the horse without difficulty; but when the *primæ viæ* are near empty, the remaining feces are discharged by this concussion. Sailing in a ship is also an exercise of great use to weak people. If the vessel moves with an even motion, by increasing perspiration it usually excites a wonderful alacrity, creates an appetite, and promotes digestion. These exercises are more especially serviceable to weak people; but, in order to strengthen the body by muscular motion, running, and bodily exercises, are to be used. In these we should begin with the most gentle, such as walking, and increase it by degrees till we come to running. Those exercises of the body are more especially serviceable which give delight to the mind at the same time, as tennis, fencing, &c.; for which reason, the wisdom of antiquity appointed rewards for those who excelled in these gymnastic exercises, that by this means the bodies of their youth might be hardened for warlike toils.

As nothing is more conducive to health than moderate exercise, so violent exercise dissipates the spirits, weakens the body, destroys the elasticity of the fibres, and exhausts the fluid parts of the blood. No wonder, then, that acute and mortal fevers often arise from too

Exercise.

violent exercise of the body; for the motion of the venous blood towards the heart being quickened by the contraction of the muscles, and the veins being thus depleted, the arteries more easily propel their contained humours through the smallest extremities into the now less resisting veins; and therefore the velocity of the circulation will be increased through all the vessels. But this cannot be performed without applying the humours oftener, or in a greater quantity, to the secretory organs in the same time, whence the more fluid parts of the blood will be dissipated, and what remains will be inspissated; and by the greater action of the vessels upon their contained fluids, and of the reacting fluids upon the vessels, the blood acquires an inflammatory density. Add to this, that by the violent attrition of the solids and fluids, together with the heat thence arising, all the humours will incline to a greater acrimony, and the salts and oils of the blood will become more acrid and volatile. Hence, says Boerhaave, those fevers which arise from too much exercise or motion, are cured by rest of body and mind, with such aliments and medicines as moisten, dilute, and soften or allay acrimony.

The exercise of a soldier in camp, considered as conducive to health, Dr Pringle distinguishes into three heads; the first relating to his duty, the second to his living more commodiously, and the third to his diversions. The first, consisting chiefly in the exercise of his arms, will be no less the means of preserving health, than of making him expert in his duty: and frequent returns of this, early, and before the sun grows hot, will be made more advantageous than repeating it seldom, and staying out long at a time; for a camp affording little convenience for refreshment, all unnecessary fatigue is to be avoided. As to the second article, cutting boughs for shading the tents, making trenches round them for carrying off the water, airing the straw, cleaning their cloaths and accoutrements, and assisting in the business of the mess, ought to be no disagreeable exercise to the men for some part of the day. Lastly, as to diversions, the men must be encouraged to them either by the example of their officers, or by small premiums to those who shall excel in any kind of sports as shall be judged most conducive to health: but herein great caution is necessary, not to allow them to fatigue themselves too much, especially in hot weather, or sickly times; but above all, that their cloaths be kept dry, wet cloaths being the most frequent causes of camp-diseases.

EXERCISE, in military affairs, is the ranging a body of soldiers in form of battle, and making them perform the several motions and military evolutions with different management of their arms, in order to make them expert therein.

EXERCISE, in the royal navy, is the preparatory practice of managing the artillery and small-arms, in order to make the ship's crew perfectly skilled therein, so as to direct its execution successfully in the time of battle.

The exercise of the great guns has, till the late war, been very complicated, and abounding with superfluities, in our navy, as well as all others. The following method was then successfully introduced by an officer of distinguished abilities.

Exercise.

1st, Silence.

2d, Cast loose your guns.

3d, Level your guns.

4th, Take out your tompons.

5th, Run out your guns.

6th, Prime.

7th, Point your guns.

8th, Fire.

9th, Spunge your guns.

10th, Load with cartridge.

11th, Shot your guns.

12th, Put in your tompons.

13th, House your guns.

14th, Secure your guns.

Upon beat-to-arms (every body having immediately repaired to their quarters) the midshipman commanding a number of guns, is to see that they are not without every necessary article, as (at every gun) a sponge, powder-horn, with its priming wires, and a sufficient quantity of powder, crow, hand-spike, bed, quoin, train-tackle, &c. sending without delay for a supply of any thing that may be amissing; and, for the greater certainty of not overlooking any deficiency, he is to give strict orders to each captain under him, to make the like examination at his respective gun, and to take care that every requisite is in a serviceable condition, which he is to report accordingly. And (besides the other advantages of this regulation) for the still more certain and speedy account being taken upon these occasions, the midshipman is to give each man his charge at quarters (as expressed in the form of the monthly report), who is to search for his particular implements, and, not finding them, is immediately to acquaint his captain, that, upon his report to the midshipman, they may be replaced.

The man who takes care of the powder, is to place himself on the opposite side of the deck from that where we engage, except when fighting both sides at once, when he is to be amid-ships. He is not to suffer any other man to take a cartridge from him, but he who is appointed to serve the gun with that article, either in time of a real engagement, or at exercise.

Lantrons are not to be brought to quarters in the night, until the midshipman gives his orders for so doing to the person he charges with that article. Every thing being in its place, and not the least lumber in the way of the guns, the exercise begins with,

1. "Silence." At this word every one is to observe a silent attention to the officers.

2. "Cast loose your guns." The muzzle lashing is to be taken off from the guns, and (being coiled up in a small compafs) is to be made fast to the eye-bolt above the port. The lashing-tackles at the same time to be cast loose, and the middle of the breeching seized to the thimble of the pommillion. The sponge to be taken down, and, with the crow, hand-spike, &c. laid upon the deck by the gun. N. B. When prepared for engaging an enemy, the seizing within the clinch of the breeching is to be cut, that the gun may come sufficiently within-board for loading, and that the force of the recoil may be more spent before its acts upon the breeching.

3. "Level your guns." The breech of your metal is to be raised so as to admit the foot of the bed's being placed upon the axle-tree of the carriage, with the

Exercise.

the quoin upon the bed, both their ends being even one with the other. N. B. When levelled for firing, the bed is to be lashed to the bolt which supports the inner end of it, that it may not be thrown out of its place by the violence of the gun's motion, when hot with frequent discharges.

4. "Take out your tompons." The tompon is to be taken out of the gun's mouth, and left hanging by its laniard.

5. "Run out your guns." With the tackles hooked to the upper bolts of the carriage, the gun is to be bowled out as close as possible, without the assistance of crows or hand-spikes; taking care at the same time to keep the breeching clear of the trucks, by hauling it through the rings; it is then to be bent so as to run clear when the gun is fired. When the gun is out, the tackle falls are to be laid along-side the carriages in neat fakes, that, when the gun by recoiling overhauls them, they may not be subject to get foul, as they would if in a common coil.

6. "Prime." If the cartridge is to be pierced with the priming-wire, and the vent filled with powder, the pan also is to be filled; and the flat space, having a score through it at the end of the pan, is to be covered, and this part of the priming is to be bruised with the round part of the horn. The apron is to be laid over, and the horn hung up out of danger from the flash of the priming.

7. "Point your guns." At this command the gun is, in the first place, to be elevated to the height of the object, by means of the side-fights; and then the person pointing is to direct his fire by the upper fight, having a crow on one side and a hand-spike on the other, to heave the gun by his direction till he catches the object.

N. B. The men who heave the gun for pointing are to stand between the ship's side and their crows or hand-spikes, to escape the injury they might otherwise receive from their being struck against them, or splintered by a shot; and the man who attends the captain with a match is to bring it at the word, "Point your guns," and kneeling upon one knee opposite the train-truck of the carriage, and at such a distance as to be able to touch the priming, is to turn his head from the gun, and keep blowing gently upon the lighted match to keep it clear from ashes. And as the missing of an enemy in action, by neglect or want of coolness, is most inexcusable, it is particularly recommended to have the people thoroughly instructed in pointing well, and taught to know the ill consequences of not taking proper means to hit their mark; wherefore they should be made to elevate their guns to the utmost nicety, and then to point with the same exactness, having caught the object thro' the upper-fight. At the word,

8. "Fire," the match is instantly to be put to the bruised part of the priming; and when the gun is discharged the vent is to be closed, in order to smother any spark of fire that may remain in the chamber of the gun; and the man who sponges is immediately to place himself by the muzzle of the gun in readiness; when, at the next word,

9. "Sponge your gun," the sponge is to be rammed down to the bottom of the chamber, and then twisted round, to extinguish effectually any remains of

fire; and, when drawn out, to be struck against the out-side of the muzzle, to shake off any sparks or scraps of the cartridge that may have come out with it; and next, its end is to be shifted ready for loading; and while this is doing, the man appointed to provide a cartridge is to go to the box, and by the time the sponge is out of the gun, he is to have it ready; and at the word,

10. "Load with cartridge," the cartridge (with the bottom end first, seam downwards, and a wad after it) is to be put into the gun, and thrust a little way within the mouth, when the rammer is to be entered: the cartridge is then to be forcibly rammed down; and the captain at the same time is to keep his priming-wire in the vent, and, feeling the cartridge, is to give the word *home*, when the rammer is to be drawn, and not before. While this is doing, the man appointed to provide a shot is to provide one (or two, according to the order at that time) ready at the muzzle, with a wad likewise; and when the rammer is drawn, at the word,

11. "Shot your guns," the shot and wad upon it are to be put into the gun, and thrust a little way down, when the rammer is to be entered as before. The shot and wad are to be rammed down to the cartridge, and there have a couple of forcible strokes; when the rammer is to be drawn, and laid out of the way of the guns and tackles, if the exercise or action is continued; but if it is over, the sponge is to be secured in the place it is at all times kept in.

12. "Put in your tompons." The tompons to be put into the muzzle of the cannon.

13. "Houze your guns." The seizing is to be put on again upon the clinched end of the breeching, leaving it no flacker than to admit of the guns being hauled with ease. The quoin is to be taken from under the breech of the gun, and the bed, still resting upon the bolt, within the carriage, thrust under, till the foot of it falls off the axle-tree, leaving it to rest upon the end which projects out from the foot. The metal is to be let down upon this. The gun is to be placed exactly square; and the muzzle is to be close to the wood, in its proper place for passing the muzzle-lashings.

14. "Secure your guns." The muzzle-lashings must first be made secure, and then with one tackle (having all its parts equally taught with the breeching) the gun is to be lashed. The other tackle is to be bowled taught, and by itself made fast, that it may be ready to cast off for lashing a second breeching. N. B. Care must be taken to hook the first tackle to the upper bolt of the carriage, that it may not otherwise obstruct the reeving of the second breeching, and to give the greater length to the end part of the fall. No pains must be spared in bowling the lashing very taught, that the gun may have the least play that is possible, as their being loose may be productive of very dangerous consequences. The quoin, crow, and hand-spike, are to be put under the gun, the powder-horn hung up in its place, &c.

Being engaged at any time when there is a large swell, a rough sea, or in equally weather, &c. as the ship may be liable to be suddenly much heeled, the port-tackle fall is to be kept clear, and (whenever the working of the gun will admit of it) the man charged

Exercise.

with

Exercise
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Exeter.

with that office is to keep it in his hand ; at the same time the muzzle lashing is to be kept fast to the ring of the port, and, being hauled taught, is to be fastened to the eye-bolt over the port-hole, so as to be out of the gun's way in firing, in order to haul it in at any time of danger.

This precaution is not to be omitted, when engaging to the windward, any more than when to the leeward, those situations being very subject to alter at too short a warning.

A train-tackle is always to be made use of with the lee-guns, and the man stationed to attend it is to be very careful in preventing the gun's running out at an improper time.

EXERCISE, may also be applied with propriety to the forming our fleets into orders of sailing, lines of battle, &c. an art which the French have termed *evolutions*, or *tactiques*. In this sense exercise may be defined, the execution of the movements which the different orders and disposition of fleets occasionally require, and which the several ships are directed to perform by means of signals. See TACTICS.

EXERCISES, are also understood of what young gentlemen learn in the academies and riding-schools, such as fencing, drawing, riding the great horse, &c.

How useful, how agreeable soever, study may be to the mind, it is very far from being equally salutary to the body. Every one observes, that the Creator has formed an intimate connexion between the body and the mind ; a perpetual action and reaction, by which the body instantly feels the disorders of the mind, and the mind those of the body. The delicate springs of our frail machines lose their activity and become enervated, and the vessels are choked by obstructions when we totally desist from exercise, and the consequences necessarily affect the brain : a more studious and sedentary life is therefore equally prejudicial to the body and the mind. The limbs likewise become stiff ; we contract an awkward constrained manner ; a certain disgusting air attends all our actions, and we are very near being as disagreeable to ourselves as to others. An inclination to study is highly commendable ; but it ought not, however, to inspire us with an aversion to society. The natural lot of man is to live among his fellows : and whatever may be the condition of our birth, or our situation in life, there are a thousand occasions where a man must naturally desire to render himself agreeable ; to be active and adroit ; to dance with a grace ; to command the fiery steed ; to defend himself against a brutal enemy ; to preserve his life by dexterity, as by leaping, swimming, &c. Many rational causes have therefore given rise to the practice of particular exercises, and the most sagacious and benevolent legislators have instituted, in their academies and universities, proper methods of enabling youth, who devote themselves to study, to become expert also in laudable exercises.

EXERCITOR, in Scots law, he who employs a ship in trade, whether he be owner, or only freights her from the owner.

EXERGESIA. See ORATORY, n° 90.

EXERGUM, among antiquarians, a little space around or without the figures of a medal, left for the inscription, cipher, device, date, &c.

EXETER, the capital city of Devonshire, situated

on the river Ex, ten miles north of the British channel : W. Long. 3. 40. N. Lat. 50. 44. Anciently the name of this city was *Ilex*, and *Ipsa Dummaniorum*. The present name is a contraction of *Excester*, that is, a city upon the Ex. It is large, populous, and wealthy, with gates, walls, and suburbs : the circumference of the whole is about two miles, being well supplied with water brought in pipes from the neighbourhood. The city is a county of itself ; and the magistrates have extensive powers with respect to the administration of justice, both in civil and criminal cases. Formerly the sea flowed up to the city-walls, and ships loaded and unloaded at the water-gate ; but the navigation of the river was so obstructed by the weirs made in it by Hugh Courtenay earl of Devon, that the merchants brought their goods from Topham by land. A channel, however, hath been since cut through the dams, and vessels of 150 tons now come up to the key. There is a prodigious woollen manufacture in this city, of serges, perpetuanas, long ells, druggets, and kerseys. A large market is kept here once a-week, in which goods are sometimes sold to the amount of L. 60,000.

EXFOLIATION, a term used by surgeons for the scaling of a bone, or its rising and separating into thin laminae or scales.

EXHALATION, a general term for all effluvia or steams raised from the surface of the earth in form of vapour.

EXHIBIT, in law, is where a deed, or other writing, being produced in a chancery suit to be proved by witnesses, the examiner, or commissioner appointed for the examination of any such, certifies on the back of the deed or writing, that the same was shewn to the witness at the time of his examination, and by him sworn to.

EXIGENT, in law, a writ which lies where the defendant in a personal action cannot be found, nor any effects of his within the county, by which he may be attached or distrained.

EXIGENTERS, four officers in the court of common-pleas, who make all exigents and proclamations, in all actions where process of outlawry lies. Writs of superseatas, as well as the prothonotaries upon exigents, were likewise drawn up in their office.

EXILE. See BANISHMENT.

Among the Romans, the word *exile*, *exilium*, properly signified an interdiction, or exclusion from water and fire ; the necessary consequence of which was, that the interdicted person must betake himself into some other country, since there was no living without fire and water.—Thus, Cicero *ad Herenn.* observes, that the form of the sentence did not express *exile*, but only *aque & ignis interdictio*. The same author remarks, that exile was not properly a punishment ; but a voluntarily flying, or avoiding the punishment decreed : *Exilium non esse supplicium, sed persequium, partisque supplicii*. He adds, that there was no crime among the Romans, as among other nations, punished with exile ; but exile was a recourse people flew voluntarily to, in order to avoid chains, ignominy, starving, &c.

The Athenians frequently sent their generals and great men into exile, out of envy of their merits, or distrust of their too great authority *.

EXISTENCE, that whereby any thing has an actual

Exfoliation
||
Existence.

* See Ostracism.

Exocoetus tual effence, or is said to be. See **METAPHYSICS**, n° 220, &c.

Exorcism. **EXOCOETUS**, or the **FLYING-FISH**, in ichthyology, a genus belonging to the order of abdominales. The head is scaly, and it has no teeth. It has 10 radii in the branchiole membrane; the body is whitish, and the belly is angular: the pectoral fins, the instruments of flight, are very large. When pursued by any other fish, it raises itself from the water by means of these long fins, and flies in the air to a considerable distance, till the fins dry, and then it falls down into the water. It is a fish that seems to lead a most miserable life. In its own element, it is perpetually harassed by the dorados and other fish of prey. If it endeavours to avoid them by having recourse to the air, it either meets its fate from the gulls, or the albatross, or is forced down again into the mouth of the inhabitants of the water, who, below, keep pace with its aerial excursion. Neither is it unfrequent that whole shoals of them fall on board of ships that navigate the seas in warm climates. It is therefore apparent, that nature in this creature hath supplied it with instruments which frequently bring it into the destruction it strives to avoid, by having recourse to an element unnatural to it.

See Pl. CII.
fig. 7.

EXODIARY, in the ancient Roman tragedy, was the person who, after the drama or play was ended, sung the **EXODIUM**.

EXODIUM, in the ancient Greek drama, one of the four parts or divisions of tragedy, being so much of the piece as included the catastrophe and unravelling of the plot, and answering nearly to our fourth and fifth acts.

EXODIUM, among the Romans, consisted of certain humorous verses rehearsed by the exodiary at the end of the *Fabulæ Atellane*.

Exodium, in the Septuagint, signifies the end or conclusion of a feast. Particularly it is used for the eighth day of the feast of tabernacles, which, it is said, had a special view to the commemoration of the *exodus* or departure out of Egypt.

EXODUS, a canonical book of the Old Testament; being the second of the pentateuch, or five books of Moses.

It is so called from the Greek [*exodos*], the “going out” or departure of the children of Israel from the land of Egypt; the history of which is delivered in this book, together with the many miracles wrought on that occasion.

EXOMPHALUS, in surgery, called also *omphalocele*, and *hernia umbilicalis*, is a preternatural tumour of the abdomen, at the navel, from a rupture or distention of the parts which invest that cavity *.

EXORCISM, among ecclesiastical writers, the expelling devils from persons possessed, by means of conjurations and prayers.

Exorcism makes a considerable part of the superstition of the church of Rome, the rituals of which forbid the exorcising any person without the bishop's leave.

The ceremony is performed at the lower end of the church, towards the door. The exorcist first signs the possessed person with the sign of the cross, makes him kneel, and sprinkles him with holy water. Then follow the litanies, psalms, and prayer; after which the exorcist asks the devil his name, and adjures him by the mysteries of the Christian religion not to afflict the person any more: then, laying his right hand on the *dæmoniac's* head, he repeats the form of exorcism, which is this: “I exorcise thee, unclean spirit, in the name of Jesus Christ: tremble, O Satan! thou enemy of the faith, thou foe of mankind, who hast brought death into the world, who hast deprived men of life, and hast rebelled against justice; thou seducer of mankind, thou root of evil, thou source of avarice, discord, and envy.”

The Romanists likewise exorcise houses and other places, supposed to be haunted by unclean spirits; and the ceremony is much the same with that for persons possessed.

EXORCISTS, in church-history, an order of men, in the ancient church, whose employment it was to exorcise or cast out devils. See the preceding article.

EXORDIUM, in oratory, is the preamble or beginning, serving to prepare the audience for the rest of the discourse.

Exordiums are of two kinds, either just and formal, or vehement and abrupt. The last are most suitable on occasions of extraordinary joy, indignation, or the like. See **ORATORY**, n° 26.

EXOTIC, an appellation denoting a thing to be the produce of foreign countries.

EXPANSION, among metaphysicians, denotes the idea we have of lasting distance, all whose parts exist together.

EXPANSION, in physiology, the swelling or increase of the bulk of bodies when heated. See **FIRE** and **HEAT**.

EXPECTORANTS, in pharmacy, medicines which promote **EXPECTORATION**.

EXPECTORATION, the act of evacuating or bringing up phlegm or other matters out of the trachea, lungs, &c. by coughing, hawking, spitting, &c.

EXPERIENCE, a kind of knowledge acquired by long use, without any teacher. See **METAPHYSICS**, n° 26, 28.

EXPERIMENT, in philosophy, is the trial of the result or effect of the applications and motions of certain natural bodies, in order to discover something of their motions and relations, whereby to ascertain some of their phenomena, or causes.

Exorcist.
Experi-
ment.

EXPERIMENTAL PHILOSOPHY;

THAT philosophy which proceeds on experiments, which deduces the laws of nature, and the properties and powers of bodies, and their actions upon each other, from sensible experiments and observations.

I. It is not very long since this science has been known to the world, or, to speak more properly, since it was first reduced into a system. Natural philosophy has been, for these 50 centuries, nothing more than a confused heap of systems laid one upon another, and
very

* See Surgery.

very frequently the one clashing against the other. Each philosopher thought, that he had an equal right to erect a similar edifice to his own memory. They adopted barbarous terms and expressions, that conveyed confused ideas only. For explications, they gave certain unintelligible or unmeaning words, which had been introduced by the authority of some celebrated name, but from which a man of understanding could not receive the least information. At length, the true physics was brought to light; it was drawn from the obscurity of the schools, where it had grown old under the authority of Aristotle, and scarce any thing been suffered to remain of it but the name. This reformation proceeded principally from the manner of studying it. Instead of guessing at it, they began to investigate it by experiments; and whereas they formerly confined themselves to speculations, and vague researches concerning phenomena and their causes, that were always merely conjectural, they now gave ocular demonstrations of causes and effects by means of experiments; and this is what they call *experimental philosophy*.

II. The principles of this philosophy are as follow. All the material substances, whose assemblage composes the universe, are called *natural bodies*. What we perceive in these substances that is uniform and invariable, and of which we do not know the cause, is called their *properties*. Physics sets out with this, as from a fixed point, in order to explain the different phenomena that are perceived on the earth, in the water, the air, or fire, and in all that these elements contain. For though it does not pretend to know all that bodies have in common among themselves, or all that is peculiar to each one of them; yet it knows a certain number of their properties, which it regards as primary, till it discovers a precedent cause of which they may be the effect; and which properties are general, and in a manner inseparable from all matter, as for example, *extension*. There are likewise properties of an inferior order, which do not appertain to all bodies but as they are in certain states, or under certain circumstances: these, in general, are nothing more than combinations of the primary properties; and form a second class, as for example, *fluidity*. Lastly, these properties of the first and second order combine more and more, and become common to a still smaller number of bodies: and here they are no longer extended to all bodies, as the first; nor are peculiar to certain states, as the second; but are confined to genders, species, or even individuals. Such are several properties of the air, fire, light, metals, the magnet, &c. These three orders of properties are the subject of the inquiries of experimental philosophy, which proves by experiments those that are already known, and frequently discovers others that were unknown.

III. It is necessary here to descend to some particulars. The first property of bodies, which presents itself to our ideas and our senses, is their extension; which is a limited bulk of any form whatever, of which we can conceive parts that may be distinguished from each other. This material extension has three dimensions, which are length, breadth, and depth. Every body, whose extension is large enough to be seen or felt, may be divided into several parts, and which must consequently decrease in proportion as the division is increa-

sed; from hence comes the infinite divisibility of matter, at least in idea; for in the smallest particle we can still imagine two halves, though the fact has never been proved by experiment; for nature does not at all times conform to imagination, seeing that the minutest particles, and their decomposition, escape our observation even in the most accurate experiments. However, we should never have believed, without having made the trial, to what degree experimental philosophy is capable of dividing bodies, and of reducing them to particles that are almost indivisible.

IV. The order, or arrangement, which the surfaces of bodies take among themselves, is called their *figures*. As these surfaces cannot be confounded, but are always distinguishable by their situations, it is evident that figure is a common and necessary property of all bodies. The experiments by which this truth is demonstrated by the aid of the microscope, are equally curious and convincing: and from hence it is also proved, that there are no two bodies that are absolutely similar. The solidity of a body is nothing more than the quantity of matter that is contained within its bulk: this property is essential to all bodies, and the most certain sign of their existence. Resistance is a necessary consequence of the foregoing property; and every physical resistance proves a real solidity in a greater or less degree. Fluids being the only bodies in which solidity is in any manner necessary to be proved, it has been there demonstrated by numberless experiments. The porosity of bodies is, on the contrary, nothing but that space which is found between their solid parts. This space has its degrees. When a dry sponge is plunged into water, a quantity of air comes out of it, in proportion to the water that penetrates it: and when moist bodies are dried, they become more light in proportion as they lose by evaporation what their porosity had admitted. This is the first sort of space or vacuum. Light, or the matter of fire that we see pass through bodies impenetrable to air and water, supposes pores more delicate, and a space more subtle. It is almost indubitable, that after these first kinds of vacuum, and which indeed are improperly so called, as they are filled with other matter, there are others still smaller, and which are so in a literal sense. That freedom, which is requisite to motion, seems to prove it: for though we may say, matter being divisible almost *ad infinitum*, that a body or substance more solid may move in another substance that is more subtle, and that will give way to its motion, we must nevertheless have recourse to a last resort, and admit of an ultimate vacuum, which will give room sufficient to the least corpuscle, that its part *A* may take the place of its part *B*, without the least resistance: besides, it is not to be imagined, that nature, in fact, admits of that infinite divisibility which our imagination can conceive, and that every thing which is possible in idea is at all times practicable. All that exists is possible, but all that is possible does not however exist. The air-pump is of very great use in proving these three sorts of vacuums. By density, is understood the proportion between the extension and solidity of a body: one body therefore is more dense than another, when, under the same degree of extension, it contains more solid matter: and this quality arises from condensation and compression. Elasticity is nothing more than that effort

by which certain bodies, when compressed, endeavour to restore themselves to their former state; and this property supposes them compressible. As all these natural properties of bodies are of great utility in explaining the principles of physics, and in applying them to all the arts, experimental philosophy proves their reality by a thousand examples.

V. We discover still other properties in bodies; such as mobility, which we must not here confound with motion. This mobility arises from certain dispositions which are not in an equal degree in all bodies; from whence it comes that some are more easily moved than others: and this proceeds from the resistance to motion which is perceived in all bodies, having regard merely to their masses; and this resistance is called *vis inertiae*, or *inert force*. A body is said to be in motion, when it is actually moving from one place to another; or, whenever a body changes its situation with regard to the objects that surround it, either nearly or remotely, it is said to be in motion. There are three principal matters to be considered in a moving body; its direction, its velocity, and the quantity of its motion: and here physics explains the force or moving power; it likewise distinguishes between simple and compound motion. Simple motion is that which arises from only one force, or which tends to only one point. It describes the laws, and explains the resistance, of mediums; the resistance of friction; the difficulties of a perpetual motion; the alteration of direction, occasioned by the opposition of a fluid matter; reflected or reverberated motion; the communication of motion by the shock of bodies, &c. Compound motion is that of a body impelled to move by several causes or powers which act according to their different directions. Physics here likewise investigates the laws of motion; and is particularly applied to the explaining, under this head, what are called the *central forces*, which produce a motion that is either circular or in a curve line, and which incessantly urge the moving body either to approach or recede from the centre. To distinguish these from each other, the former is called the *centripetal force*, and the latter the *centrifugal force*.

VI. By gravity, or ponderosity, is to be understood that force which occasions bodies to pass from a higher to a lower place, when nothing opposes their course, or when the obstacles are not sufficient to stop them. Speculative philosophy investigates its cause, and perhaps in vain. Experimental philosophy contents itself with describing the phenomena, and teaching the laws of gravity, which are thoroughly established by a thousand reiterated experiments. In order properly to understand this subject, we must take care not to confound the term *gravity* with that of *weight*. By the former, we understand that force which urges bodies to descend through a certain space in a given time. By the latter, is meant the quantity of a heavy body that is contained under the same bulk. The phenomena are explained by the experiments themselves, and by inferences deduced from them.

VII. Hydrostatics is a science whose object is the gravity and equilibrium of fluids in particular. Though the gravity of these bodies is the same with that of others, and is subject to the same laws, yet their state of fluidity gives rise to particular phenomena, which it is of consequence to know. But as hydrostatics can-

not be successfully treated on without the assistance of calculation, it has been ranged among the mathematical sciences. See MATHEMATICS.

VIII. We say the same with regard to mechanics; which is the art of employing, by the aid of machines, the motion of bodies, in conformity to its properties and laws, as well with regard to solids as fluids, either more commodiously or more advantageously.

IX. After it has made the most accurate experiments, and the most judicious observations, on all these different subjects, and the properties of bodies in particular, experimental philosophy passes to the examination of the air, the water, fire, the wind, colours, &c. The air is a fluid with which we are surrounded from the instant of our birth, and without which we cannot exist. It is by the properties and the influence of the air, that nature gives increase and perfection to all that it produces for our wants and conveniences; it is the spirit of navigation: sound, voice, speech itself, are nothing more than percussions of the air: this globe that we inhabit is completely surrounded by air; and this kind of coverture, which is commonly called the *atmosphere*, has such remarkable functions, that it evidently appears to concur to the mechanism of nature. Experimental physics, therefore, considers the air, 1. Of itself, independent of its bulk, and the figure of its whole body: it examines its essential properties; as its gravity, density, spring, &c. The air-pump is here of indispensable use; and by this machine physics examines in what manner space, or a vacuum, is made. It likewise shows the necessity of air to the preservation of animal-life; the effect it has on sound, fire, and gunpowder, *in vacuo*; and a hundred other experiments of various degrees of curiosity. 2. It considers the air as the terrestrial atmosphere, sometimes as a fluid at rest, and sometimes as in motion. And by these means it accounts for the variation of the mercury in the barometer, and why it sinks in proportion as the height of the atmosphere diminishes; as also for the figure, the extent, and weight of the atmosphere: it shows the method of determining the height of mountains, the nature of sound in general, of its propagation, and of sonorous bodies.

IX. It is here also, that experimental philosophy considers the nature of the wind; which is nothing more than agitated air, a portion of the atmosphere that moves like a current, with a certain velocity and determinate direction. This fluid, with regard to its direction, takes different names according to the different points of the horizon from whence it comes, as east, west, north, and south. Winds are likewise distinguished into three sorts; one of which is called *general* or *constant*, as the trade-winds, which continually blow between the tropics: another is the *periodical*, which always begin and end within a certain time of the year, or a certain hour of the day, as the monsoons, the land-breezes and sea breezes, which rise constantly in the morning and evening; and lastly, such as are *variable*, as well with regard to their direction as their velocity and duration.

M. Mariotte computes the velocity of the most impetuous wind, to be at the rate of 32 feet in a second, and Mr Derham makes it 66 feet in the same time. The first, doubtless, meant the wind of the greatest velocity that had then come to his knowledge.

X. The force of the wind, like that of other bodies, depends on its velocity and mass; that is, the quantity of air which is in motion: so the same wind has more or less force on any obstacle that opposes it, in proportion as that obstacle presents a greater or a less surface: for which reason it is that they spread the sails of a vessel more or less, and place the wings of a wind-mill in different directions. The machines, by which the winds are measured, are called *anemometers*. They shew the direction, the velocity, and the duration of winds. It is by the agitations of the wind, that the air is purified; that the seeds of trees and herbs are conveyed to the forests and fields; that ships are driven from one pole to the other; that our mills turn upon their axes, &c.; and art, by imitating nature, sometimes procures us artificial winds, by which we refresh our bodies, invigorate our fires, purify our corn, &c.

XI. Water is a universal agent, which nature employs in all her productions. It may be considered as in three states, 1. As a liquid; 2. As a vapour; 3. As ice. These three different states do not in any manner change its essence, but make it proper to answer different ends. The natural state of water would be that of a solid body, as fat, wax, and all those other bodies which are only fluid when heated to a certain degree: for water would be constantly ice, if the particles of fire, by which it is penetrated in the temperate climates, did not render it fluid, by producing a reciprocal motion among its parts; and, in a country where the cold is continually strong enough to maintain the congelation, the assistance of art is necessary to make it fluid in the same manner as we do lead, &c. Water, when not in ice, is a fluid that is insipid, transparent, without colour, and without smell, and that easily adheres to the surface of some bodies, that penetrates many, and extinguishes fire. Experimental philosophy investigates the origin of fountains; the cause of the saltness of the sea; the means of purifying water; what is its weight, and what are its effects when heated, &c. It likewise examines this fluid in the state of vapour; and, finds that a drop of water, when in vapour, occupies a space vastly greater than it did before. It explains the *aeolipile* and its effects; fire engines; and the force of vapours that give motion to immense machines in mines and elsewhere, &c. and lastly, it considers water in the state of ice. Ice consequently is more cold than water; and its coldness increases if it continue to lose that matter, already too rare, or too little active, to render it fluid. Experimental physics endeavours to investigate the causes of the congelation of water, and why ice is lighter than water; from whence it derives that expansive force by which it breaks the containing vessel; the difference there is between the congelation of rivers and that of standing waters; why ice becomes more cold by the mixture of salts; and many other similar phenomena.

XII. The nature of fire is yet very much unknown to the most learned philosophers. As objects when at a great distance are not perceptible to our senses, so when we examine them too nearly, we discern them but confusedly. It is still disputed whether fire be a homogeneous, unalterable matter, designed, by its presence, or by its action, to produce heat, inflammation, and dissolution, in bodies; or if its essence consists in motion only, or in the fermentation of those particles which we call *in-*

flammable, and which enter as principles, in greater or less quantities, in the composition of mixed bodies. The most learned inquirers into nature incline to the former opinion; and to have recourse to a matter, which they regard as the principle of fire. They suppose that there is in nature a fluid adapted to this purpose, created such from the beginning, and that nothing more is necessary than to put it in action. The numberless experiments which are daily made in electricity, seem to favour this opinion, and to prove that this matter, this fluid, this elementary fire, is diffused through all nature, and in all bodies, even ice itself. We cannot say to what important knowledge this great discovery of electricity may lead if we continue our inquiries concerning it. It appears, however, that we may believe, without any inconvenience or absurdity, that fire and light, considered in their first principle, are one and the same substance differently modified.

XIII. Be this matter however as it may, experimental philosophy is employed in making the most ingenious and most useful researches concerning the nature of fire, its propagation, and the means by which its power may be excited or augmented; concerning the phosphorous and its inflammation; fire excited by the reflection of the sun's rays from a mirror; and on the effects of fire in general; concerning lightning and its effects; the fusion of metals; gunpowder and its explosion; flame, and the aliments of fire; and an infinity of like objects which it explains, or concerning which it makes new discoveries, by the aid of experiments.

XIV. By the word *light*, we understand that agent by which nature affects the eye with that lively, and almost constantly pleasing sensation, which we call *seeing*, and by which we discern the size, figure, colour, and situation of objects, when at a convenient distance. All philosophers agree, that the light, which is diffused in any place, is a real body. But what this body is, and by what means it enters that place where it is perceived, is a question about which philosophers are divided.

XV. Experimental philosophy is applied in discovering or proving, by an infinity of experiments, what is the nature of light, in what manner it is propagated, what its velocity and progressive motion. It also investigates and explains the principles of *optics*, properly so called, and shows the directions which light observes in its motions. From thence it proceeds to the examen of the principles of *catoptrics*, and describes the laws and effects of reflected light. It next treats of the principles of *dioptrics*, and explains the laws of refracted light; and lastly, it teaches, from the principles of natural and artificial vision, the construction of optical instruments, as lenses, concave mirrors, prisms, telescopes, &c. &c. and the uses to which they are applied.

XVI. By resolving or separating the rays of light, philosophy has obtained true and clear discoveries of the nature of colours. We are naturally led to imagine that colours, and their different degrees, make a part of the bodies that present them to our sight; that white is inherent in snow, green in leaves and grass, and red in a stuff dyed of that colour. But this is far from being true. If an object, which presents any colour to our sight, be not illuminated, it presents no colour whatsoever. In the night all is black. Colours, therefore, depend

depend on light; for without that we could form no idea of them: but they depend also on bodies; for of several objects presented to the same light, some appear white, others red, blue, &c. But all these matters being separate from our own bodies, we should never acquire any ideas of them, if the light, transmitted or reflected by these objects, did not make them sensible to us, by striking upon the organs of our sight, and if these impressions did not revive in us those ideas which we have been used to express by certain terms. For these reasons philosophy considers colours from three points of view, 1. As in the light; 2. In bodies, as being coloured; and, 3. From the relation they have to our visual faculties, which they particularly affect,

and by which we are enabled to distinguish them:

It is unnecessary in this place to say more either on colour in particular, or experimental philosophy in general. The different subjects of this collective article are particularly treated under their proper names, in the order of the alphabet: the reader will therefore turn, as he has occasion, to ACOUSTICS, CATOPTICS, CHROMATICS, DIOPTRICS, HYDROSTATICS, MECHANICS, OPTICS, PNEUMATICS, ELECTRICITY, MAGNETISM, &c. &c. &c.—Also AIR, ATMOSPHERE, BURNING-GLASS, COLD, COLOUR, CONGELATION, EVAPORATION, FIRE, FLAME, FLUIDITY, HEAT, IGNITION, LIGHT, SOUND, STEAM, WATER, WIND, &c.

E X P

Experi-
mentum
||
Exponent.

EXPERIMENTUM CRUCIS, a capital, leading, or decisive experiment; thus termed, either on account of its being like a cross, or direction-post, placed in the meeting of several roads, guiding men to the true knowledge of the nature of that thing they are inquiring after; or, on account of its being a kind of torture, whereby the nature of the thing is as it were extorted by force.

EXPHORESIS. See ORATORY, n° 85.

EXPIATION, a religious act, by which satisfaction, atonement, or amends, is made for the commission of some crime, the guilt done away, and the obligation to punishment cancelled.

The method of expiation among the Jews was chiefly by sacrifice, whether for sins of ignorance, or to purify themselves from certain pollutions.

Great Day of EXPIATION, an annual solemnity of the Jews, upon the tenth day of the month Tifri, which answers to our September. On this occasion, the high-priest laid aside his breast-plate and embroidered ephod, as being a day of humiliation. He first offered a bullock and a ram for his own sins, and those of the priests; then he received from the heads of the people two goats for a sin-offering, and a ram for a burnt-offering, to be offered in the name of the whole multitude. It was determined by lot which of the goats should be sacrificed, and which set at liberty. After this he perfumed the sanctuary with incense, and sprinkled it with blood: then, coming out, he sacrificed the goat upon which the lot had fallen. This done, the goat which was to be set at liberty being brought to him, he laid his hands upon its head, confessed his sins and the sins of the people, and then sent it away into some desert place: it was called *azazel*, or the *scape-goat*.

As to the expiations among the heathens, they were of several kinds; as sacrifices, and religious washings.

EXPIATION, in a figurative sense, is applied by divines to the pardon procured to mens sins, by the merits of Christ's death. See the article CHRISTIANITY, n° 12.

EXPLICIT, in the schools, something clear, distinct, formal, and unfolded.

EXPLOSION, in physics, is properly applied to the going off of gun-powder and the report made thereby. Hence it is used to express such sudden actions of bodies as generate air instantaneously.

EXPONENT, in algebra, the same with index.

E X P

See ALGEBRA, n° 9.

EXPONENT is also used in arithmetic, in the same sense as index or logarithm.

EXPORTATION, the shipping and carrying out of the kingdom wares and commodities for other countries. See the articles COMMERCE, TRADE, and SHIPPING.

EXPOSING of CHILDREN, among the ancients, a barbarous custom of laying down children by the sides of the highways, and other places most frequented, where they were left at the mercy of the public, and where it behoved them to perish unless taken up and educated by charitable and compassionate persons. Many exposed their children, merely because they were not in a condition to educate them; and as for those who exposed them for other reasons, they commonly did it with jewels, with a view no doubt to encourage those who found them to take care of their education if alive, or give them human burial if dead.

EXPOSITION, in general, denotes the setting a thing open to public view: thus it is the Romanists say, the host is *exposed*, when shewn to the people.

EXPOSITION, in a literary sense, the explaining an author, passage, writing, or the like, and setting their meaning in an obvious and clear light.

EXPOSITOR, or EXPOSITORY, a title given to small dictionaries, serving to explain the hard words of a language.

EXPOSTULATION, in rhetoric, a warm address to a person, who has done another some injury, representing the wrong in the strongest terms, and demanding redress.

EXPOSURE, in gardening, the situation of a garden-wall, or the like, with respect to the points of the compass, as south or east. See GARDENING.

EXPRESSED OILS, in chemistry, such oils as are obtained from bodies only by pressing. See OIL.

EXPRESSION, in rhetoric, the elocution, diction, or choice of words in a discourse. See LANGUAGE, ORATORY, and POETRY.

EXPRESSION, in music. See COMPOSITION.

EXPRESSION, in painting, a natural and lively representation of the subject, or of the several objects intended to be shewn.

The expression consists chiefly in representing the human body and all its parts, in the action suitable to it: in exhibiting in the face the several passions proper to the figures, and observing the motions they impress on the external parts. See PAINTING, n° 15.

Expor-
tation
||
Expression.

Expresſion
||
Extortion.

EXPRESſION, in reading. See *READING*, N^o ix. x.
EXPRESſION *Theatrical*. See *DECLAMATION*, article iv.

EXPRESſION, in pharmacy. See *PHARMACY*, n^o 221.
EXPULSION, in a general ſenſe, the act of violently driving a perſon out of any city, ſociety, &c.

EXPULSION, in medicine, the act whereby any thing is forcibly driven out of the place in which it is: thus we ſay, the expulſion of the fetus in delivery.

EXSICCATION, in pharmacy. See *PHARMACY*, n^o 226.

EXSPIRATION, in phyſic, that part of reſpiration by which the air is expelled or driven out of the lungs. See *ANATOMY*, n^o 381. and *RESPIRATION*.

EXTASY, a tranſport which ſuſpends the function of the ſenſes, by the intenſe contemplation of ſome extraordinary or ſupernatural object.

EXTASY, in medicine, a ſpecies of catalepy, when a perſon perfectly remembers, after the paſſyſm is over, the ideas he conceived during the time it laſted.

EXTENSION, in philoſophy, one of the common and eſſential properties of body; or that by which it poſſeſſes or takes up ſome part of univerſal ſpace, which is called the place of that body *.

EXTENSOR, an appellation given to ſeveral muſcles, from their extending or ſtretching the parts to which they belong. See *ANATOMY*, *Table of the Muſcles*.

EXTENT, in law, is uſed in a double ſenſe. Sometimes it ſignifies a writ or command to the ſheriff for the valuing of lands or tenements; and ſometimes the act of the ſheriff, or other commiſſioner, upon this writ.

Old and New EXTENT, in Scots law. See *LAW*, N^o clxvi. 6.

EXTERIOR, or EXTERNAL. See *EXTERNAL*.

EXTERMINATION, in general, the extirpating or deſtroying ſomething.

EXTERMINATION, in algebra. See *ALGEBRA*, n^o 19. 20.

EXTERNAL, a term of relation applied to the ſurface or outſide of a body, or that part which appears or preſents itſelf to the eye, touch, &c. in contradiſtinction to *internal*.

EXTERNAL is alſo uſed to ſignify any thing that is without-ſide a man, or that is not within himſelf, particularly in his mind; in which ſenſe we ſay, external objects, &c.

EXTINCTION, in general, denotes the putting out or deſtroying ſomething, as a fire or flame. See *Extinguiſhing of FIRE*.

EXTINGUIſHMENT, in law, is a conſolidation or union, as where one has due to him a yearly rent out of lands, and afterwards purchaſes the lands out of which the rent ariſes; in this caſe, both the property and the rent being united in one poſſeſſor, the rent is ſaid to be extinguiſhed.

EXTIRPATION, the ſame with extermination. See *EXTERMINATION*.

EXTISPEX, in antiquity, the perſon who drew preſages from viewing the intrails of animals offered in ſacrifice.

EXTORTION, in law, is an illegal manner of wreſtling any thing from a man, either by force, menace, or authority. It is alſo the exaction of unlaw-

ful uſury, winning by unlawful games, and taking more than is due under pretence of right, as exceſſive tolls in millers, &c.

At the common law, extortion is puniſhable by fine and imprifonment; and the ſtatute of 3 Eliz. 1. c. 30. has enacted, that officers of juſtice guilty of extortion for the expedition of buſineſs, &c. ſhall render to the party treble value. There are likewiſe divers other ſtatutes for puniſhing extortions of ſheriffs, bailiffs, goalers, clerks of the aſſiſe and of the peace, attorneys, ſolicitors, &c.

EXTRACT, in pharmacy, is a ſolution of the purer parts of a mixed body inſpiffated, by diſtillation or evaporation, nearly to the conſiſtence of honey *.

† EXTRACT, in matters of literature, is ſomething copied or collected from a book or paper.

EXTRACTION, in chemiſtry and pharmacy, the operation by which eſſences, tinctures, &c. are drawn from natural bodies. See *EXTRACT*.

EXTRACTION, in ſurgery, is the drawing any foreign matter out of the body by the hand, or by the help of inſtruments. See *SURGERY*.

EXTRACTION, in genealogy, implies the ſtock or family from which a perſon is deſcended.

EXTRACTION of *Roots*, in algebra and arithmetic. See *ALGEBRA*, and *ARITHMETIC*.

EXTRACTOR, in midwifery, an inſtrument or forceps, for extracting children by the head. See *MIDWIFERY*.

EXTRAVAGANTES, thoſe decretal epiſtles which were publiſhed after the CLEMENTINES.

They were ſo called, becauſe, at firſt, they were not digeſted, or ranged, with the other papal conſtitutions, but ſeemed to be, as it were, detached from the canon law. They continued to be called by the ſame name when they were afterwards inſerted in the body of the canon law. The firſt extravagantes are thoſe of John XXII. ſucceſſor of Clement V. The laſt collection was brought down to the year 1483, and was called the *common extravagantes*, notwithstanding that they were likewiſe incorporated with the reſt of the canon law.

EXTRAVASATION, in contuſions, fiſſures, depreſſions, fractures, and other accidents of the cranium, is when one or more of the blood-veſſels, that are diſtributed in the dura mater, is broke or divided, whereby there is ſuch a diſcharge of blood as greatly oppreſſes the brain, and diſturbs its office; frequently bringing on violent pains, and other miſchiefs; and at length death itſelf, unleſs the patient is timely relieved. See *SURGERY* and *MEDICINE*.

EXTREMES, in logic, the terms expreſſing the two ideas whoſe relation we inquire after in a ſyllogiſm.

EXTREME *Uction*. See *UNCTION*.

EXTRINSIC, among metaphyſicians, is taken in various ſenſes. Sometimes it ſignifies a thing's not belonging to the eſſence of another; in which ſenſe, the efficient cauſe and end of a thing are ſaid to be extrinſic. Sometimes it ſignifies a thing's not being contained within the capacity of another; in which ſenſe, thoſe cauſes are called extrinſic which introduce ſomething into a ſubject from without, as when a fire introduces heat. Sometimes it ſignifies a thing added, or applied, to another; in which ſenſe accidents and adherents

Extrac-
||
Extriuſic.

* See
Pharmacy,
n^o 603, &c.

* See *Meta-
phyſics*,
n^o 56.

herents are said to be extrinsic to the subjects to which they adhere. Sometimes the vision is said to be extrinsic from some form which does not exist in that thing, but is adjacent to it, or by some means or other without it.

EXULCERATION, in-furgery. See ULCER.

EXUVIÆ, among naturalists, denote the cast-off parts or coverings of animals, as the skins of serpents, caterpillars, and other insects.

EYE, in anatomy. See ANATOMY, n° 406.

Bull's EYE, in astronomy. See ALDEBARAN.

EYE of a Block, in naval affairs, that part of the rope-stop which is fastened to some necessary place in the ship: the stop is a sort of wreath or rope formed into a ring, and fixed round the block for the double convenience of strengthening the block, and fastening it in any place where it is wanted.

EYE, in agriculture and gardening, signifies a little bud or shoot, inserted into a tree by way of graft. See ENGRAFTING.

EYE of a Tree, a small pointed knot to which the leaves flick, and from which the shoots or sprigs proceed. See GEMMA.

EYE-Bright. See EUPHRASIA.

EYRAC, or IRAC, ARABIA, a province of Turkey in Asia, 345 miles in length, and 190 in breadth; of which BAGDAD is the capital.

EYRAC Agemi, the principal province of Persia, anciently called PARTHIA.

EYRE, or EIRE, in law, the court of itinerant justices. See ASSIZE.

EYRIE, in falconry, a brood or nest, a place where hawks build and hatch their young.

EZEKIEL, a canonical book of the Old Testament, referring chiefly to the degenerate manners and corruptions of the Jews of those times.

It abounds with fine sentences and rich comparisons, and discovers a good deal of learning in profane matters.

Ezekiel was carried captive to Babylon with Jeconiah, and began his prophecies in the fifth year of the captivity. He was cotemporary with Jeremiah, who prophesied at the same time in Judea. He foretold many events, particularly the destruction of the temple, the fatal catastrophe of those who revolted from Babylon to Egypt, and the happy return of the Jews to their own land.

EZRA, a canonical book of the Old Testament; comprehending the history of the Jews from the time of Cyrus's edict for their return, to the 20th year of Artaxerxes Longimanus. It specifies the number of Jews who returned, and Cyrus's proclamation for the rebuilding the temple, together with the laying its foundation, the obstruction it met with, and the finishing thereof in the reign of Darius.

The illustrious author of this book was also the restorer and publisher of the canon of the Old Testament. See BIBLE.

F.

THE fourth consonant, and sixth letter of the alphabet. The letter F is borrowed from the digamma or double gamma of the Ælians, as is evident from the inscription on the pedestal of the Colossus at Delos; and was undoubtedly formed from the old Hebrew vau: and tho' this letter is not found in the modern Greek alphabet, yet it was in the ancient one, from whence the Latins received it, and transmitted it to us.

It is formed by a strong expression of the breath, and joining at the same time the upper-teeth and under-lip. It has but one sort of sound, which has a great affinity with *v* and *ph*, the latter being written for it by us in all Greek words, as *philosophy*, &c. tho' the Italians write it *flosophia*.

The Romans for some time used an inverted F, *ɿ*, instead of V consonant, which had no peculiar figure in their alphabet. Thus, in inscriptions we meet with TERMINA_ɿIT, DIA_ɿL, &c. Lipius and others say, that it was the emperor Claudius who introduced the use of the inverted digamma, or *ɿ*: but it did not long subsist after his death; for Quintilian observes, that it was not used in his time.

F, or FA, in music, is the fourth note in rising in this order of the gamut, *ut, re, mi, fa*. It likewise denotes one of the Greek keys in music, destined for the bass.

F, in physical prescriptions stands for *Fiat*, or "Let it be done." Thus *f. s. a.* signifies *fiat secundum artem*.

F was also a numeral letter, signifying 40; according to the verse,

Sexta quaterdenos gerit que distat ab alpha.

And when a dash was added at top, thus *ƒ*, it signified forty thousand.

F, in the civil law. Two fs joined together thus *ff*, signify the pandects. See PANDECTS.

F, in criminal law, a stigma or brand put upon felons with a hot iron, on their being admitted to the benefit of clergy; by stat. 4 H. 7. c. 13.

FABA, in botany. See VICIA.

FABA Sancti Ignatii. See IGNATIUS's Bean.

FABAGO, in botany. See SYCOPHYLLUM.

FABER, in ichthyology. See ZEUS.

FABIAN (Robert), an alderman of the city of London, and sheriff in the year 1494; was a person of learning for the time he lived in, a good poet, and author of a Chronicle of England and France, intitled *The Concordance of Stories*, in two volumes folio, beginning with Brute, and ending with the 20th of Henry VII. 1504. It contains several curious particulars relative to the city of London, not elsewhere to be found. Stowe calls it "a painful labour, to the great honour of the city and of the whole realm." We are told that Cardinal Wolsey caused as many copies of

Fabius
||
Fabric

Fabricius,

of this book, as he could procure, to be burned, because the author had made too clear a discovery of the large revenues of the clergy. Fabian died in 1512.

FABIVS *Maximus* (Quintus), one of the greatest generals of his time, was surnamed *Cunctidator*, because being created dictator, after the battle of Trasimene, in the 217th year before the Christian era, he found means to weary out Hannibal without fighting, by encamping in the most advantageous manner, and incessantly harassing him. Hannibal sent him word, that "If he was as great a captain as he would be thought, he ought to come into the plain and give him battle." But Fabius coldly replied, "That if he was as great a captain as he would be thought, he would do well to force him to fight." Fabius was five times consul; and performed such great services for his country, that he was called *The Buckler of the Republic*. See (*History of*) *ROME*.

FABIUS, styled *Pictor*, a Roman general and historian. He first introduced painting at Rome; and having caused the walls of the temple of Health to be painted, some authors have erroneously reckoned him a painter. Died about 216 B. C.

FABLE, a tale, or feigned narration, designed either to instruct or divert, disguised under the allegory of an action, &c.

Fables were the first pieces of wit that made their appearance in the world; and have continued to be highly valued, not only in times of the greatest simplicity, but in the most polite ages of the world. Jotham's fable of the trees is the oldest that is extant, and as beautiful as any that have been made since. Nathan's fable of the poor man is next in antiquity. We find *Æsop* in the most distant ages of Greece; and in the early days of the Roman commonwealth, we read of a mutiny appealed by the fable of the belly and the members. As fables had their rise in the very infancy of learning, they never flourished more than when learning was at its greatest height; witness *Horace*, *Boileau*, and *Fontaine*.

Fable is the finest way of giving counsel, and most universally pleasing, because least shocking; for, in the reading of a fable, a man thinks he is directing himself, whilst he is following the dictates of another, and consequently is not sensible of that which is the most unpleasing circumstance in advice. Besides, the mind is never so much pleased as when she exerts herself in any action that gives her an idea of her own abilities; this natural pride of the soul is very much gratified in the reading of fable.

FABLE, is also used for the plot of an epic or dramatic poem; and is, according to Aristotle, the principal part, and, as it were, the soul of the poem.*

FABRI (Honorius), a laborious jesuit born in the diocese of Bellay, distinguished himself by his skill in philosophy and the mathematics, and by writing a great number of books. The most curious of which treat of geometry, optics, the loadstone, the motion of the earth, the ebbing and flowing of the sea, &c. He died at Rome, in 1688.

FABRIC, in general, denotes the structure or construction of any thing; but particularly of buildings, as a church, hall, house, &c. See *ARCHITECTURE*.

FABRIC-LANDS, those formerly given towards rebuilding or repairing of cathedrals and other churches;

for anciently almost every body gave more or less, by his will, to the fabric of the parish-church where he dwelt.

FABRICIUS, the celebrated Roman consul and general; not less memorable for his incorruptible integrity, in rejecting immense bribes proffered to induce him to betray or quit the service of his country. Neither would he give bribes to take off his enemy by base means. See (*History of*) *ROME*.

FABRICIUS (George), a learned German, born at Chenitz in Misnia, in 1516. After a liberal education, he visited Italy in quality of a tutor to a young nobleman; and, examining all the remains of antiquity with great accuracy, compared them with their descriptions in Latin writers. The result of these observations was his work intitled *Roma*, containing a description of that city. He afterwards settled at Misenum, where he conducted a great school to the time of his death in 1571. He was also the author of a great number of sacred Latin poems, wrote seven books of the *Annals of Misnia*, three of the *Annals of Meissen*, and *Travels*.

FABRICIUS (Jerom), a celebrated physician in the latter end of the 16th century (surnamed *Aquapendente*, from the place of his birth) was the disciple and successor of Fallopius. He chiefly applied himself to surgery and anatomy, which he professed at Padua for forty years with extraordinary reputation. The republic of Venice settled a large pension upon him, and honoured him with a gold chain and a statue. He died in 1603; leaving behind him several works which are much esteemed.

FABRICIUS (John Albert), one of the most learned and laborious men of his age, was born at Leipzig in 1668. He was chosen professor of eloquence at Hamburgh in 1699, and was made doctor of divinity at Kiel. His works are numerous; and he died at Hamburgh in 1736, after a life spent in the severest literary application to collect and publish valuable remains of ancient learning.

FABRICIUS (Vincent), born at Hamburgh in 1613, was a good poet, a great orator, an able physician, and a learned civilian. He was for some time counsellor to the bishop of Lubec, and afterward burgomaster and syndic of the city of Dantzic; from whence he was 13 times sent deputy into Poland, where he died at Warlaw in 1657, during the diet of that kingdom. The most complete edition of Fabricius's poems and other works was published at Leipzig in 1685, under the direction of his son Frederic Fabricius.

FABRICIUS (Baron), one of the finest gentlemen of his time, and known to the public by his letters relating to the transactions of Charles XII of Sweden during his residence in the Ottoman empire, was descended from a good family in Germany. He was taken early into the service of the Court of Holstein, and was sent in a public character to the king of Sweden whilst he was at Bender; where he soon acquired the good graces of that prince. He accompanied him in his exercises; gave him a turn for reading; and it was out of his hand Charles snatched Boileau's satires, when he tore out those that represented Alexander the Great as a madman. Fabricius was also in favour with Stanislaus, and with our king George I. whom he accompanied in his last journey to Hanover, and was with him when he died. A translation of his
letters

* See
Poetry.

Fabrot
Faction.

letters was published in London, 1761.

FABROT (Charles Hannibal), one of the most celebrated civilians of his time, was born at Aix in 1681; and acquired an extraordinary skill in the civil and canon law, and in the belles lettres. He published the *Basilica*, or Constitutions of the Emperors of the East, in Greek and Latin, with learned notes, in seven vols folio; and editions of *Cedrenus*, *Nicetas*, *Anastafius*, *Bibliothecarius*, *Constantine Manasses*, and *Cujas*, with learned and curious notes.

FABULOUS, something consisting of, or connected with, a fable.

FABULOUS *Age*, among ancient historians. See *AGE*.

FACE, the surface, or first side which a body presents to the eye: See *SURFACE*. We say, the *face* of the earth, of the waters, &c. Polyhedrons have several *faces*: See *POLYHEDRON*. A die, or cube, has six *faces*: See *CUBE*.

FACE, is particularly used for the visage of an animal, and especially of man; and comprehends, in the latter, all that part of the head which is not covered with the common long hair. The Latins call it *facies*, *vultus*, *os*, &c.

The human face is called the *image of the soul*, as being the seat of the principal organs of sense; and the place where the ideas, emotions, &c. of the soul are chiefly set to view. Pride and disdain are shewn in the eye-brows, modesty on the cheeks, majesty in the forehead, &c. It is the face shews the sex, age, temperament, health, or disease, &c.

The face, considered as the index of the passions, habits, &c. of the person, makes the subject of physiognomy. See *PHYSIOGNOMY* and *METOPOSCOPY*.

Anatomists usually divide the face into two parts, the upper and lower: The upper is the front, or forehead; the lower includes the eyes, nose, ears, mouth, and chin. See *ANATOMY*, n° 17, &c. 366. 404. 405. 406.

Foul or Pimpled FACE. See *GUTTA Rosacea*.

Hippocratic FACE, is when the nose is sharp, the eyes hollow, the temples sunk, the ears cold and contracted, and their lobes inverted; the skin about the forehead is hard, tense, and dry; the countenance is pale, greenish, or blackish. Some call this a cadaverous face. If it appears within three days after the onset of an acute disease, it indicates death.

FACE, in the military art, a word of command, intimating to turn about: thus, *face to the right*, is to turn upon the left heel a quarter-round to the right; and, *face to the left*, is to turn upon the right heel a quarter-round to the left.

FACET, or FACETTE, among jewellers, is the name of the little faces or planes to be found in brilliant and rose diamonds.

FACIES HIPPOCRATICÆ. See *Hippocratic FACE*.

FACIES Rubra, red, fiery, or foul face. See *GUTTA Rosacea*.

FACTION, a cabal or party formed in a state, city, or company.

FACTION, in antiquity, a name given to the different companies of combatants in the circus. They were four, *viz.* the white, the red, the green, and the blue; to which Domitian added another of purple colour. They were so denominated from the colour of

the liveries they wore; and were dedicated, according to M. Aur. Cassiodorus, to the four seasons of the year; the green being consecrated to spring, the blue to winter, the red to summer, and the white to autumn. It appears from ancient inscriptions, that each faction had its procurators and physician; and from history, that party-rage ran so high among them, that in a dissension between two factions, in the time of Justinian, almost 40,000 men lost their lives in the quarrel.

FACTITIOUS, any thing made by art, in opposition to what is the produce of nature. Thus, factitious cinnabar is opposed to native cinnabar.

FACTOR, in commerce, is an agent employed by merchants residing at other places, to buy or sell goods, or negotiate bills, or transact any kind of business on their account; and entitled to a certain allowance for his trouble.

A *supercargo* differs from a factor in this. The business of the former is limited to the care of a particular cargo; he goes along with it, and generally returns when his business is completed: the latter has a fixed residence abroad, and executes business for different merchants. But their duties, and the circumstances for which they are accountable, are the same.

The duty of a factor is to procure the best intelligence of the state of trade at his place of residence; of the course of exchange; of the quantity and quality of goods at market, their present price, and the probability that it may rise or fall; to pay exact obedience to the orders of his employers; to consult their advantage in matters referred to his direction; to execute their business with all the dispatch that circumstances admit; to be early in his intelligence, distinct in his accounts, and punctual in his correspondence.

A factor's power is either absolute or limited. Though intrusted with ample discretionary powers, he is not warranted to take unreasonable or unusual measures, or do any thing contrary to his employer's interest; but it is incumbent on the employer, if he challenge his proceedings, to prove that he could have done better, and was guilty of wilful mismanagement.

When a factor's power is limited, he must adhere strictly to his orders. If he exceeds his power, though with a view to his employer's interest, he is liable for the consequence. For example, if he gives credit when not empowered, or longer credit if not empowered, for the sake of a better price, and the buyer proves insolvent, he is liable for the debt. A factor has no power to give credit, unless authorized: But, if the goods consigned be generally sold on credit at the place of consignment, the factor will be vindicated for selling at the usual credit, unless expressly restricted.

Although opinion will never justify the factor for departing from orders, necessity sometimes will. If he be limited not to sell goods under a certain price, and the goods be perishable, and not in a situation for being kept, he may sell them, to prevent their destruction, even under the price limited.

A factor is never warranted to deal on trust, except with persons in good credit at the time. If the employer challenge the debtors, it is incumbent on him to prove that their bad circumstances was known at the time of sale; and the factor will be vindicated, if he trusted them at the same time for goods of his own.

If the factor sells his employer's goods on trust, and after.

Factitious,
Factor.

Factor,
Factorage.

Factory
||
Faerous.

after the day of payment is elapsed, receive payment from the purchaser for a debt of his own, he becomes liable in equity for the debt.

1 In case of bankruptcy, the factor ought immediately to lay attachments, and advise his employers; and he cannot withdraw his attachments, nor compound debts, without orders.

If a factor sells goods belonging to different merchants to the same person, and the buyer proves insolvent, they shall bear the loss in equal proportions; and, if the buyer has paid part before his insolvency, without specifying for which, the payment ought to be distributed in equal proportions; but, if the days of payment be fixed, and part of the debts only due, the payment ought to be applied, in the first place, to such debts as were due.

If he makes a wrong entry at the custom-house, and the goods be seized in consequence thereof, he must bear the loss, unless the error be occasioned by a mistake in the invoice, or letter of advice.

The owner bears the loss of goods seized when attempted to be smuggled by his orders; but the factor complying with an unlawful order is liable in such penalties as the laws exacts.

If a factor saves the duty of goods due to a foreign prince, he shall have the benefit; for, if detected, he bears the loss.

If a factor sells goods bought by his employer's orders for his own advantage, the employer may recover the benefit, and the factor shall be amerced for the same.

If a factor receives bad money in payment, he bears the loss; but if the value of the money be lessened by the government, the employer bears the loss.

A factor is not liable for goods spoiled, robbed, or destroyed, by fire.

If a factor receives counterfeit jewels from his employer, and sells them, the employer is liable to indemnify him for any penalties he may incur.

If a factor be ordered to make insurance, and neglect it, and the subject be lost, he is liable to make it good, providing he had effects in his hands.

If a factor buys goods for his employer, his bargain shall be binding on the employer.

In case of a factor's insolvency, the owner may reclaim his goods; and, if they be sold on trust, the owner (and not the factor's creditors) shall recover payment of the debts.

FACTOR, in multiplication, a name given to the multiplier and multiplicand, because they constitute the product. See ARITHMETIC.

FACTORAGE, called also *commissio*, is the allowance given to factors by the merchant who employs them.

A factor's commission in Britain, on most kinds of goods, is $2\frac{1}{2}$ per cent.; on lead, and some other articles, 2 per cent.; in Italy, $2\frac{1}{2}$ per cent.; in France, Holland, Spain, Portugal, Hamburgh, and Dantzick, 2 per cent.; in Turkey, 3 per cent.; in North America, 5 per cent. on sales, and 5 per cent. in returns; in the West Indies, 8 per cent. for commission and storage. In some places, it is customary for the factors to insure the debts for an additional allowance, generally $1\frac{1}{2}$ per cent. In that case, they are accountable for the debt when the usual term of credit is expired.

Factorage on goods is sometimes charged at a certain rate per cask, or other package, measure, or weight, especially when the factor is only employed to receive or deliver them.

FACTORY is a place where a considerable number of factors reside, to negotiate for their masters or employers. See FACTOR.

The most considerable factories belonging to the British are those established in the East-Indies, Portugal, Turkey, &c.

FACTUM, in arithmetic, the product of two quantities multiplied by each other.

FACULÆ, in astronomy, certain bright and shining parts, which the modern astronomers have, by means of telescopes, observed upon or about the surface of the sun: they are but very seldom seen.—The word is pure Latin; being a diminutive of *fax*, "torch;" and supposed to be here applied from their appearing and disappearing by turns.

The *facule* or bright spots differ very considerably from the *macule* or dark spots, both in light, colour, figure, magnitude, and duration. See MACULÆ; and ASTRON. n^o 14—18. 33—39.

FACULTY, in law, a privilege granted to a person, by favour and indulgence, of doing what, by law, he ought not to do.

For granting these privileges, there is a court under the archbishop of Canterbury, called the *court of the faculties*. The chief officer of this court is styled *master of the faculties*, and has a power of granting dispensations in divers cases; as, to marry without the bans being first published, to eat flesh on days prohibited, to ordain a deacon under age, for a son to succeed his father in his benefice, a clerk to hold two or more livings, &c.

FACULTY, in the schools, a term applied to the different members of an university, divided according to the arts and sciences taught there: thus in most universities there are four faculties, *viz.* 1. Of arts, which include humanity and philosophy. 2. Of theology. 3. Of physic. And, 4. Of civil law.

FACULTY of Advocates. See ADVOCATES.

FACULTY is also used to denote the powers of the human mind, *viz.* understanding, will, memory, and imagination. See METAPHYSICS.

FÆCES, in chemistry, the gross matter, or sediment, that settles at the bottom after distillation, fermentation, and the like.—The fæces of wine are commonly called LEES.

FÆCES, in medicine, the excrements voided by stool. See EXCREMENTS.

FÆCULENT, in general, is applied to things abounding with fæces, or dregs: thus the blood and other humours of the human body, are said to be fæculent, when without that purity which is necessary to health.

FAENZA, a city of Romania in Italy with a bishop's see. It is an ancient place, and has undergone various revolutions. The river Amona washes its walls, and passes between the city and the suburbs, which are joined by a stone bridge defended by two good towers. The city is remarkable for its earthen ware, which is the best in all Italy.

FAERNUS (Gabriel), a native of Cremona in Italy, was an excellent Latin poet and critic of the 16th cen-

century. He was so skilled in all parts of polite literature, that the cardinal de Medicis, afterward pope Pius IV. was particularly fond of him. He was the author of some Latin elegies; of 100 Latin fables, selected from the ancients, written in iambic verse; and of several pieces of criticism, as *Censura emendationum Livianarum*, *De Metris Comicis*, &c. He was remarkably happy in decyphering manuscripts, and restoring ancient authors to their purity: he took such pains with Terence in particular, that Bentley has adopted all his notes in the edition he gave of that writer. He died at Rome in 1561; and Thuanus, who wrote his eloge, says, that the learned world was greatly obliged to him, yet had been still more so, if, instead of suppressing the then unknown fables of Phædrus, for fear of lessening the value of his own Latin fables, written in imitation of *Æsop*, he had been content with imitating them. M. Perault, however, who translated Faernus's fables into French, has defended him from this imputation, by affirming that the first MS. of Phædrus's fables, found in the dust of an old library, was not discovered till about 30 years after Faernus's death.

FAGARA, Iron-wood, a genus of the monogynia order, belonging to the tetrandria class of plants. There are two species, both natives of the warm parts of America, rising with woody stems more than 20 feet high. They are propagated by seeds; but in this country must be kept continually in a stove.

FAGE (Raimond de la), an excellent designer and engraver, highly esteemed by Carlo Maratti, was born at Toulouse in 1648. He applied himself to designing, through inclination, in spite of his parents; and had no master, nor any assistance: but his superior talents supplied the want of them, and he became one of the best designers in Europe; but his performances on licentious subjects are the most esteemed. It is reported of this artist, that he never made use of money, but contracted debts; and when the accounts were brought him, he drew upon the back of the bills, and bid the owners sell the drawings to connoisseurs for the amount, by which they were generally great gainers. Several of those drawings are in the cabinets of the curious. He died in 1690.

FAENSA, a city and bishop's see of Italy, situated in the pope's territories, about 30 miles east of Bologna: E. Long. 12. 38. and N. Lat. 44. 30.

FAGARA, in botany, a genus of the tetrandria monogynia class. The calix consists of four segments, and the corolla of four petals; and the capsule has four cells, two valves, and contains one seed. There are three species, none of them natives of Britain.

FAGGOT, in times of popery here, was a badge worn on the sleeve of the upper garment of such persons as had recanted or abjured what was then termed *heresy*; being put on after the person had carried a faggot, by way of penance, to some appointed place of solemnity. The leaving off the wear of this badge was sometimes interpreted a sign of apostacy.

FAGGOTS, among military men, persons hired by officers, whose companies are not full, to muster and hide the deficiencies of the company; by which means they cheat the king of so much money.

FAGIUS (Paul), *alias* BUCHLIN, a learned protestant minister, born at Rheinzabern in Germany in Vol. IV.

1504. He was a schoolmaster at Inna; but afterwards became a zealous preacher, and wrote many books. The persecution in Germany menacing danger to all who did not profess the Romish doctrines, he and Bucer came over to England in 1549, at the invitation of archbishop Cramer, to perfect a new translation of the scriptures. Fagius took the Old Testament, and Bucer the New, for their respective parts; but the design was at that time frustrated by the sudden deaths of both the professors. He died in 1550, and Bucer did not live above a year after. Both their bodies were dug up and burned in the reign of queen Mary.

FAGOPYRUM, or BUCK-WHEAT. See **POLYGONUM**.

FAGUS, the BEECH-TREE, a genus of the polyandria order, belonging to the monoecia class of plants. There are three species. 1. The sylvaticus, or beech-tree, rises 60 or 70 feet high, and hath a proportionable thickness, branching upward into a fine regular head, garnished with oval serrated leaves, with flowers in globular catkins, succeeded by angular fruit called *mast*. 2. The castanea, or chestnut-tree, hath a large upright trunk growing 40 or 50 feet high, branching regularly round into a fine spreading head, garnished with large spear-shaped acutely serrated leaves naked on the under side, having flowers in long amentums, succeeded by round prickly fruit, containing two or more nuts. 3. The pumila, dwarf chestnut-tree, or chinkapin, rises eight or ten feet high, with a branching shrubby stem, and oval, spear-shaped, and acutely serrated leaves, hoary on the under side.

Culture. The first is very easily raised from the mast or seed, which ripens in September, and may either be sown then, or in a month or two after, or towards the spring. For this purpose, beds are to be prepared four feet wide. The earth is then to be raked evenly from the surface, about an inch deep; then sow the mast, and beat it gently down with the back of the spade, afterwards covering it up with earth to the above-mentioned depth. Many of the plants will come up in the spring, but others not till a year after; and when they are two years old, they must be planted out in nursery-rows two feet and a half asunder, there to remain till they are four or five feet high, when they are to be transplanted to those places where they are to continue.—The second and third sorts are also propagated by seeds or nuts sown in drills. The nuts sometimes ripen perfectly in this country; but in default of this, there are vast quantities imported from Spain or Portugal. These last are reckoned preferable even to the best ripened chestnuts of this country.

Properties. The first species spreads its branches very wide, and affords a grateful shade; but no verdure will thrive under it. The mast, or seeds, yield a good oil for lamps; and are a very agreeable food to squirrels, mice, and swine. The fat of swine fed with them, however, is soft, and boils away unless hardened by some other food. The wood is brittle; very fissile; durable in water, but not in the open air: it is the best of all woods for fuel, and is sometimes used by the wheelwright and turner to make axes, spokes, bowls, &c. Sword scabbards are also made of it, and shoemakers lasts, and formerly book-binders used it in making covers for books. The leaves gathered in autumn, before they are much injured by the frosts, make much

Faint
Fair.

better matrasles than straw or chaff; and last for seven or eight years. The nuts, when eaten by the human species, occasion giddiness and headach; but when well dried and powdered, they make wholesome bread. They are sometimes roasted, and substituted for coffee. The poor people in Silesia use the expressed oil instead of butter. The chestnut tree sometimes grows to an immense size. The largest in the known world are those

* See *Ætna*. which grow upon Mount Ætna in Sicily *. At Tortworth in Gloucestershire, is a chestnut tree 52 feet round. It is proved to have stood there ever since the year 1150, and was then so remarkable that it was called the *great chestnut of Tortworth*. It fixes the boundary of the manor, and is probably near 1000 years old. The wood of the chestnut tree is applicable to the same purposes with the oak. If the bark is not taken off, it makes poles for cisterns, dead fences, and hop-yards; and pipes to convey water under ground, which will last longer than elm or oak. Some of the oldest buildings in London are said to be constructed with this wood. The nuts are used for whitening linen cloth, and for making starch.

FAINT-ACTION, in law, a feigned action, or such as, although the words of the writ are true, yet, for certain causes, the plaintiff has no title to recover thereby.

FAINT-Pleader, in law, a covinous, false, or collusive manner of pleading, to the deceit of a third person.

FAINTING. See (the *Index* subjoined to) MEDICINE.

FAINTS, in the distillery, the weak spirituous liquor that runs from the still in rectifying the low wines after the proof-spirit is taken off.

FAINTS, is also the last runnings of all spirits distilled by the alembic. The clearing the worm of these is so essential a point in order to the obtaining a pure spirit by the subsequent distillation, that all others are fruitless without it.

FAIR, a greater kind of market, granted to a town, by privilege, for the more speedy and commodious providing of such things as the place stands in need of.

The word *fair*, is formed from the French *foire*, which signifies the same thing: and *foire* is by some derived from the Latin *forum*, "market;" by others from the Latin *seria*, because anciently fairs were always held in the places where the wakes, or feasts of the dedications of churches, called *series*, were held *.

* See *Feria*.

It is incident to a fair, that persons shall be free from being arrested in it for any other debt or contract than what was contracted in the same; or, at least, promised to be paid there. These fairs are generally kept once or twice a-year; and, by statute, they shall not be held longer than they ought, by the lords thereof, on pain of their being seized into the king's hands, &c. Also proclamation is to be made, how long they are to continue; and no person shall sell any goods after the time of the fair is ended, on forfeiture of double the value, one fourth to the prosecutor, and the rest to the king. There is a toll usually paid in fairs on the sale of things, and for stallage, picaage, &c. See the article TOLL.

Fairs abroad are either free, or charged with toll and imposition. The privileges of free fairs consist chiefly, first, in that all traders, &c. whether natives or foreigners, are allowed to enter the kingdom, and

are under the royal protection, exempt from duties, impositions, tolls, &c. Secondly, that merchants, in going or returning, cannot be molested or arrested, or their goods stopped. They are established by letters-patent from the prince. Fairs, particularly free fairs, make a very considerable article in the commerce of Europe, especially that of the Mediterranean, and inland parts of Germany, &c.

The most celebrated fairs in Europe are those, 1. Of Francfort, held twice a-year, in spring and autumn: the first commencing the Sunday before Palm-Sunday, and the other on the Sunday before the eighth of September. Each lasts 14 days, or two weeks; the first of which is called the *week of acceptance*, and the second the *week of payment*. They are famous for the sale of all kinds of commodities; but particularly for the immense quantity of curious books no where else to be found, and whence the bookellers throughout all Europe used to furnish themselves. Before each fair, there is a catalogue of all the books to be sold thereat, printed and dispersed, to call together purchasers: though the learned complain of divers unfair practices therein; as fictitious titles, names of books purely imaginary, &c. beside great faults in the names of the authors, and the titles of the real books.

—2. The fairs of Leipzick, which are held twice a-year: one beginning on the first of January; another three weeks after Easter; and a third after Michaelmas. They hold 12 days a piece; and are at least as considerable as those of Francfort. 3. The fairs of Novi, a little city in the Milanese, under the dominion of the Republic of Genoa. There are four in the year, commencing on the second of February, the second of May, the first of August, and second of September. Though the commodities bought and sold here be very considerable; yet, what chiefly contributes to render them so famous, is the vast concourse of the most considerable merchants and negotiants of the neighbouring kingdoms, for the transacting of affairs, and settling accounts. 4. The fairs of Riga, whereof there are two in the year; one in May, and the other in September. They are much frequented by the English, Dutch, and French ships, as also from all parts of the Baltic. The best time for the sale of goods at Riga, is during the fairs. Since the building of the famous city of Peterburg, these fairs have suffered some diminution. 5. Fair of Archangel, during which all the trade foreigners have with that city is managed. It holds a month, or six weeks at most, commencing from the middle of August. The Muscovite merchants attend here from all parts of that vast empire; and the English, Dutch, French, Swedish, Danish, and other ships in the port of that city, on this occasion, ordinarily amount to 300. But this is no free fair, as the rest are: The duties of exportation and importation are very strictly paid, and on a very high footing. 6. The fair of St Germain, one of the suburbs of Paris, commencing on the third of February, and holding till Easter; though it is only free for the first 15 days. 7. The fairs of Lyons, which Monf. du Chesne, in his antiquity of cities, would insinuate, from a passage in Strabo, were established by the Romans: though it is certain, the fairs, as they now stand, are of a much later date. There are three in the year, each lasting 20 days, and free

Fair.

for ever. They begin on Easter Monday, the 26th of July, and the first of December. 8. Fair of Guibray, a suburb of the city of Falaife, in the Lower Normandy. It is said to have been established by our William the Conqueror, in consideration of his being born at Falaife. It commences on the 16th of August; and holds 15 days free by charter, and longer by custom. 9. Fair of Beaucaire, held partly in a city of that name, in Languedoc, and partly in the open country, under tents, &c. It commences on the 22d of July, and only holds for three days; yet it is the greatest and most celebrated of all the fairs in that part of Europe, both for the concourse of strangers from all parts of the world, and for the traffic of all kind of goods: the money returned in these three days amounting sometimes to above six millions of livres.

The fairs of Porto-bello, Vera Cruz, and the Havana, are the most considerable of all those in America. The two first last as long as the flota and gallions continue in those parts; and the last is opened as soon as the flota or gallions arrive there upon their return for Spain; this being the place where the two fleets join. See *FLOTA*, and *GALLIONS*.

The principal British fairs are, 1. Sturbridge-fair, near Cambridge, by far the greatest in Britain, and perhaps in the world. 2. Bristol has two fairs, very near as great as that of Sturbridge. 3. Exeter. 4. West Chester. 5. Edinburgh. 6. Wheyhill; and, 7. Burford-fair; both for sheep. 8. Pancras fair, in Staffordshire, for saddle-horses. 9. Bartholomew fair, at London, for lean and Welch black cattle. 10. St Faith's, in Norfolk, for Scotch runts. 11. Yarmouth fishing-fair for herrings, the only fishing fair in Great Britain. 12. Ipswich batter-fair. 13. Woodborough-hill, in Dorsetshire, for west-country manufactures, as kerseys, druggits, &c. 14. Two cheese fairs at Chipping Norton: with innumerable other fairs, besides weekly markets, for all sorts of goods, as well our own as of foreign growth.

FAIR (Isle), a small island lying between Orkney and Shetland, twelve or ten leagues E. N. E. from the former; and seven, eight, or ten leagues, S. W. from the latter. It is three miles long, and scarce half a mile broad, very craggy, with three high rocks which are visible both from Orkney and Shetland. There is in this island a small quantity of arable land, which is very fruitful and well manured; and there might be considerably more, but the inhabitants are obliged to reserve it for peat and pasturage. They have for the size of the island a great many sheep, and those very good and fat: but they have no kind of moor-fowl or other game; but there is great plenty of sea and water fowl, and all kinds of fish upon their coasts. There is in effect no port, though they have two that are nominally so: one at the fourth end, which is full of rocks, where only small boats can lie, and that but indifferently; the other at the north-east end, larger and safer in summer, so that it serves commodiously enough for their fishery. The duke of Medina Sidonia, when commander of the famous Spanish armada in 1588, was wrecked on the east coast of this island. The ship broke to pieces, but the duke and 200 men made their escape. They lived here so long, that both they and the inhabitants were almost famished. At length the duke and the poor remains of

Fairfax,
Fairford.

his people were carried over to the main land of Shetland, and then to Dunkirk, by one Andrew Humphry, for which service Andrew was rewarded with 3000 merks. This island produced to its former proprietor between 50 l. and 60 l. Sterling. It was sold at Edinburgh on the 20th of June 1766, for about 850 l. to James Stewart of Burgh, Esq.

FAIRFAX (Edward), natural son of Sir Thomas Fairfax, was an English poet who lived in the reigns of Elizabeth and James I. and dedicated a translation of *Tasso* to the former. The last account we have of him is in the year 1631, but the time of his death is uncertain. He wrote several poetical pieces, and was an accomplished genius. Dryden introduces Fairfax with Spencer, as the leading writers of the times; and even seems to give the preference to the former in the way of harmony, when he observes that Waller owned himself indebted for the harmony of his numbers to Fairfax's *Godfrey of Boulogne*.

FAIRFAX (Sir Thomas), general of the parliamentary forces against Charles I. in 1644. See (*History of*) *BRITAIN* n° 127 et seq. He resigned in 1650; after which he lived privately, till he was invited by general Monk to assist him against Lambert's army. He cheerfully embraced the occasion; and, on the third of December 1659, appeared at the head of a body of gentlemen of Yorkshire; when, upon the reputation of his name, a body of 12,000 men forsook Lambert and joined him. He was at the head of the committee appointed by the House of Commons to attend king Charles II. at the Hague, to desire him speedily to return to England; and having readily assisted in his restoration, returned again to his seat in the country; where he lived in a private manner, till his death, which happened in 1671, in the 60th year of his age.—He wrote, says Mr Walpole, memorials of Thomas lord Fairfax, printed in 1699; and was not only an historian, but a poet. In Mr Thoreby's museum were preserved in manuscript the following pieces: The Psalms of David, the Canticles, the songs of Moses, and other parts of Scripture, verified; a poem on Solitude; Notes of sermons by his lordship, by his lady daughter of Horace lord Vere, and by their daughter Mary the wife of George second duke of Buckingham; and a treatise on the shortness of life. But of all lord Fairfax's works, says Mr Walpole, the most remarkable were the verses he wrote on the horse on which Charles II. rode to his coronation; and which had been bred and presented to the king by his lordship. How must that merry monarch, unapt to keep his countenance on more serious occasions, have smiled at this awkward homage from the old victorious hero of republicanism and the covenant! He gave a collection of manuscripts to the Bodleian library.

FAIRFORD, a town in Gloucestershire, with a market on Thursdays. It is remarkable for the church, which has curious painted glass-windows. They are said to have been taken in a ship by John Tame, Esq. towards the end of the 15th century, who built the church for their sake. They are preserved entire, and the figures are extremely well drawn and coloured. They represent the most remarkable histories in the Old and New Testament. They are frequently visited by travellers, and many go on pur-

pose to view them, as one of the greatest curiosities in England. The painter was Albert Durer. W. Long. i. 46. N. Lat. 51. 42.

FAIRY, in ancient traditions and romances, signifies a sort of deity, or imaginary genius, conversant on the earth, and distinguished by a variety of fantastical actions either good or bad.

They were most usually imagined to be women of an order superior to human nature, yet subject to wants, passions, accidents, and even death; sprightly and benevolent while young and handsome; morose, peevish, and malignant, if ugly, or in the decline of their beauty; fond of appearing in white, whence they are often called the *white ladies*.

Concerning these imaginary beings, no less a person than Jervaise of Tilleberry, marshal of the kingdom of Arles, who lived in the beginning of the 13th century, writes thus in a work inscribed to the emperor Otho IV. "It has been asserted by persons of unexceptionable credit, that fairies used to choose themselves gallants from among men, and rewarded their attachment with an affluence of worldly goods; but if they married, or boasted of a fairy's favours, they as severely smarted for such indifference." The like tales still go current in Languedoc; and, throughout the whole province, there is not village without some ancient feat or cavern which had the honour of being a fairy's residence, or at least some spring where a fairy used to bathe. This idea of fairies has a near affinity with that of the Greeks and Romans, concerning the nymphs of the woods, mountains, and springs; and an ancient scholiast on Theocritus says, "The nymphs are demons which appear on the mountains in the figure of women;" and what is more surprising, the Arabs and other orientals have their *ginn* and *peri*, of whom they entertain the like notions.

But fairies have been likewise described as of either sex, and generally as of minute stature, though capable of assuming various forms and dimensions. The most charming representation imaginable of these children of romantic fancy, is in the *Midsummer-night's Dream* of Shakspeare; in referring to which, we will no doubt have been anticipated by the recollection of almost every reader.

Spenser's *Fairy Queen* is an epic poem, under the persons and characters of fairies. This sort of poetry raises a pleasing kind of horror in the mind of the reader, and amuses his imagination with the strangeness and novelty of the persons who are represented in it; but, as a vehicle of instruction, the judicious object to it, as not having probability enough to make any moral impression.

The belief of fairies still subsists in many parts of our own country. The

"Swart fairy of the mine,"

(of German extraction), has scarce yet quitted our subterraneous works; (*vid.* next article.) *Puck*, or *Robin Good-Fellow*, still haunts many of our villages. And in the Highlands of Scotland, new-born children are watched till the christening is over, lest they should be stolen or changed by some of these phantastical existences.

FAIRY of the *Mine*; an imaginary being, an inhabitant of mines. The Germans believed in two species; one fierce and malevolent; the other a gentle race, appear-

ing like little old men dressed like the miners, and not much above two feet high. These wander about the drifts and chambers of the works; seem perpetually employed, yet do nothing; some seem to cut the ore, or fling what is cut into vessels, or turn the windlafs; but never do any harm to the miners, unless provoked; as the sensible Agricola, in this point credulous, relates in his book de *Animantibus Subterraneis*.

FAIRY Circle or Ring, a phenomenon pretty frequent in the fields, &c. supposed by the vulgar to be traced by the fairies in their dances. There are two kinds of it; one of about seven yards in diameter, containing a round bare path, a foot broad, with green grass in the middle of it. The other is of different bigness, encompassed with a circumference of grass. Mess. Jessop and Walker, in the Philosophical Transactions, ascribe them to lightning; which is thought to be confirmed by their being most frequently produced after storms of that kind, as well as by the colour and brittleness of the grass-roots when first observed. Lightning, like all other fires, moves round, and burns more in the extremity than in the middle: the second circle arises from the first, the grass burnt up growing very plentifully afterwards. Others maintain that these circles are made by ants, which are frequently found in great numbers therein.—Mr Cavallo, who hath published an esteemed treatise on electricity, does not think that lightning is at all concerned in the formation of them: "They are not," (says he), always of a circular figure; and, as I am informed, they seem to be rather beds of mushrooms, than the effects of lightning."

FAITH, in divinity and philosophy, the firm belief of certain truths upon the testimony of the person who reveals them. See METAPHYSICS, n° 265.

The grounds of a rational faith are, 1. That the things revealed be not contrary to, though they may be above, natural reason. 2. That the revealer be well acquainted with the things he reveals. 3. That he be above all suspicion of deceiving us.

Where these criterions are found, no reasonable person will deny his assent: thus, we may as well doubt of our own existence, as of the truth of a revelation coming from God, who can neither be deceived himself, nor deceive others by proposing things to be believed that are contradictory to the faculties he has given us. Whatever propositions, therefore, are beyond reason, but not contrary to it, are, when revealed, the proper matter of faith.

FAITH, or *Fidelity*, (*Fides*), was deified by the ancient Romans, and had a temple in the Capitol consecrated to her by Attilius Calatinus. Her priests wore white veils: unbloody sacrifices were offered to her, and the greatest oaths were taken in her name. Horace clothes her in white, places her in the retinue of Fortune, and makes her the sister of Justice, *Od.* 24, 35, l. 1. Public Faith is represented in a great number of medals; sometimes with a basket of fruit in one hand, and some ears of corn in the other; and sometimes holding a turtle-dove. But the most usual symbol is two hands joined together. The inscriptions are generally, *Fides Augusti*, *Fides Exercitus*, or *Fides Militum*, &c.

FAITHFUL, an appellation assumed by the Mahometans. See MAHOMETANS.

Faithorn,
Fakirs.

FAITHORN (William), an ingenious English painter of the 17th century, who, when the civil wars broke out, went into the army; but being made prisoner in Basinghouse, and refusing to take the oaths to Oliver, he was banished to France. He was as great a proficient in engraving as in painting; and there are many specimens of his performance extant in England. He died in Blackfriars, about the beginning of king William's reign; and wrote a book *Upon Drawing, Graving, and Etching*, for which he was celebrated by his friend Thomas Flatman the poet.

FAKIRS, Indian monks or friars. They out-do the severity and mortification of the ancient Anchorets or Solitaries. Some of them make a vow of continuing all their life-time in one posture, and keep it effectually. Others never lie down; but continue in a standing posture all their lives, supported only by a stick, or rope under their arm-pits. Some mangle their bodies with scourges and knives. They look upon themselves to have conquered every passion, and triumphed over the world; and accordingly scruple not, as if in a state of innocence, to appear entirely naked in public.

The common people of East-India are thoroughly persuaded of the virtue and innocence of the fakirs; notwithstanding which, they are accused of committing the most enormous crimes in private.

They have also another kind of fakirs, who do not practise such severities: these flock together in companies, and go from village to village, prophesying, and telling fortunes. They are wicked villains, and it is dangerous for a man to meet them in a lone place: nevertheless the Indian idolaters have them in the utmost veneration. They make use of drums, trumpets, and other musical instruments, to rouse their souls, and work themselves up to an artificial ecstacy, the better to publish their pretended prophecies.

Some of the votaries of these fages most devoutly kiss their privy-parts; and they receive this monstrous declaration of respect with a kind of ecstatic pleasure. The most sober and discreet Indians consult them in this preposterous attitude; and their female votaries converse with them a considerable time, with the most indecent freedom.

The fire they burn is made of cow's dung, dried in the sun. When they are disposed to sleep, they repose themselves on cow's dung, and sometimes on ordure itself. They are so indulgent towards every living creature, that they suffer themselves to be over-run with vermin, or stung by insects, without the least reluctance or complaint.

It is more than probable, these Indian friars have some secret art to lull their senses asleep, in order to render themselves, in a great measure, insensible of the excessive torments they voluntarily undergo. Ovington assures us, that "as he was one day in an assembly of fakirs, he observed, that they drank opiates infused in water; the intoxicating virtue whereof was enough to turn their brain."

The garment of the chief fakirs consists of three or four yards of orange-coloured linen, which they tie round them, and a tyger's skin, which hangs over their shoulders. Their hair is woven in tresses, and forms a kind of turban. The superior of the fakirs is distinguished from the rest by having a greater number of

pieces in his garment, and by a chain of iron, two yards long, tied to his leg. When he designs to rest in any place, a garment is spread upon the ground; on which he sits and gives audience, whilst his disciples publish his virtues.

Some persons of quality in India have become fakirs: among others, five great lords belonging to the court of Cha-gehan, Mogul of the Indies. It is said, there are about two millions of fakirs in the East-Indies.

FALCADE, in the menage, the motion of a horse when he throws himself upon his haunches two or three times, as in very quick curvets; which is done in forming a stop and half stop. See *STOP*.

FALCATED, something in the form of a sickle: thus, the moon is said to be *falcated* when the appears horned.

FALCO, in ornithology, a genus belonging to the order of accipitres, the characters of which are these: Plate CIV. The beak is crooked, and furnished with wax at the CV. The head is thick-set with feathers, and the tongue is cloven. The principal species are, *viz.*

1. The coronatus, or crowned eagle of Edwards, with ash-coloured wax; the legs are covered with white downy feathers, interperfed with black spots; the breast is reddish; and there are black belts on the sides. It is a native of Guinea.

2. The melaræctus, or black eagle of Ray, has yellowish-wax on the beak; the legs are half covered with feathers; and the body is ash-coloured and streaked with yellow. It is a native of Europe.

3. The leucocephalus, or white-headed eagle of Catelby, is ash-coloured, with the head and tail white; the iris of the eye is white, over which is a prominence covered with a yellow skin; the bill and the feet or wax are yellow, as are likewise the legs and feet; and the talons are black. Though it is an eagle of small size, it weighs nine pounds, is strong and full of spirit, preying on lambs, pigs, and fawns. They always make their nests near the sea, or great rivers, and usually upon old, dead pine or cypress trees, continuing to build annually on the same tree till it falls. Though he is so formidable to all birds, yet he suffers them to build near his royal nest without molestation; particularly the fishing hawk, herons, &c. which all build on high trees, and in some places are so near one another, that they appear like a rookery. It is a native both of Europe and America.

4. The ossifragus, or sea-eagle, with yellow wax, and half-feathered legs; it is about the size of a peacock; Sea-eagle: the feathers are white at the base, iron-coloured in the middle, and black at the points; and the legs are yellow. It is found in several parts of Great Britain and Ireland. Mr Willoughby tells us, that there was an airy of them in Whitfield Park, Westmoreland; and the bird soaring in the air with a cat in its talons, (which Barlow drew from the very fact which he saw in Scotland), is of this kind. The cat's resemblance brought both animals to the ground, when Barlow took them up; and afterwards caused the event to be engraved in the 36th plate of his Collection of Prints. Turner says, that in his days this bird was too well known in England; for it made horrible destruction among the fish. All authors indeed agree, that it feeds principally on fish; which it takes, as they are swimming.

Falcade
||
Falco.

Falco.

Falco.

ming near the surface, by darting itself down upon them; not by diving or swimming, as some authors have pretended, who furnish it for that purpose with one webbed foot to swim with, and another divided foot to take its prey with. Martin, speaking of what he calls the great eagles of the Western Isles, says, that they fasten their talons in the back of the fish, commonly of salmon, which are often above the water, or very near the surface. Those of Greenland will even take a young seal out of the water.—Turner, above-mentioned, says, that the fishermen were fond of anointing their baits with the fat of this bird, imagining that it had a peculiar alluring quality: they were even superstitious enough to believe, that whenever the sea-eagle hovered over a piece of water, the fish (as if charmed) would rise to the surface with their bellies upwards; and in that manner present themselves to him. It also preys on water-fowl.

Golden eagle.

5. The *Chrylaetos*, or golden eagle, weighs about 12 pounds, and is in length about three feet, the wings, when extended, measuring about seven feet four inches. The sight and sense of smelling are very acute: the head and neck are clothed with narrow, sharp-pointed feathers, of a deep brown colour bordered with tawny; the hind part of the head in particular is of a bright rust-colour.—These birds are very destructive to fawns, lambs, kids, and all kinds of game; particularly in the breeding season, when they bring a vast quantity of prey to their young. Smith, in his history of Kerry, relates, that a poor man in that country got a comfortable subsistence for his family, during a summer of famine, out of an eagle's nest, by robbing the eaglets of the food the old ones brought; whose attendance he protracted beyond the natural time, by clipping the wings and retarding the flight of the former. It is very unsafe to leave infants in places where eagles frequent; there being instances in Scotland of two being carried off by them; but, fortunately, the theft was discovered in time, and the children were restored unhurt out of the eagles' nests. In order to extirpate these pernicious birds, there is a law in the Orkney isles, which entitles every person that kills an eagle to a hen out of every house in the parish where it was killed.—Eagles seem to give the preference to the carcasses of dogs and cats. People who make it their business to kill those birds, lay one or other of these carcasses by way of bait; and then conceal themselves within gunshot. They fire the instant the eagle alights; for she, that moment, looks about before she begins to prey. Yet, quick as her sight may be, her sense of hearing seems still more exquisite. If hooded crows or ravens happen to be nearer the carrion, and resort to it first, and give a single croak, the eagle is certain of instantly repairing to the spot.

Eagles are remarkable for their longevity, and for their power of sustaining a long abstinence from food. Mr Keyser relates, that an eagle died at Vienna after a confinement of 104 years. This pre-eminent length of days probably gave occasion to the saying of the Psalmist, "Thy youth is renewed like the eagle's." One of this species, which was nine years in the possession of Owen Holland, Esq. of Conway, lived 32 years with the gentleman who made him a present of it; but what its age was when the latter received it from Ireland, is unknown. The same bird also furnishes us with a

proof of the truth of the other remark; having once, through the neglect of servants, endured hunger for 21 days without any sustenance whatever.

6. The *Fulvus*, is common to the northern parts of Europe and America; that figured by Mr Edwards differing from our species only in having some white spots on the breast. It is frequent in Scotland; where it is called the *black eagle*, from the dark colour of its plumage. It is very destructive to deer, which it will seize between the horns; and, by incessantly beating it about the eyes with its wings, soon makes a prey of the harraled animal. The eagles in the isle of Rum have nearly extirpated the stags that used to abound there. This species generally builds in clefts of rocks near the deer-forests; and makes great havock not only among them, but also among the white hares and ptarmigans. It is of equal size with the preceding, and is easily distinguished from all the other species by a band of white on the upper part of the tail; the end only being of a deep brown. The legs are feathered to the feet, the toes yellow, the claws black. Mr Willoughby gives the following curious account of the nest of this species. "In the year of our Lord 1668, in the woodlands near the river Darwent, in the peak of Derbyshire, was found an eagle's nest made of great sticks, resting one end in the edge of a rock, the other on two birch trees; upon which was a layer of rushes, and over them a layer of heath, and upon the heath rushes again: upon which lay one young one and an addle egg; and by them a lamb, a hare, and three heath-poults. The nest was about two yards square, and had no hollow in it. The young eagle was black as a hobby, of the shape of a goshawk, almost of the weight of a goose, rough-footed, or feathered down to the foot: having a white ring about the tail."

7. The *rusticolus*, with a yellow wax, yellow ring round the eyes, and yellow legs; the body is ash-coloured undulated with white, and a white ring round the neck: it is a native of Sweden.

8. The *barbarus*, with yellow wax, and yellow legs; the body is bluish, and spotted with brown: it is a native of Barbary.

9. The *ceruleus*, with yellow wax, a yellow ring round the eyes, and the feet yellow underneath; the back is of a blackish blue colour; and the temples are surrounded with a white line. This is the smallest bird of the genus, and is a native of Asia.

10. The *cyaneus*, or hen-harrier, with white wax, Hen-harrier round the eyes and throat. It is the blue hawk of Edwards, and is a native of Europe and Africa. These birds are extremely destructive to young poultry and to the feathered game: they fly near the ground, skimming the surface in search of prey. They breed on the ground, and never are observed to settle on trees.

11. The *albiulla*, or cinereous eagle, is inferior in size to the golden eagle; the head and neck are of a pale ash-colour: the body and wings cinereous, clouded with brown; the quill-feathers very dark; the tail white; the legs feathered but little below the knees, and of a very bright yellow. The male is of a darker colour than the female. The bill of this species is rather straighter than is usual in the eagle; which seems

Falcon.

seems to have induced Linnæus to place it among the *vultures*. But it can have no title to be ranked with that genus: for the *pygargus* is wholly feathered; whereas the characteristic mark of the *vulture* is, that the head and neck are either quite bare, or only covered with down. It inhabits Scotland and the Orkneys; and feeds on fish, as well as on land animals.

12. The *milvus*, or kite, is a native of Europe, Asia, and Africa. Bellonius relates, that, about the end of April, incredible numbers of them are seen flying over the Black Sea into Asia. This species generally breeds in large forests, or woody mountainous countries. Its nest is composed of sticks, lined with several odd materials, such as rags, bits of flannel, rope, and paper. It lays two, or at most three, eggs; which, like those of other birds of prey, are much rounded and blunt at the smaller end. They are white, spotted with dirty yellow. Its motion in the air distinguishes it from all other birds, being so smooth and even that it is scarce perceptible. Sometimes it will remain quite motionless for a considerable space; at others, glide through the sky, without the least apparent action of its wings; from thence deriving the old name of *glead* or *glide*, from the Saxon *glida*. The tail of this bird, as being forked, is sufficient to distinguish it from most other birds of prey. The kites vary in their colours. Mr Pennant mentions a beautiful variety shot in Lincolnshire, that was entirely of a tawny colour. Some have supposed them to be birds of passage, but in Britain they certainly continue the whole year. Lord Bacon observes, that when kites fly high, it portends fair and dry weather.

13. The *gentilis*, or gentile falcon, inhabits the north of Scotland, and was in high esteem as a bold and spirited bird in the days of falconry. It makes its nest in rocks: it is larger than the *goshawk*; the head of a light rust colour, with oblong black spots; the whole under-side from chin to tail white, tinged with yellow; the back of a brown colour; the tail barred with four or five bars of black, and as many of ash-colour; the very tips of all the tail-feathers white.

14. The *subbuteo*, or hobby, was used like the kestrel in the humbler kind of falconry; particularly in what was called *daring* or *Jarks*: the hawk was cast off; the larks, aware of their most inveterate enemy, were fixed to the ground for fear; by which means they became a ready prey to the fowler by drawing a net over them. The back of this bird is brown; the nape of the neck white; and the belly pale, with oblong brown spots. It is a bird of passage; but breeds in Britain, and migrates in October.

15. The *buteo*, or buzzard, is the most common of the hawk kind in England. It breeds in large woods; and usually builds on an old crow's nest, which it enlarges, and lines with wool and other soft materials. It lays two or three eggs, which are sometimes perfectly white, sometimes spotted with yellow. The cock buzzard will hatch and bring up the young if the hen is killed. The young keep company with the old ones for some little time after they quit the nest; which is not usual with other birds of prey, who always drive away their brood as soon as they can fly. This species is very sluggish and inactive, and is much less in motion than other hawks; remaining perched

on the same bough for the greatest part of the day, and is found at most times near the same place. It feeds on birds, rabbits, moles, and mice; it will also eat frogs, earthworms, and insects. This bird is subject to some variety in its colours. Some have their breast and belly of a brown colour, and are only marked cross the craw with a large white crescent; but usually the breast is of a yellowish white, spotted with oblong rust-coloured spots, pointing downwards: the back of the head, neck, and coverts of the wings, are of a deep brown, edged with a pale rust-colour: the middle of the back covered only with a thick white down. The tail is barred with black, and ash-colour, and sometimes with ferruginous.

16. The *tinnunculus*, or kestrel, breeds in the hollows of trees, in the holes of high rocks, towers, and ruined buildings. It feeds on field-mice, small birds, and insects; which it will discover at a great distance. This is the hawk that we so frequently see in the air fixed in one place; and, as it were, fanning it with its wings; at which time it is watching for its prey. When falconry was in use in Great Britain, this bird was trained for catching small birds and young partridges. It is easily distinguished from all other hawks by its colours. The crown of the head and the greater part of the tail are of a fine light grey; the back and coverts of the wings of a brick-red, elegantly spotted with black: the whole under side of the bird, of a pale rust-colour spotted with black.

17. The *fluviator*, with yellowish wax and legs; the body is of a brownish white colour; and the coverts of the eyes are bony. He has a fleshy lobe between the nostrils; which, when angry or terrified, he inflates till his head becomes as big as his whole body. He is a native of Surinam.

18. The *cachinnans*, or laughing hawk, has yellowish legs and wax, and white eye-brows; the body is variegated with brown and white; and it has a black ring round the top of the head. It makes a laughing kind of noise when it observes any person, and is a native of America.

19. The *columbarius*, or pigeon-hawk of Catesby, Pigeon-weighs about six ounces. The bill is black at the point, and whitish at the base; the iris of the eye is yellow; the base of the upper mandible is covered with a yellow cere or wax; all the upper part of the body, wings, and tail, are brown. The interior vanes of the quill-feathers have large red spots. The tail is marked with large regular transverse white lines; the throat, breast, and belly, are white, mixed with brown; the small feathers that cover the thighs reach within half an inch of the feet, and are white, with a tincture of red, beset with long spots of brown; the legs and feet are yellow. It is a very swift and bold hawk, preying on pigeons, young turkeys, &c. and is a native of Carolina.

20. The *vespertinus*, is about the size of a pigeon; the body is of a bluish brown colour; and the bill is yellow, and brown at the point. It is a native of Ingria, and flies both in the day and in the night.

21. The *furcatus*, or swallow-tailed hawk, weighs about 14 ounces; the bill is black; the eyes are large and black, with a red iris; the head, neck, breast, and belly, are white; the upper part of the back and wings a dark purple; but more dusky towards the lower parts,

Falcon.

Kite.

Falcon-gentil.

Hobby.

Buzzard.

Falcon.

parts, with a tincture of green. The wings are long in proportion to the body, and, when extended, measure four feet. The tail is dark purple mixed with green, and remarkably forked. Like swallows, they continue long on the wing; catching, as they fly, beetles, flies, and other insects. They are said to prey upon lizards and serpents, and are found in America.

22. *Haliæetus*, the fishing-hawk of Cateby, or the osprey, weighs three pounds and a quarter; its measures, from one end of the wing to the other, five feet and a half. The bill is black, with a blue cere or wax; the iris of the eye is yellow, and the crown of the head brown, with a mixture of white feathers; from each eye, backwards, runs a brown stripe: the back, wings, and tail, are of a dark brown; the throat, neck, and belly, white; the legs and feet are rough and scaly, and of a pale blue colour; the talons are black, and nearly of an equal size; the feathers of the thighs are short, and adhere close to them, contrary to others of the hawk kind, which nature seems to have designed for the more easily penetrating the water. Their manner of fishing is, after hovering a while over the water, to precipitate into it with prodigious swiftness; where they remain for some minutes, and seldom rise without a fish. The white-headed eagle, who is generally on the watch, no sooner spies him with his fish, than he flies furiously upon him: the hawk immediately mounts, and screams out; but the eagle always soars above him, and compels him to let the fish fall: the eagle instantly darts down upon the fish, and seldom fails to catch it before it reaches the water. It is remarkable, that, whenever the hawk catches a fish, he calls out, as if it were to give warning to his enemy the eagle, who always obeys the call, if within hearing. The lower parts of the rivers and creeks near the sea in America, abound with these eagles and hawks, where such diverting contests are often seen.

Gyr Falcon.

23. The gyrfalcon, or gyrfalcon, with blue wax on the beak, yellow legs, a brown body marked with ash-coloured streaks underneath, and the sides of the tail white. It is the gyrfalcon of all the ornithologists except Linnaeus, whose bird is unknown to the rest. It is a native of Europe; and feeds upon cranes, pigeons, &c.

Honey-buzzard.

24. The *aviporus*, with black wax, yellow legs, half naked, the head of an ash colour, and having an ash-coloured stripe on the tail which is white at the end. It is the honey-buzzard of Ray, and had its name from the combs of wasps being found in its nest. It is a native of Europe, and feeds on mice, lizards, frogs, bees, &c. It runs very swiftly, like a hen.

Moor-buzzard.

25. The *ægruginosus*, or moor-buzzard, with greenish wax, a greyish body, the top of the head, nape of the neck, and legs, yellowish; is a native of Europe, and frequents moors, marshy places, and heaths: it never fears like other hawks; but commonly sits on the ground, or on small bushes. It makes its nest in the midst of a tuft of grass or rushes. It is a very fierce and voracious bird; and is a great destroyer of rabbits, young wild-ducks, and other water-fowl. It preys, like the osprey, on fish.

26. The *palumbarius*, with black wax edged with yellow; yellow legs, a brown body, and the prime feathers of the tail marked with pale streaks, and the

eye-brows white. It is the gofhawk of Ray; and was formerly in high esteem among falconers, being flown at cranes, geese, pheasants, and partridges. It breeds in Scotland, and builds its nest in trees; is very destructive to game, and dashes thro' the woods after its quarry with vast impetuosity; but if it cannot catch the object of its pursuit almost immediately, desists, and perches on a bough till some new game presents itself.

Falcon, Falconer.

Goshawk.

27. The nifus, or sparrow-hawk, with green wax, yellow legs, a white belly undulated with grey, and the tail marked with blackish belts. This is the most pernicious hawk we have; and makes great havoc among pigeons as well as partridges. It builds in hollow trees, in old nests of crows, large ruins, and high rocks: it lays four white eggs, encircled near the blunter end with red specks.

Sparrow-hawk.

28. The minutus, with white wax, yellow legs, and the body white underneath. It is the least hawk of Brissonius, being about the size of a thrush; and is found on the island Melita.

FALCON, or FAUCON, a bird of prey of the hawk kind, superior to all others for courage, docility, gentleness, and nobleness of nature *. Several authors take the name *falcon* to have been occasioned by its crooked talons or pounces, which resemble a falx or sickle. Giralduus derives it a *falcando*, because it flies in a curve.

* See Falcon.

The falcon, or falcon gentle, is both for the fist and for the lure. In the choice, take one that has wide nostrils, high and large eye-lids, a large black eye; a round head, somewhat full on the top; barb feathers on the clap of the beaks, which should be short, thick, and of an azure colour; the breast large, round, and fleshy; and the thighs, legs, and feet, large and strong; with the fear of the foot soft and bluish: the pounces should be black, with wings long and crossing the train, which should be short and very pliable.

The name *falcon* is restrained to the female: for the male is much smaller, weaker, and less courageous, than the female; and therefore is denominated *tassel*, or *tireolet*. The falcon is excellent at the river, brook, and even field; and flies chiefly at the larger game, as wild-geese, kite, crow, heron, crane, pyc, shoveler, &c. For further particulars, see FALCONRY, HAWK, and HAWKING.

FALCONER, a person who brings up, tames, and makes, that is, tutors and manages, birds of prey; as falcons, hawks, &c. See FALCONRY.

The grand leignior usually keeps 6000 falconers in his service.—The French king has a grand falconer, which is an office dismembered from that of great hunt, *grand veneur*. Historians take notice of this post as early as the year 1250.

A falconer should be well acquainted with the quality and mettle of his hawks, that he may know which of them to fly early, and which late. Every night after flying he should give them casting; one while plumage, sometimes pellets of cotton, and at another time physic, as he finds necessary. He ought also every evening to make the place clean under the porch, that by her casting he may know whether she wants scouring upwards or downwards. Nor must he forget to water his hawk every evening, except on such days as she has bathed; after which, at night, the should

Fig. 1.
FALCO LEUCOCEPHALUS
or
WHITE HEADED EAGLE



Fig. 2.
FALCO FURCATUS
or
SWALLOW TAIL HAWK



Fig. 3.
FALCO COLUMBARIUS
or
PIGEON HAWK



should be put into a warm room, having a candle burning by her, where she is to sit unhooded, if she be not ramage, that she may pick and prune herself.—A falconer should always carry proper medicines into the field, as hawks frequently meet with accidents there. Neither must he forget to take with him any of his hawking implements; and it is necessary he should be skilful in making lures, hoods of all sorts, jessets, bewets, and other furniture. Neither ought he to be without his coping irons, to cope his hawk's beak when overgrown, and to cut her pounces and talons as there shall be occasion: nor should his cauterizing irons be wanting.

FALCONER (William), an ingenious Scots sailor, who, about the year 1762, came up to London with a pretty pathetic poem, called the *Shipwreck*, founded on a disaster of his own experience. The publication of this piece recommended him to the late duke of York; and he would in all probability have been suitably preferred, if a second shipwreck, as may be supposed, had not proved fatal to him, and to many gentlemen of rank and fortune with whom he sailed. In 1760, he went out a volunteer in the *Aurora* frigate sent to carry Messrs Vanstitt, Scrafton, and Ford, the supervisors appointed to regulate our East India settlements; which vessel, after it had touched at the Cape of Good Hope, was never more heard of. Before his departure, he published a very useful *Marine Dictionary*, in 1 vol. 4to.

FALCONRY, the art of training all manner of hawks, but more especially the larger ones called *falcons*, to the exercise of hawking. See *HAWKING*.

When a falcon is taken, she must be feeded in such a manner, that, as the feeding slackens, she may see what provision lies before her; but care ought to be taken, not to feed her too hard. A falcon or hawk newly taken should have all new furniture, as new jessets of good leather, mailed leashes with buttons at the end, and new bewets. There should also be provided a small round stick, to stroke the hawk; because, the oftener this is done, the sooner and better will she be manned. She must also have two good bells, that she may be found when she scattereth. Her hood should be well fashioned, raised, and embossed against her eyes, deep, and yet frait enough beneath, that it may fasten about her head without hurting her; and her beak and talons must be a little coped, but not so near as to make them bleed.

If it be a foar-falcon, which hath already passed the seas, she will indeed be harder to reclaim, but will prove the best of falcons. Her food must be good and warm, and given her twice or thrice a-day, till she be full gorged: the best for this purpose is pigeons, larks, or other live birds; because she must be broken off by degrees from her accustomed feeding. When she is fed, you must hoop and lure, as you do when you call a hawk, that she may know when you intend to give her meat. On this occasion she must be unhooded gently; and after giving her two or three bits, her hood must be put on again, when she is to get two or three bits more. Care must be taken that she be close feeded; and after three or four days, her diet may be lessened: the falconer setting her every night to perch by him, that he may awaken her often in the night. In this manner he must proceed, till he find

her to grow tame and gentle; and when she begins to feed eagerly, he may give her a sheep's heart. He may now begin to unhood her in the day-time; but it must be far from company, first giving her a bit or two, then hooding her gently, and giving her as much more. When she is sharp set, he may now unhood her, and give her some meat just against his face and eyes, which will make her less afraid of the countenances of others. She must be borne continually on the fist, till she is properly manned, causing her to feed in company, giving her in the morning, about sun-rise, the wing of a pullet; and in the evening, the foot of a hare or coney, cut off above the joint, stead and laid in water, which being squeezed, is to be given her with the pinion of a hen's wing. For two or three days give her washed meat, and then plumage in more or less quantity as she is thought to be more or less foul within. After this, being hooded again, she is to get nothing till she has gleamed and cast, when a little hot meat may be given her in company; and, towards evening, she may be allowed to plume a hen's wing in company also. Cleanse the feathers of her casting, if foul and slimy; if she be clean within, give her gentle castings; and when she is reclaimed, manned, and made eager and sharp set, he may venture to feed her on the lure.

However, three things are to be considered before the lure be shewed her, 1. That she be bold and familiar in company, and not afraid of dogs and horses. 2. Sharp set and hungry, having regard to the hour of morning and evening, when you would lure her. 3. Clean within, and the lure well garnished with meat on both sides; and when you intend to give her the length of a leash, you must abscond yourself.

She must also be unhooded, and have a bit or two given her on the lure as she sits on your fist; afterwards take the lure from her, and hide it that she may not see it; and when she is unfeeled, cast the lure so near her, that she may catch it within the length of her leash, and as soon as she has seized it, use your voice as falconers do, feeding her upon the lure, on the ground, with the heart and warm thigh of a pullet.

Having so lured your falcon, give her but little meat in the evening; and let this luring be so timely, that you may give her plumage, and a juck of a joint next morning on your fist. When she has cast and gleamed, give her a little reaching of warm meat. About noon, tie a creance to her leash; and going into the field, there give her a bit or two upon her lure: then unwind the creance, and draw it after you a good way; and let him who has the bird hold his right-hand on the tassel of her hood, ready to unhood her as soon as you begin to lure; to which if she come well, stoop roundly upon it, and hastily seize it, let her cast two or three bits thereon. Then, unfeizing and taking her off the lure, hood her and give her to the man again; and, going farther off, lure and feed her as before.

In this manner is the falconer to proceed, luring her every day farther and farther off, till she is accustomed to come freely and eagerly to the lure; after which she may be lured in company, taking care that nothing fright her. When she is used to the lure on foot, she is to be lured on horseback; which may be effected the sooner, by causing horsemen to be about her when she is lured on foot.

When she has grown familiar to this way, let somebody on foot hold the hawk, and lie on horseback must call and cast the lure about his head, the holder taking off the hood by the tassel; and if she seize eagerly on the lure without fear of man or horse, then take off the creance, and lure her at a greater distance. And if you would have her love dogs as well as the lure, call dogs when you give her her living or plumage. See the article *HAWKING*.

FALKKIRK, a town of Stirlingshire in Scotland, situated in W. Long. 3. 48. N. Lat. 56. 20. It is a large ill-built place, and is supported by great fairs for black cattle from the Highlands; it being computed that 24,000 head are annually sold there. A great deal of money is also got here by the carriage of goods landed at Carron wharf to Glasgow. This town is remarkable for a battle fought in its neighbourhood between Edward I. of England, and the Scots commanded by the Steward of Scotland, Cummin of Badenoch, and Sir William Wallace. The latter had been invested with the supreme command; but perceiving that this gave umbrage to the nobility, he resigned his power into the hands of the noblemen above-mentioned, reserving to himself only the command of a small body who refused to follow another leader. The Scots generals placed their pikemen along the front, and lined the intervals between the three bodies of which their army was composed, with archers: and dreading the great superiority of the English cavalry, endeavoured to secure their front by palliades tied together with ropes. The battle was fought on the 22d of July 1298. The king of England divided his army likewise into three bodies; and, by the superiority of his archers, defeated the Scots with great slaughter. Wallace alone preserved entire the troops he commanded; and retiring behind the Carron, marched leisurely along the banks of that river, which protected him from the enemy. In this battle fell John de Graham, a gentleman much celebrated for his valour, and styled the *right-hand* of the gallant Wallace. His epitaph is still to be seen on a plain stone in the church-yard of Falkirk. On the 18th of January 1746, a battle was fought here between the king's forces commanded by general Hawley, and the Highlanders headed by Charles Stuart. The former was seized with a panic, and fled; but Colonel Halk with two regiments, who kept their ground, prevented the Highlanders from pursuing their victory. Extensive ruins are perceived in the neighbourhood of this town, supposed by some antiquarians to have been the capital of the Pictish government; but others believe them to be the remains of some Roman stations.

FALKLAND, a small town of Fifeshire in Scotland, made a royal burgh by James II. in 1458. Here stood one of the seats of the Macduff's earls of Fife. On the attainder of Munro Stewart, the 17th earl, it became forfeited to the crown in 1424. James V. who grew very fond of the place, enlarged and improved it. The remains evince its former magnificence and elegance, and the fine taste of the princely architect. The gateway is placed between two fine round towers; on the right-hand joins the chapel, whose roof is of wood, handsomely gilt and painted, but in a most ruinous condition. Beneath are several apartments. The front next to the court was beautifully adorned

with statues, heads in bas-relief, and elegant columns not reducible to any order, but of fine proportion, with capitals approaching the Ionic scroll. Beneath some of these pillars was inscribed I. R. M. G. 1537: or *Jacobus Rex, Maria de Guise*.—This place was also a favourite residence of James VI. on account of the fine park and plenty of deer. The castle side was accidentally burnt in the time of Charles II. and the park ruined during Cromwell's usurpation; when the fine oaks were cut down in order to build the fort at Perth.

FALKLAND (Lord). See *CARY*.

FALL, the descent of a heavy body towards the centre of the earth. It is also the name of a measure of length used in Scotland, containing six fells.

FALLACY, a deception, fraud, or false appearance.

The epicureans deny that there is any such thing as a fallacy of the senses: for, according to them, all our sensations and perceptions, both of sense and phantasy, are true; whence they make sense the primary criterion of truth.

The Cartesian, on the other hand, maintain, that we should suspect as false, or at most as dubious, every thing that presents itself to us by means only of the external senses, because they frequently deceive us. They add, that our senses, as being fallacious, were never given us by nature for the discovery of truth, or the contemplation of the principles of things; but only for pointing out to us what things are convenient or hurtful to our bodies.

The Peripatetics keep a middle course. They say, that if a sensible object be taken in its common or general view, the sense cannot be deceived about it; but that if the object be taken under its specific view, the sense may be mistaken about it, from the want of the dispositions necessary to a just sensation, as a disorder in the organ, or any thing uncommon in the medium: thus, in some disorders of the eye, all objects appear yellow; a stick in water appears broken or crooked, &c.

FALLING-SICKNESS. See (the *Index* subjoined to) *MEDICINE*.

FALLOPIAN TUBES. See *ANATOMY*, n° 372. l.

FALLOPIUS (Gabriel), a most celebrated physician and anatomist, was born at Modena in Italy, in the year 1523, and descended of a noble family. He made several discoveries in anatomy, one of which was that of the tubes, called from him the *Fallopian tubes*. He travelled through the greatest part of Europe, and obtained the character of being one of the ablest physicians of his age. He was made professor of anatomy at Pisa in the year 1548, and at Padua in the year 1551: here he died in 1562, aged 39. His writings, which are numerous, were first printed separately, and afterwards collected under the title of "*Opera genuina omnia, tam practica quam theoretica, in tres tomos distributa*." They were printed at Venice in 1585, and in 1606; at Francfort in 1600, *cum operum appendice*; and in 1606, in folio.

FALLOW, a pale-red colour, like that of brick half-burnt; such is that of a fallow-deer.

FALLOW-Field, or *Fallow-ground*; land laid up, or that has been untilled for a considerable time.

FALLOWING of LAND, a particular method of improving land. See *AGRICULT.* n° 15. 12. 14. 15. 143.

FAL-

Falmouth
Fanatics.

FALMOUTH, a port-town of Cornwall in England, situated in W. Long. 5. 30. N. Lat. 50. 15. on a fine bay of the English channel, the entrance whereof is guarded by two forts.

FALSE, in general, something contrary to truth, or not what it ought to be; thus we say a false action, false weights, false claim, &c.

FALSE Action, if brought against one whereby he is cast into prison, and dies pending the suit, the law gives no remedy in this case, because the truth or falsehood of the matter cannot appear before it is tried: and if the plaintiff is barred, or non-suited at common law, regularly all the punishment is amercement.

FALSE Imprisonment, is a trespass committed against a person, by arresting and imprisoning him without just cause, contrary to law; or where a man is unlawfully detained without legal process: and it is also used for a writ which is brought for this trespass. If a person be any way unlawfully detained, it is false imprisonment; and considerable damages are recoverable in those actions.

FALSE Oath. See **PERJURY**.

FALSE Prophecy. See **PROPHECY**.

FALSE Quarter, or **Quittor**, in farriery. See **FARRIER**, § xl. 4.

FALSI CRIMEN, in the civil law, is fraudulent subornation or concealment, with design to darken or hide the truth, and make things appear otherwise than they are. The *crimen falsi* is committed, 1. By words, as when a witness swears falsely. 2. By writings, as when a man antedates a contract, or the like. 3. By deed, as when he sells by false weights and measures.

FALSTAFF. See **FALSTOFF**.

FALX, in anatomy. See there, n° 395.

FAME, a heathen goddess, celebrated chiefly by the poets. She is feigned to have been the last of the race of Titans produced by the earth, to have her palace in the air, and to have a vast number of eyes, ears, and tongues. She is mentioned by Hesiod, and particularly described by Ovid and Virgil.

FAMES CANINA, the fame with **BULIMY**.

FAMILY, denotes the persons that live together in one house, under the direction of one head or chief manager. It also signifies the kindred or lineage of a person; and is used by old writers for a hide or portion of land sufficient to maintain one family.*

FAMILY, in natural history, a term used by authors to express any order of animals, or other natural productions of the same class. See **CLASS** and **ORDER**.

FAN, a machine used to raise wind, and cool the air by agitating it. The custom which now prevails of wearing fans was borrowed from the east, where they are almost indispensibly necessary for keeping off the sun and the flies. Fans are made of a thin skin or a piece of paper, taffety, or other light stuff cut semi-circularly, and mounted on several little sticks of wood, ivory, tortoise-shell, or the like. The paper, &c. is usually painted; and, in mounting, is plaited in such a manner that the plaits may be alternately inward and outward.

FANATICS, wild, enthusiastic, visionary persons, who pretend to revelation and inspiration.

The ancients called those *fanatici* who passed their time in temples (*fana*), and being often seized, with a kind of enthusiasm, as if inspired by the divinity,

shewed wild and antic gestures. Prudentius represents them as cutting and flashing their arms with knives. Shaking the head was also common among the fanatici; for Lampridius informs us, that the emperor Heliogabalus was arrived to that pitch of madnels, as to shake his head with the gashed fanatics. Hence the word was applied among us to the Anabaptists, Quakers, &c. at their first rise, and is now an epithet given to the modern prophets, muggletonians, &c.

FANCY, or imagination. See **IMAGINATION**.

FANIONS, in the military art, small flags carried along with the baggage.

FANSHAW (Sir Richard), famous for his embassies and writings, was the tenth and youngest son of Sir Henry Fanshaw of Ware Park in Hertfordshire, where it is supposed he was born about the year 1607. He distinguished himself so early by his abilities, that, in 1635, he was taken into government-employments by king Charles I. and sent resident to the court of Spain; whence being recalled in the beginning of the troubles in 1641, he adhered to the royal interest, and was employed in several important matters of state. During his vacant hours he wrote divers poems, and made several translations. At the restoration it was expected he would have been made one of the secretaries of state; however, he was made master of the requests; a station, in those times, of considerable profit. Afterwards, on account of his skill in the Latin language, he was made secretary for that tongue. In 1661, he was sent envoy to the king of Portugal. In 1662, he was again sent to that court with the title of *ambassador*, and negotiated the marriage of his master king Charles II. with the infant Donna Catharina. Upon his return he was made one of the privy-council. In 1664, he was sent ambassador to both the courts of Spain and Portugal; at which time, the foundation of peace betwixt those crowns and England was laid by him. His conduct during his former employments in those courts gained him such high esteem there, that his reception was magnificent, exceeding all that were before, which those kings declared was not to be a precedent to succeeding ambassadors. He died at Madrid in 1666; on the very day he had fixed for setting out on his return to England. Besides some original poems, and others translations, he published a translation of Bathista Guarini's *Pastor Fido*, and another of the *Lusiad* of Camoens. Among his posthumous publications are, "Letters during his embassies in Spain and Portugal; with his life prefixed."

FANUM, among the Romans, a temple or place consecrated to some deity. The deified men and women among the heathens had likewise their *fana*; even the great philosopher Cicero erected one to his daughter Tullia.

FARANDMAN, a traveller, or merchant stranger, to whom, by the laws of Scotland, justice ought to be done with all expedition, that his business or journey be not hindered.

FARCE, was originally a droll, petty shew, or entertainment, exhibited by charlatans, and their buffoons, in the open street to gather the crowd together.—The word is French, and signifies literally, "force-meat or stuffing." It was applied on this occasion, no doubt, on account of the variety of jests, gibes, tricks, &c. wherewith the entertainment was interlarded. Some

Fancy
Farce.

authors derive *farce* from the Latin *facetia*; others from the Celtic *farce*, "mockery;" other from the Latin *facere*, "to fluff."

At present it is removed from the street to the theatre; and instead of being performed by merry-andrews to amuse the rabble, is acted by comedians, and become the entertainment of a polite audience. Poets have reformed the wildness of the primitive farces, and brought them to the taste and manner of comedy. The difference between the two on our stage is, that comedy keeps to nature and probability, and therefore is confined to certain laws prescribed by ancient critics; whereas farce disallows of all laws, or rather sets them aside on occasion. Its end is purely to make merry; and it sticks at nothing which may contribute thereto, however wild and extravagant. Hence the dialogue is usually low, the persons of inferior rank, the fable or action trivial or ridiculous, and nature and truth every where heightened and exaggerated to afford the more palpable ridicule.

FARCIN, *FARCY*, or *Fasbions*, in farriery. See FARRIERY, § XX.

FARDING-DEAL, the fourth part of an acre of land. See ACRE.

FARE, most commonly signifies the money paid for a voyage, or passage by water; but, in London, it is what persons pay for being conveyed from one part of the town to another in a coach or chair.

FAREWELL-CAPE, the most southerly promontory of Greenland, in W. Long. 50°, and N. Lat. 60°.

FARIN, or FARM. See FARM.

FARINA, a Latin term signifying meal, or the flour of corn. See CORN.

FARINA *Facundans*, among botanists, the supposed impregnating muck or dust on the apices or anthers of flowers. See POLLEN.

The manner of gathering the farinæ of plants for microscopical observations is this: gather the flowers in the midst of a dry sunshiny day when the dew is perfectly off, then gently shake off the farina, or lightly brush it off with a soft hair-pencil, upon a piece of white paper; then take a single talc or isinglass between the nippers, and, breathing on it, apply it instantly to the farina, and the moisture of the breath will make that light powder stick to it. If too great a quantity be found adhering to the talc, blow a little of it off, and, if there is too little, breathe upon it again, and take up more. When this is done, put the talc into the hole of a slider, and, applying it to the microscope, see whether the little grains are laid as you desire; and if they are, cover them up with another talc, and fix the ring; but be careful that the talcs do not press upon the farina in such a manner as to alter its form.

FARINELLI, the Italian singer so famous in England some time ago, and whose proper name was *Carlo Broschi*, was born at Naples in 1705. He had his first musical education under his father, and was afterwards educated under Porpora, who travelled with him. He was 17 years of age when he went to Rome; where, during the run of an opera, there arose a struggle every night, between him and a famous trumpeter who accompanied him in a song, for execution and strength of lungs in holding out longest; and his fame may be dated from his victory in this contest. In 1734, he

came to England, where his musical talents enraptured every audience: sweetness, strength, and compass, were found in his voice; and, in his style, the tender, the graceful, and the rapid. He is said to have possessed powers that never met before, or since, in any one human being; and which proved therefore irrefutable. With this character he went to Spain in the year 1737, with a full design to return to England; being under articles to the nobility, who then managed the opera, to perform the ensuing season: but the first day he performed before the king and queen of Spain, it was determined to take him into the service of the court; a pension of above 2000*l.* a year was settled on him, and he was never more suffered to sing in public. On the death of Philip V. he continued in favour under his successor Ferdinand VI. who, in 1750, dignified him with the order of Calatrava. But when the present king ascended the throne, he was obliged to quit Spain, though his pension was continued; he then returned to Italy, where all his old relations and friends being dead or removed, he had a second life to begin in his own country, among strangers. Dr Burney visited Farinelli in 1770, and the above account of him is abridged from the Doctor's "Present state of music in France and Italy."

FARLEU, money paid by the tenants in the west of England, in lieu of a heriot. In some manors of Devonshire, farleu is often distinguished to be the best goods, as heriot is the best beast, payable at the death of a tenant.

FARM, FARIN, or *Ferm*, (*Firma*), in law, signifies a little country messuage, or district; containing house and land, with other conveniences; hired, or taken by lease, either in writing, or parole, under a certain yearly rent. See LEASE.

This in divers parts is differently termed: in the north, it is a *tack*; in Lancashire, a *fermeholt*; in Essex, a *wikke*, &c.

In the corrupted Latin, *firma* signified a place inclosed, or shut in: whence, in some provinces, Menage observes, they call *closerie*, or *closure*, what in others they call a *farm*. Add, that we find *locare ad firmam*, to signify to let to *farm*; probably on account of the sure hold the tenant here has in comparison of tenants at will.

Spelman and Skinner, however, choose to derive the word *farm* from the Saxon *fearne*, or *seorne*, that is, *victus*, "provision;" by reason the country people and tenants anciently paid their rents in victuals and other necessities, which were afterwards converted into the payment of a sum of money. Whence a *farm* was originally a place that furnished its landlord with provisions. And among the Normans they still distinguish between farms that pay in kind, i.e. provisions, and those which pay in money; calling the former simply *fermes*, and the latter *blanche ferme*, "white ferm."

Spelman shews, that the word *firma*, anciently signified not only what we now call a *farm*, but also a feast or entertainment, which the former gave the proprietor or landlord, for a certain number of days, and at a certain rate, for the lands he held of him. Thus *fearme* in the laws of King Canutus is rendered by Mr Lambard, *victus*: and thus we read of *reddere firmam unius noctis*, and *reddebat unum diem de firma*; which denote provision for a night and day, the rents about the

Farm.

the time of the conquest being all paid in provisions; which custom is said to have been first altered under king Henry I. We also say to *farm* duties, imposts, &c.

Culture of a FARM. See AGRICULTURE.

FARM, as connected with gardening, and susceptible of embellishment. See GARDENING.

In speculation, it might have been expected that the first essays of improvement should have been on a farm, to make it both advantageous and delightful; but the fact was otherwise: a small plot was appropriated to pleasure; the rest was reserved for profit only. And this may, perhaps, have been a principal cause of the vicious taste which long prevailed in gardens. It was imagined that a spot set apart from the rest should not be like them: the conceit introduced deviations from nature, which were afterwards carried to such an excess, that hardly any objects truly rural were left within the enclosure, and the view of those without was generally excluded. The first step, therefore, towards a reformation, was by opening the garden to the country, and that immediately led to assimilating them; but still the idea of a spot appropriated to pleasure only prevailed, and one of the latest improvements has been to blend the useful with the agreeable; even the ornamented farm was prior in time to the more rural; and we have at last returned to simplicity by force of refinement.

Of a pastoral farm.

1. The ideas of pastoral poetry seem now to be the standard of that simplicity; and a place conformable to them is deemed a farm in its utmost purity. An allusion to them evidently enters into the design of the *Leafowes* (A), where they appear so lovely as to endear the memory of their author; and justify the reputation of Mr Shenstone, who inhabited, made, and celebrated the place: it is a perfect picture of his mind, simple, elegant, and amiable; and will always suggest a doubt, whether the spot inspired his verse, or whether, in the scenes which he formed, he only realized the pastoral images which abound in his songs. The whole is in the same taste, yet full of variety; and, except in two or three trifles, every part is rural and natural. It is literally a grazing farm lying round the house; and a walk, as unaffected and as unadorned as a common field-path, is conducted through the several enclosures. But for a detail of the plan and scenery, as illustrative of the present subject, the reader is referred to the particular description of the *Leafowes* published by the late Mr Dodsley. We shall only take notice of one or two circumstances independent on the general delineation.

The art with which the divisions between the fields are diversified is one of them. Even the hedges are distinguished from each other: a common quick-set fence is in one place the separation; in another, it is a lofty hedge-row, thick from the top to the bottom; in a third, it is a continued range of trees, with all their stems clear, and the light appearing in the intervals between their boughs, and the bushes beneath them; in others, these lines of trees are broken, a few groups only being left at different distances; and sometimes a wood, a grove, a coppice, or a thicket, is the apparent boundary, and by them both the shape and the style of the enclosures are varied.

The inscriptions, which abound in the place, are an-

other striking peculiarity: they are well known and justly admired; and the elegance of the poetry, and the aptness of the quotations, atone for their length and their number. But, in general, inscriptions please no more than once: the utmost they can pretend to, except when their allusions are emblematical, is to point out the beauties, or describe the effects, of the spots they belong to; but those beauties and those effects must be very faint, which stand in need of the assistance. Inscriptions, however, to commemorate a departed friend, are evidently exempt from the censure; the monuments would be unintelligible without them; and an urn, in a lonely grove, or in the midst of a field, is a favourite embellishment at the *Leafowes*: they are indeed among the principal ornaments of the place; for the buildings are mostly mere seats, or little root-houses; a ruin of a priory is the largest, and that has no peculiar beauty to recommend it: but a multiplicity of objects are unnecessary in the farm; the country it commands is full of them; and every natural advantage of the place within itself has been discovered, applied, contrasted, and carried to the utmost perfection, in the purest taste, and with inexhaustible fancy.

Among the ideas of pastoral poetry which are here introduced, its mythology is not omitted: but the allusions are both to ancient and to modern fables; sometimes to the fairies; and sometimes to the naiads and mules. The objects also are borrowed partly from the scenes which this country exhibited some centuries ago, and partly from those of Arcadia: the priory, and a Gothic seat, still more particularly characterized by an inscription in obsolete language and the black letter, belong to the one; the urns, Virgil's obelisk, and a rustic temple of Pan, to the other. All these allusions and objects are indeed equally rural: but the images in an English and a classical eclogue are not the same; each species is a distinct imitative character. Either is proper; either will raise the farm it is applied to above the ordinary level; and within the compass of the same place both may be introduced; but they should be separate: when they are mixed, they counteract one another; and no representation is produced of the times and the countries they refer to. A certain district should therefore be allotted to each, that all the fields which belong to the respective characters may lie together, and the corresponding ideas be preferred for a continuance.

2. In such an assortment, the more open and polished scenes will generally be given to the Arcadian shepherd; and those in a lower degree of cultivation, will be thought more conformable to the *manners of the ancient British yeomanry*. We do not conceive that the country in their time was entirely cleared, or distinctly divided; the fields were surrounded by woods, not by hedges; and if a considerable tract of improved land lay together, it still was not separated into a number of inclosures. The subjects, therefore, proper to receive this character, are those in which cultivation seems to have encroached on the wild, not to have subdued it; as the bottom of a valley in corn, while the sides are still overgrown with wood; and the outline of that wood indented by the tillage creeping more or less up the hill. But a glade of grass, thus circumstanced, does not peculiarly belong to the species: that may occur

Of an ancient farm.

(A) In Shropshire, between Birmingham and Stourbridge.

Farm. occur in a park or pastoral farm; in this, the pastures should rather border on a waste or a common: if large, they may be broken by straggling bushes, thickets, or coppices; and the scattered trees should be beset with brambles and briars. All these are circumstances which improve the beauty of the place; yet appear to be only remains of the wild, not intended for embellishment. Such interruptions must, however, be less frequent in the arable parts of the farm; but there the opening may be divided into several lands, distinguished, as in common fields, only by different sorts of grain. These will sufficiently break the sameness of the space; and tillage does not furnish a more pleasing scene, than such a space so broken, if the extent be moderate, and the boundary beautiful.

As much wood is essential to the character, a spot may easily be found, where turrets rising above the covert, or some arches seen within it, may have the resemblance of a castle or an abbey. The partial concealment is almost necessary to both; for to accord with the age, the buildings must seem to be entire; the ruins of them belong to later days: the disguise is, however, advantageous to them as objects; none can be imagined more picturesque, than a tower bowered in trees, or a cloyster appearing between the stems and the branches. But the superstitions of the times furnish other objects, which are more within compass: hermitages were then real; solitary chapels were common; many of the springs of the country being deemed holy wells, were distinguished by little Gothic domes built over them; and every hamlet had its cross; even this, when perfect, set on a little rustic pillar, and that raised upon a base of circular steps, may in some scenes be considerable: if a situation can be found for a Maypole, whence it would not obtrude itself on every view, that also might not be improper; and an ancient church, however unwelcome it may be when it breaks into the design of a park or a garden, in such a farm as this would be a fortunate accident: nor would the old yew in the church-yard be indifferent; it would be a memorial of the times when it was useful.

Many other objects, significant of the manners of our ancestors, might perhaps, upon recollection, occur; but these are amply sufficient for a place of considerable extent; and cottages must abound in every age and every country; they may therefore be introduced in different forms and positions. Large pieces of water are also particularly proper; and all the varieties of rills are consistent with every species of farm. From the concurrence of so many agreeable circumstances in this, be the force or the effect of the character what it may, a number of pleasing scenes may be exhibited either in a walk or riding, to be contrasted to those which in another part of the place may be formed on Arcadian ideas; or even to be substituted in their stead, if they are omitted.

Of a simple farm. 3. A part may also be free from either of these imitative characters, and laid out in a common simple farm. Some of the greatest beauties of nature are to be found in the fields, and attend an ordinary state of cultivation: wood and water may there be exhibited in several forms and dispositions; we may enlarge or divide the inclosures, and give them such shapes and boundaries as we please; every one may be an agreeable spot;

together, they may compose beautiful views; the arable, the pasture, and the mead may succeed one another; and now and then a little wild may be intermixed without impropriety; every beauty, in short, which is not unusual in an inclosed country, whether it arise from neglect or improvement, is here in its place.

The buildings, also, which are frequent in such a country, are often beautiful objects; the church and the mansion are considerable; the farm-yard itself, if an advantageous situation be chosen for it; if the ricks, and the barns, and the out-houses, are ranged with any design to form them into groups, and if they are properly blended with trees; may be made a picturesque composition. Many of them may be detached from the groups, and dispersed about the grounds: the dove-cote, or the dairy, may be separated from the rest; they may be elegant in their forms, and placed wherever they will have the best effect. A common barn, accompanied by a clump, is sometimes pleasing at a distance; a Dutch barn is so when near; and an hay-stack is generally an agreeable circumstance in any position. Each of these may be single; and besides these, all kinds of cottages are proper. Among so many buildings, some may be converted to other purposes than their construction denotes; and, whatever be their exterior, may within be made agreeable retreats, for refreshment, indulgence, or shelter.

With such opportunities of improvement, even to decoration within itself, and with advantages of prospect into the country about it, a simple farm may undoubtedly be delightful. It will be particularly acceptable to the owner, if it be close to his park or his garden: the objects which constantly remind him of his rank, impose a kind of constraint; and he feels himself relieved, by retiring sometimes from the splendor of a seat into the simplicity of a farm: it is more than a variety of scene; it is a temporary change of situation in life, which has all the charms of novelty, ease, and tranquillity, to recommend it. A place therefore, can hardly be deemed perfect, which is not provided with such a retreat. But if it be the whole of the place it seems inadequate to the mansion: a visitor is disappointed; the master is dissatisfied; he is not sufficiently distinguished from his tenants; he misses the appendages incidental to his seat and his fortune; and is hurt at the familiarity of his grounds with the country about them. A pastoral or an ancient farm is a little above the common level; but even these, if brought close up at the door, set the house in a field, where it always appears to be neglected and naked. Some degree of polish and ornament is expected in its immediate environs; and a garden, tho' it be but a small one, should be interposed between the mansion and any species of farm.

4. A sense of the propriety of such improvements about a seat, joined to a taste for the more simple delights of the country, probably suggested the idea of an *ornamented farm*, as the means of bringing every rural circumstance within the verge of a garden. This idea has been partially executed very often; but no where, perhaps, so completely, and to such an extent, as at (a) Woburn farm. The place contains 150 acres; of which near 35 are adorned to the highest degree; of the rest, about two thirds are in pasture, and the remainder

(a) Belonging to Mrs Southcote, near Weybridge in Surry.

Farm. remainder is in tillage. The decorations are, however, communicated to every part: for they are disposed along the sides of a walk, which, with its appendages, forms a broad belt round the grazing-grounds; and is continued, though on a more contracted scale, thro' the arable. This walk is properly garden; all within it is farm; the whole lies on the two sides of a hill, and on a flat at the foot of it: the flat is divided into corn-fields; the pastures occupy the hill; they are surrounded by the walk, and crossed by a communication carried along the brow, which is also richly dressed, and which divides them into two lawns, each completely encompassed with garden.

These are in themselves delightful; the ground in both lies beautifully; they are diversified with clumps and single trees; and the buildings in the walk seem to belong to them. On the top of the hill is a large octagon structure; and, not far from it, the ruin of a chapel. To one of the lawns the ruin appears, on the brow of a gentle ascent, backed and grouped with wood; from the other is seen the octagon, upon the edge of a steep fall, and by the side of a pretty grove, which hangs down the declivity. This lawn is further embellished by a neat Gothic building; the former by the house, and the lodge at the entrance; and in both, other objects of less consequence, little seats, alcoves, and bridges, continually occur.

The buildings are not, however, the only ornaments of the walk; it is shut out from the country, for a considerable length of the way, by a thick and lofty hedge-row, which is enriched with woodbine, jessamine, and every odiferous plant whose tendrils will entwine with the thicket. A path, generally of sand or gravel, is conducted in a waving line, sometimes close under the hedge, sometimes at a little distance from it; and the turf on either hand is diversified with little groupings of shrubs, of firs, or the smallest trees, and often with beds of flowers: these are rather too profusely swarded, and hurt the eye by their littleness; but then they replenish the air with their perfumes, and every gale is full of fragrant. In some parts, however, the decoration is more chaste; and the walk is carried between larger lumps of evergreens, thickets of deciduous shrubs, or still more considerably open plantations. In one place it is entirely simple, without any appendages, any gravel, or any sunk fence to separate it from the lawn; and is distinguished only by the richness of its verdure, and the nicety of its preservation. In the arable part it is also of green sward, following the direction of the hedges about the several inclosures: these hedges are sometimes thickened with flowering shrubs; and in every corner or vacant space, is a rosary, a clove or an open clump, or a bed of flowers; but if the parterre has been rifled for the embellishment of the fields, the country has on the other hand been searched for plants new in a garden; and the shrubs and the flowers which used to be deemed peculiar to the one, have been liberally transferred to the other; while their number seems multiplied by their arrangement in so many and such different dispositions. A more moderate use of them would, however, have been better; and the variety more pleasing, had it been less licentious.

But the excess is only in the borders of the walk; the scenes through which it leads are truly elegant, every

where rich, and always agreeable. A peculiar cheerfulness overspreads both the lawns, arising from the number and the splendor of the objects with which they abound, the lightness of the buildings, the inequalities of the ground, and the varieties of the plantations. The clumps and the groves, though separately small, are often massed by the perspective, and gathered into considerable groupings, which are beautiful in their forms, their tints, and their positions. The brow of the hill commands two lovely prospects: the one gay and extensive, over a fertile plain, watered by the Thames, and broken by St Anne's Hill and Windsor Castle; a large mead, of the most luxuriant verdure, lies just below the eye, spreading to the banks of the river; and beyond it the country is full of farms, villas, and villages, and every mark of opulence and cultivation. The other view is more wooded: the steeples of a church, or the turrets of a seat, sometimes rise above the trees; and the bold arch of Walton Bridge is there a conspicuous object, equally singular and noble. The inclosures on the flat are more retired and quiet; each is confined within itself; and all together they form an agreeable contrast to the open exposure above them.

With the beauties which enliven a garden are every where intermixed many properties of a farm: both the lawns are pastured; and the lowings of the herds, the bleating of the sheep, and the tinklings of the bell-wedder, resound thro' all the plantations: even the clucking of poultry is not omitted; for a menagerie of a very simple design is placed near the Gothic building; a small serpentine river is provided for the water-fowl; while the others stray among the flowering shrubs on the banks, or straggle about the neighbouring lawn: and the corn-fields are the subjects of every rural employment, which arable land from seed-time to harvest can furnish. But though so many of the circumstances occur, the simplicity of a farm is wanting; that idea is lost in such a profusion of ornament; a rusticity of character cannot be preserved amidst all the elegant decorations which may be lavished on a garden.

FARN ISLANDS, two groups of little islands and rocks, 17 in number, lying opposite to Bamborough castle in Northumberland. At low-water, the points of several others are visible besides the 17 just mentioned. The nearest island to the shore is called the *Houfe-island*, and lies exactly one mile and 68 chains from the coast. The most distant is about seven or eight miles. They are rented for *L. 16 per annum*: their produce is kelp, feathers, and a few seals, which the tenant watches and shoots for the sake of the oil and skins. Some of them yield a little grafs that may serve to feed a cow or two; which the people transport over in their little boats. St Cuthbert is said to have passed the two last years of his life on the Houfe-island. A priory of Benedictines was afterwards established here, for six or eight monks, subordinate to Durham. A square tower, the remains of a church, and some other buildings, are still to be seen on this island; and a stone coffin, which is pretended to be that of St Cuthbert. At the north end of the isle is a deep chafm, from the top to the bottom of the rock, communicating with the sea; through which, in tempestuous weather, the water is forced with great violence and noise, and forms a fine jet d'eau of 60 feet high. It is called by the inhabitants of the opposite

Farnabie,
Farquhar.

opposite coast, the *Churn*. One of the islands in the most distant groupe is called the *Pinnacles*, from some vast columnar rocks at the south end, even at their sides, flat at the tops, and entirely covered with guillemots and flags. The fowlers pass from one to the other of these columns by means of a narrow board, which they place from top to top, forming a narrow bridge over such a dreadful gap that the very sight of it strikes one with horror.

FARNABIE (Thomas), son of a carpenter at London, born in 1575, staid a short while at Oxford; where being enticed to abandon his religion, he went to Spain, and was there educated in a college belonging to the Jesuits. Being weary of their severe discipline, he went with Sir John Hawkins and Sir Francis Drake in their last voyage in 1595. He was afterwards a soldier in the Low Countries; but being reduced to great want, returned to England, where wandering about for some time under the name of *Thomas Bainrafé*, the anagram of his name, he settled at Mattock in Somersetshire, and taught a grammar-school with good reputation. He removed to London, and opened a school with large accommodations for young gentlemen. While he taught this school he was made master of arts at Cambridge, and incorporated into the university of Oxford. Thence he removed, in 1636, to Seven-oaks in Kent; and taught the sons of several noblemen and gentlemen, who boarded with him, with great success, and grew rich. His works gained him reputation. Upon the breaking out of the civil commotions in 1641, he was cast into prison. It was debated in the house of commons, whether he should be sent to America; but this motion being rejected, he was removed to Ely-house in Holborn, and there he died in 1647. Mr Farnabie was a very eminent grammarian; and many writers have spoken with great approbation of his labours. M. Bayle in particular says, "His notes upon most of the ancient Latin poets have been of very great use to young beginners; being short, learned, and designed chiefly to clear up the text."

FARQUHAR (George), an ingenious poet and dramatic writer, the son of a clergyman in Ireland, was born at Londonderry in 1678. He was sent to Trinity College, Dublin; but his volatile disposition not relishing a college life, he betook himself to the stage; where, having dangerously wounded a brother-actor in a tragic scene, by forgetting to change his sword for a foil, it shocked him so much that he left the Dublin theatre and went to London. Here he procured a lieutenant's commission by the interest of the earl of Orrery; which he held several years, and gave many proofs both of courage and conduct. In 1698, he wrote his first comedy called *Love and a Bottle*; which, for its sprightly dialogue and busy scenes, was well received. In the beginning of the year 1700, which was the jubilee year at Rome, he brought out his *Constant Couple, or a Trip to the Jubilee*: and suited Mr Wilks's talents so well in the character of Sir Harry Wildair, that the player gained almost as much reputation as the poet. This tempted him to continue it in another comedy called *Sir Harry Wildair, or the Sequel of the Trip to the Jubilee*; in which Mrs Oldfield acquired great applause. In 1702, he published his *Miscella-*

nies, which contain a variety of humorous fallacies of fancy. In 1703, appeared the *Inconstant, or the Way to win him*; in 1704, a farce called *the Stage-coach*; in 1705, *The Twin Rivals*; and in 1706, the *Recruiting Officer*, founded on his own observations while on a recruiting party at Shrewsbury. His last comedy was the *Beaux Stratagem*, of which he did not live to enjoy the full success.

Mr Farquhar married in 1703. Before that time his manner of life had been rather dissipated. The lady, therefore, who afterwards became his wife, having fallen violently in love with him, but judging that a gentleman of his humour would not easily be drawn into the trammels of matrimony, contrived to have it given out that she was possessed of a large fortune; and finding means afterwards to let Mr Farquhar know her attachment to him, the united powers of interest and vanity perfectly got the better of his passion for liberty, and they were united in the hymeneal bands. But how great was his disappointment, when he found all his prospects overclouded so early in life, (for he was then no more than 24), by a marriage from which he had nothing to expect but an annual increase of family, and an enlargement of expence in consequence of it far beyond what his income would support. Yet, to his honour be it told, though he found himself thus deceived in a most essential particular, he never was known once to upbraid his wife with it; but generously forgave an imposition which love for him alone had urged her to, and even behaved to her with all the tenderness and delicacy of the most indulgent husband.

Mrs Farquhar, however, did not very long enjoy the happiness she had purchased by this stratagem: for the circumstances that attended this union were in some respect perhaps the means of shortening the period of the captain's life. For, finding himself considerably involved in debt in consequence of their increasing family, he was induced to make application to a certain noble courtier, who had frequently professed the greatest friendship for him, and given him the strongest assurances of his intended services. This pretended patron repeated his former declarations; but, expressing much concern that he had nothing at present immediately in his power, advised him to convert his commission into money to answer his present occasions, and assured him that in a short time he would procure another for him. Farquhar, who could not bear the thoughts of his wife and family being in distress, followed this advice, and fold his commission; but, to his great mortification and disappointment, found, on a renewal of his application to this inhuman nobleman, that he had either entirely forgotten, or had never intended to perform, the promise he had made him. This distracting frustration of all his hopes fixed itself so strongly on our author's mind, that it soon brought on him a cure, though not a very sudden declaration of nature, which at length carried him off the stage of life in 1707, before he arrived at 30 years of age.—His comedies are so diverting, and the characters so natural, that his plays still continue to be represented to full houses.

FARRIER, one whose employment is to shoe horses, and cure them when diseased or lame.

Farquhar
Farrier.

F A R R I E R Y.

FARRIERY is the art of curing the diseases of horses.

The practice of this useful art has been hitherto almost entirely confined to a set of men who are totally ignorant of anatomy and the general principles of medicine. It is not therefore surprising, that their prescriptions should be equally absurd as the reasons they give for administering them. It cannot indeed be expected that farriers, who are almost universally illiterate men, should make any real progress in their profession. They prescribe draughts, they rowel, cauterise, &c. without being able to give any other reason for their practice, but because their fathers did so before them. How can such men deduce the cause of a disease from its symptoms, or form a rational method of cure, when they are equally ignorant of the causes of diseases and the operation of medicines?

The miserable state of this useful art, especially in this country, has determined us to select, from the best authors, such a system of practice as seemed to be formed on rational principles; this, we hope, will be a sufficient apology for being so full upon this article.

SECT. I. General Directions with regard to the Management of Horses.

1. It ought to be laid down as a general rule, to give horses as few medicines as possible; and by no means to comply with the ridiculous custom of some, who are frequently bleeding, purging, and giving balls, though their horses be in perfect health, and have no indication that requires such treatment.

2. Proper management in their feeding, exercise, and dressing, will alone cure many disorders, and prevent molt; for the simplicity of a horse's diet, which chiefly consists of grain and herbage, when good in kind, and dispensed with judgment, secures him from those complicated disorders which are the general effects of intemperance in the human body.

3. In France, Germany, and Denmark, horses are seldom purged; there they depend much on alteratives; the use of the liver of antimony we have from the French, which is in general a good medicine for that purpose, and may, in many cases, be substituted in the room of purging.

4. As hay is so material an article in a horse's diet, great care should be taken to procure the best: when it is not extraordinary, the dust should be well shook out before it is put in the rack; for such hay is very apt to breed vermin.

5. Beans afford the strongest nourishment of all grain; but are fittest for laborious horses, except on particular occasions. In some seasons they breed a kind of vermin called the *red bugs*, which is thought to be dangerous; the best method in such a case is to procure them well dried and split.

6. Bran scalded is a kind of panada to a sick horse: but nothing is worse than a too frequent use of it, either dry or scalded; for it relaxes and weakens the bowels too much. The bots in young horses may be owing to too much musty bran and chaff, given with other foul food to make them up for sale; particular care therefore should be taken that the bran be always

sweet and new.

7. Oats, well ripened, make a more hearty and durable diet than barley, and are much better suited to the constitutions of British horses. A proper quantity of cut straw and hay mixed with them, is sometimes very useful to horses troubled with bots, indigestion, &c.

8. Horses who eat their litter, should particularly have cut straw and powdered chalk given them with their feed; as it is a sign of a depraved stomach, which wants correcting.

9. The salt-marshes are good pasture for horses who have been surfeited, and indeed for many other disorders; they purge more by dung and urine than any other pasture, and make afterwards a firmer flesh; their water is for the most part brackish, and of course, as well as the grass, saturated with salts from the sea-water.

10. A summer's grass is often necessary; more particularly to horses glutted with food, and which use little exercise: but a month or two's running is proper for most; those especially who have been worked hard, and have stiff limbs, swelled legs, or wind-galls. Horses whose feet have been impaired by quitters, bad shoeing, or any other accidents, are also best repaired at grass. Those lamenesses particularly require turning out to grass, where the muscles or tendons are contracted or shrunk; for by the continual gentle exercise in the field, with the assistance of a patten-shoe on the opposite foot, the shortened limb is kept on the stretch, the wasted parts are restored to their ordinary dimensions, and the limb again recovers its usual tone and strength.

11. The fields which lie near great towns, and are much dunged, are not proper pasture for horses; but on observation appear very injurious to them, if they feed thereon all the summer.

12. Horses may be kept abroad all the year, where they have a proper stable or shed to shelter them from the weather, and hay at all times to come to. So treated, they are seldom sick; their limbs are always clean and dry; and, with the allowance of corn, will hunt, and do more business than horses kept constantly within doors.

13. If horses, when taken from grass, should grow hot and colicive, mix bran and chopt hay with their corn; and give them sometimes a feed of scalded braa for a fortnight, or longer: let their exercise and diet be moderate for some time, and increase both by degrees.

14. When horses are soiled in the stable, care should be taken that the herbage is young, tender, and full of sap; whether it be green barley, tares, clover, or any thing else the season produces; and that it be cut fresh once every day at least, if not oftener.

15. When horses lose their flesh much in soiling, they should in time be taken to a more solid diet: for it is not in soiling as in grazing; where, tho' a horse loses his flesh at first, yet, after the grass has purged him, he soon grows fat.

16. Young horses who have not done growing, must be indulged more in their feeding, than those come to their

their maturity; but if their exercise is so little as to make it necessary to abridge their allowance of hay, a little fresh straw should constantly be put in their racks, to prevent their nibbling the manger, and turning cribs; they should also be sometimes strapped back in order to cure them of this habit.

17. It is obvious to every one, what care should be taken of a horse after violent exercise, that he cool not too fast, and drink no cold water, &c. for which reason we shall wave particular directions.

18. Most horses fed for sale, have the interstices of their muscles so filled with fat, that their true shapes are hardly known. For which reason a horse just come out of the dealer's hands, should at first be gently used. He ought to lose blood, and have his diet lowered, tho' not too much: walking exercise is most proper at first, two hours in a day; in a week or fortnight two hours at a time, twice a-day; after this usage for a month, bleed him again, and give him two or three times a week scalded bran, which will prepare him for purging physic, that may now be given safely, and repeated at the usual intervals.

19. When a horse comes out of a dealer's hands, his clothing must be abated by degrees, and care taken to put him in a moderately warm stable; otherwise the sudden transition would be attended with the worst consequences.

SECT. II. *Some General Directions in regard to Bleeding, Purging, &c.*

1. HORSES who stand much in stable, and are full fed, require bleeding now and then; especially when their eyes look heavy, dull, red, and inflamed; as also, when they feel hotter than usual, and mangle their hay.

Young horses should be bled when they are shedding their teeth, as it takes off those feverish heats they are then subject to. But the cases that chiefly require bleeding, are colds, fevers of most kinds, falls, bruises, hurts of the eyes, strains, and all inflammatory disorders, &c.

It is right to bleed a horse, when he begins to grow fleshy at grags, or at any other time when he looks heavy: and it is generally proper to bleed before purging.

Let your horse always be bled by measure, that you may know what quantity you take away: two or three quarts are always enough at one time; when you repeat it, allow for the disorder and the horse's constitution.

Let the blood, when cold, be carefully examined, both as to colour and confidence, whether black, florid, fizy, &c.

2. Purging is often necessary in gross full horses, in some disorders of the stomach, liver, &c. but should be directed with caution. Before a purge is given to any horse, it is necessary some preparation should be made for it, in order to render the operation more safe and efficacious: thus a horse that is full of flesh should first be bled, and at the same time have his diet lowered for a week, especially those that have been pampered for sale; several mashes of scalded bran should also previously be given, in order to open the bowels, and unload them of any indurated excrement, which sometimes proves an obstacle to the working of the physic, by creating great sickness and griping.

Let it be remembered, that a horse is purged with difficulty; that the physic generally lies 24 hours in the guts before it works; and, that the tract of bowels it has to pass through, is above 30 yards; and lying horizontally, consequently reflex and other improper drugs may, and often do, by their violent irritations, occasion excessive gripings and cold sweats, shave off the very mucus or lining of the guts, and bring on inflammations, which often terminate in mortifications, and death.

It is remarkable too, that the stomach and guts of a horse are but thin, compared to some other animals of the same bulk, and therefore must be more liable to inflammation and irritation.

Horses kept much in the stable, who have not the proper benefit of air and exercise in proportion to their food, should in spring have a mild purge or two after a previous preparation by bleeding, lowering their diet, and scalded mashes.

Horses that fall off in their stomach, whether it proceeds from too full feeding, or ingendering crudities and indigested matter, should have a mild purge or two.

Horses of a hot temperament, will not bear the common aloetic purges; their physic therefore should be mild and cooling.

Purging is always found very beneficial in stubborn dry coughs: but mild mercurials joined with them, make them yet more efficacious.

Horses of a watery constitution, who are subject to swelled legs, that run a sharp briny ichor, cannot have the causes removed any way so effectually as by purging.

The first purge you give to a horse should be mild, in order to know his constitution.

It is a mistaken notion, that if a proper prepared purge does not work to expectation, the horse will be injured by it; for though it does not pass by stool, its operation may be more efficacious as an alternative to purify the blood, and it may pass by urine or other secretions.

Purging medicines are very successfully given in small quantities, mixed with others; and act then as alteratives.

If mercurial physic is given, care should be taken that it be well prepared; and warmer clothing and greater circumspection are then required.

Purges should be given early in the morning upon an empty stomach: about three or four hours after the horse has taken it, he should have a feed of scalded bran; and a lock or two of hay may then be put into his rack. The same day give him two more mashes; but should he refuse warm meat, he may be allowed raw bran.

All his water should be milk-warm, and have a handful of bran squeezed in it; but if he refuses to drink white water, give it him without bran.

Early the next morning give him another mash; but if he refuses to eat it, give him as much warm water as he will drink: let him be properly clothed, and rode gently about. This should be done two or three times a-day, unless he purges violently; once or twice will then be sufficient: at night give him a feed of oats mixed with bran.

During the working, a horse should drink plentifully; but, if he will not drink warm water, he must be

Of Purging. be indulged with cold, rather than not drink at all.

We shall here insert some general forms of purges.

TAKE focotorine aloes ten drams, jalap and salt of tartar each two drams, grated ginger one dram, oil of cloves 30 drops; make them into a ball with syrup of buckthorn. Or,

TAKE aloes and cream of tartar each one ounce, jalap two drams, cloves powdered one dram, syrup of buckthorn a sufficient quantity.

Or the following, which has an established character among sportsmen.

TAKE aloes from ten drams to an ounce and an half, myrrh and ginger powdered each half an ounce, saffron and oil of annised each half a dram.

Mr Gibbon recommends the following:

TAKE focotorine aloes ten drams, myrrh finely powdered half an ounce, saffron and fresh jalap in powder of each a dram; make them into a stiff ball with syrup of roses, then add a small spoonful of rectified oil of amber.

The focotorine aloes should always be preferred to the Barbadoes or plantation aloes: though the latter may be given to robust strong horses; but even then should always be prepared with the salt or cream of tartar, which, by opening its parts, prevents its adhesion to the coats of the stomach and bowels; from whence horrid gripings, and even death itself has often ensued. This caution is well worth remarking, as many a horse hath fallen a sacrifice to the neglect of it.

Half an ounce of Castile soap, to a horse of a gross constitution, may be added to any of the above; and the proportions may be increased for strong horses.

When mercurial physic is intended, give two drams of calomel over night, mixed up with half an ounce of diapente and a little honey, and the purging ball the next morning.

The following, when it can be afforded, is a very gentle and effectual purge, particularly for fine delicate horses; and if prepared with the Indian rhubarb, will not be expensive.

TAKE of the finest focotorine aloes one ounce, rhubarb powdered half an ounce or six drams, ginger grated one dram; make into a ball with syrup of roses.

The following purging drink may be given with the utmost safety; it may be quickened, or made stronger, by adding an ounce more fenna, or two drams of jalap.

TAKE fenna two ounces; infuse it in a pint of boiling water two hours, with three drams of salt of tartar; pour off, and dissolve in it four ounces of Glauber's salts, and two or three of cream of tartar.

This last physic is cooling, easy, and quick in its operation; and greatly preferable in all inflammatory cases to any other purge, as it passes into the blood, and operates also by urine.

When horses lose their appetites after purging, it is necessary to give them a warm stomach-drink made of an infusion of camomile-flowers, anniseeds, and saffron: or the cordial ball may be given for that purpose.

Should the purging continue too long, give an ounce of diascordium in an English pint of Port-wine; and repeat it once in 12 hours, if the purging continues. Plenty of gum-arabic water should also be given; and, in case of violent gripes, fat broth glysters, or tripe li-

quor, should be often thrown up, with 100 drops of Of Purging. laudanum in each.

The arabic solution may be thus prepared.

TAKE of gum arabic and tragacanth of each four ounces, juniper-berries and carraway-seeds of each an ounce, cloves bruised half an ounce; simmer gently in a gallon of water, till the gums are dissolved: give a quart at a time in half a pail of water; but if he will not take it freely this way, give it him often in a horn.

When a purge does not work, but makes the horse swell, and refuse his food and water, which is sometimes the effect of bad drugs or catching cold, warm diuretics are the only remedy; of which the following are recommended.

TAKE a pint of white-wine, nitre one ounce; mix with it a dram of camphire, dissolved in a little rectified spirit of wine; then add two drams of oil of juniper, and the same quantity of unrectified oil of amber, and four ounces of honey or syrup of marshmallows.

When a horse swells with much physic, do not suffer him to be rode about till he has some vent; but rather lead him gently in hand till some evacuation is obtained.

As it is observed, that horses more willingly take sweet and palatable things than those that are bitter and of an ill taste, care should be taken that the latter be given in balls, and that their drinks be always contrived to be as little nauseous as possible, and sweetened either with honey or liquorice. Those that are prepared with gross powders are by no means so agreeable to a horse, as those made by infusion; as the former often clam the mouth, irritate the membranes about the palate and throat, and frequently occasion the cough they are intended to prevent.

Balls should be of an oval shape, and not exceed the size of a pullet's egg: when the dose is larger, it should be divided into two; and they should be dipt in oil, to make them slip down the easier.

As we have given some general forms of purges, we shall observe the same rule in regard to glysters, with some few cautions and remarks.

Let it be observed then, that, before the administering emollient clysters in costive disorders, a small hand, well oiled, should be passed up the horse's fundament, in order to bring away any hardened dung, which otherwise would be an obstacle to the glyster's passage.

A bag and pipe of a proper form is to be preferred to a syringe, which throws up the glyster with so much force, that it often surprises a horse, and makes him reject it as fast as it goes in; whereas the liquor, when pressed gently from the bag, gives him no surprise or uneasiness, but passes easily up into the bowels, where it will sometimes remain a long time, and be extremely useful, by cooling and relaxing them; and will sometimes incorporate so with the dung, as not easily to be distinguished from the other contents of the guts. These emollient glysters are extremely serviceable in moist fevers, and greatly preferable to purging ones; which in general are too pungent, and stimulate too much, especially if aloes are a part of the composition.

Nutritive glysters are very necessary, and often save a horse from starving when his jaws are so locked up by convulsions that nothing can be conveyed by the mouth.

Of Colds.

Of Colds.

They should not exceed a quart or three pints at a time, but be often repeated: nor should they be too fat; but made of sheep's heads, trotters, or any other meat-broths, milk pottage, rice-milk strained, and many other such nourishing things. For an emollient glyster, take the following.

Take marshmallows and camomile flowers each a large handful, bay-berries and sweet-fennel seeds bruised each an ounce; boil in a gallon of water to three quarts, pour off into a pan, and dissolve in it half a pound of treacle and a pint of linseed oil or any common oil.

To make it more laxative, add four ounces of lenitive electuary, or the same quantity of cream of tartar, or common purging salts.

Purging Glyster. **Take** two or three handfuls of marshmallows, fenna one ounce, bitter apple half an ounce, bay-berries and anniseeds bruised each an ounce, salt of tartar half an ounce; boil a quarter of an hour in three quarts of water; pour off, and add four ounces of syrup of buckthorn, and half a pint of oil.

This glyster will purge a horse pretty briskly; and may be given successfully, when an immediate discharge is wanting; especially in some fevers with inflamed lungs, or other disorders, which require speedy relief.

But it is necessary to caution against a solution of coarse aloes for this purpose, as it has been found to gripe horses violently, and excite feverish and sometimes convulsive symptoms; and indeed pungent and stimulating medicines, as the stronger purgatives generally are, should be given in this form with great caution.

But the generality of emollient glysters, may be prepared with much less trouble; as two quarts of water-gruel, with half a pound of treacle, a pint of oil, and a handful of common salt, will as effectually answer every purpose. The following is a restraining glyster.

Take pomegranate-bark or oak-bark two ounces, red-rose leaves fresh or dry a handful, balauitines an ounce; boil in two quarts of water, till one is near consumed; pour off, and dissolve in it four ounces of diascordium; to which may be added a pint of Port-wine.

This will answer in all common cases where restraints are necessary, but should never be given in larger quantities; for the longer glysters of this kind lie in the bowels, the more efficacious they are.

SECT. III. Of Colds.

By taking cold, we mean that the pores and outlets of the skin (which in a natural healthy state of body are continually breathing out a fine fluid, like the steam arising from hot water, or smoke from fire) are so far shut up, that these steams, or perspirable matter, not having a free passage through them, are hindered from going off in the usual manner; the consequence of which is, their recoiling on the blood, vitiating its quality, overfilling the vessels, and affecting the head, glands or kernels of the neck and throat, the lungs, and other principal parts.

To enumerate the various causes of colds would be endless: the most usual are, riding horses till they are hot, and suffering them to stand in that condition where the air is cold and piercing; removing a horse from a hot stable to a cold one, and too suddenly changing his

cloathing, whence it is that horses often catch such severe colds after they come out of dealers hands; and by not being carefully rubbed down when they come in hot off journeys.

The signs of a horse's catching cold, are a cough, heaviness and dullness, which affect him more or less in proportion to the severity of it: the eyes are sometimes moist and watery, the kernels about the ears and under the jaws swell, the nose gleets, and he rattles in his breathing; and when the cold is violent, the horse will be feverish, his flanks work, and he will both loath his hot meat and refuse his water. When these last symptoms are attended with a slimy mucus, ears, and feet cold, and a great inward soreness, there is danger of a bad fever.

But when the horse coughs strong, snorts after it, is but little off his stomach, pricks up his ears, and moves briskly in his stall, dungs and stales freely, his skin feels kindly, and his coat does not stare, he is in no danger, and there will be no occasion for medicines of any kind; but you should bleed him about two quarts, keep him warm, and give him feeds of scalded bran, with as much warm water as he will drink, in order to dilute his blood.

If the disorder should increase, the horse feel hot, and refuse his meat, bleed him, if strong, two quarts more; and if you are not satisfied without giving medicines, avoid, as you would poison, a farrier's drench; (which is generally composed of some hot, maulous powders, given in a quantity of ale; which too often increases the fever by overheating the blood, and palls the horse's stomach by its loathsomeness;) and instead of it, infuse two ounces of anniseeds with a dram of saffron, in a pint and a half of boiling water; pour off the clear liquor, and dissolve in it four ounces of honey, to which may be added four spoonfuls of salad-oil: this drink may be given every night; or one of the following balls, provided there is no fever, in which case it always will be more eligible to give two or three ounces of nitre or salt prunella every day in his feeds or water till it is removed; but should the horse be inclined to costiveness, remember that his body should be kept open by emollient glysters, or cream of tartar dissolved in his water, to the quantity of three or four ounces a-day.

Pectoral Horse-ball. **Take** of the fresh powders of anniseed, elecampane, carraway, liquorice, turmeric, and flour of brimstone, each three ounces; juice of liquorice four ounces, dissolved in a sufficient quantity of mountain; saffron powdered half an ounce, salad-oil and honey half a pound, oil of anniseed one ounce: mix together with wheat-flour enough to make them into a paste.

Or the following from Dr Bracken.

Take anniseed, carraway seed, and greater cardamoms, finely powdered, of each one ounce, flour of brimstone two ounces, turmeric in fine powder one ounce and a half, saffron two grains, Spanish juice dissolved in water two ounces, oil of anniseed half an ounce, liquorice-powder one ounce and a half, wheat-flour a sufficient quantity to make into a stiff paste by beating all the ingredients well in a mortar.

These balls consist of warm opening ingredients; and, given in small quantities, about the size of a pullet's egg, will encourage a free perspiration; but, in case of a fever, should be cautiously continued. They are much more efficacious

Of Fevers. efficacious and in all cases superior to the farriers drenches, if dissolved in a pint of warm ale.

This simple method, with good nursing and hot mashes, warm water and cloathing, especially about the head and throat, which promotes the running at the nostrils, will answer the most sudden colds; and when the horse feeds heartily, and suorts after coughing, moderate exercise every day will hasten his recovery.

To a horse loaded with flesh, a rowel may sometimes be necessary, as may also a gentle purge or two to some, when the distemper is gone off.

SECT. IV. *Of Fevers in general.*

1. THE symptoms of a fever are, Great restlessness; the horse ranging from one end of his rack to the other; his flanks beat; his eyes are red and inflamed; his tongue parched and dry; his breath is hot, and smells strong; he loses his appetite, and nibbles his hay, but does not chew it, and is frequently smelling to the ground; the whole body is hotter than ordinary, (though not parched, as in some inflammatory disorders;) he dungs often, little at a time, usually hard, and in small bits; he sometimes stales with difficulty, and his urine is high-coloured; and he seems to thirst, but drinks little at a time, and often; his pulse beats full and hard, to fifty strokes and upwards in a minute.

The first intention of cure is bleeding, to the quantity of two or three quarts, if the horse is strong and in good condition: then give him a pint of the following drink, four times a-day; or an ounce of nitre, mixed up into a ball with honey, may be given thrice a-day, instead of the drink, and washed down with three or four horns of any small liquor.

TAKE of baum, fage, and camomile-flowers, each a handful, liquorice-root sliced half an ounce, salt prunel or nitre three ounces; infuse in two quarts of boiling water; when cold, strain off, and squeeze into it the juice of two or three lemons, and sweeten with honey.

As the chief ingredient to be depended on in this drink is the nitre, it may perhaps be as well given in water alone; but as a horse's stomach is soon palled, and he requires palatable medicines, the other ingredients may in that respect have their use. Soleysel for this purpose advises two ounces of salt of tartar, and one of sal armoniac, to be dissolved in two quarts of water, and mixed with a pail of common water, adding a handful of bran or barley-flour to qualify the unpleasant taste: this may be given every day, and is a useful medicine.

His diet should be scalded bran, given in small quantities; which if he refuses, let him have dry bran sprinkled with water: put a handful of picked hay into the rack, which a horse will often eat when he will touch nothing else; his water need not be much warmed, but should be given often and in small quantities: his cloathing should be moderate; too much heat and weight on a horse being improper in a fever, which scarce ever goes off in critical sweats (as those in the human body terminate), but by strong perspiration.

If in a day or two he begins to eat his bran and pick a little hay, this method with good nursing will answer: but if he refuses to feed, more blood should be taken away, and the drinks continued; to which may be added two or three drams of saffron, avoiding at this

time all hotter medicines: the following glyster should be given, which may be repeated every day, especially if his dung is knotty or dry.

TAKE two handfuls of marshmallows, and one of camomile flowers; fennel-seed an ounce; boil in three quarts of water to two; strain off, and add four ounces of treacle, and a pint of linseed oil or any common oil.

Two quarts of water-gruel, fat broth, or pot-liquor, with the treacle and oil, will answer this purpose; to which may be added a handful of salt. These sort of glysters are more proper than those with purging ingredients.

The following opening drink is very effectual in those fevers; and may be given every other day, when the glysters should be omitted; but the nitre-balls or drink may be continued, except on those days these are taken.

TAKE of cream of tartar and Glauber's salts, each four ounces; dissolve in barley-water, or any other liquor: an ounce or two of lenitive electuary may be added, or a dram or two of powder of jalap, to quicken the operation in some horses.

Four ounces of Glauber's salts, or cream of tartar, with the same quantity of lenitive electuary, may be given for the same purpose, if the former should not open the body sufficiently.

In four or five days the horse generally begins to pick his hay, and has a seeming relish to food; though his flanks will heave pretty much for a fortnight: yet the temper of his body and return of appetite shew, that nothing more is requisite to complete his recovery, than walking him abroad in the air, and allowing plenty of clean litter to rest him in the stable.

This method of treating a fever is simple, according to the laws of nature; and is confirmed by long experience to be infinitely preferable to the hot method.

The intention here is to lessen the quantity of blood, promote the secretion of urine and perspiration, and cool and dilute the fluids in general.

2. There is another sort of fever that horses are subject to, of a more complicated and irregular nature than the former; which, if not properly treated, often proves fatal.

The signs are, A slow fever, with languishing, and great depressions: the horse is sometimes inwardly hot, and outwardly cold; at other times hot all over, but not to any extreme; his eyes look moist and languid; he has a continual moisture in his mouth, which is the reason he seldom cares to drink, and when he does it is but little at a time. He feeds but little, and leaves off as soon as he has eat a mouthful or two; he moves his jaws in a feeble, loose manner, with an unpleasant grating of his teeth; his body is commonly open; his dung soft and moist, but seldom greasy; his staling is often irregular, sometimes little, at other times profuse, seldom high-coloured, but rather pale, with little or no sediment.

When a horse's appetite declines daily, till he refuses all meat, it is a bad sign. When the fever doth not diminish, or keep at a stand, but increases, the case is then dangerous. But when it sensibly abates, and his mouth grows drier, the grating of his teeth ceases, his appetite mends, and he takes to lay down (which perhaps he has not done for a fortnight), these are promising signs. A horse in these fevers always runs at the nose,

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nose, but not the kindly white discharge, as in the breaking of a cold, but of a reddish or greenish dusky colour, and of a consistence like glue, and sticks like turpentine to the hair on the application of the nostrils: If this turns to a gleet or clear thin water, the horse's hide keeps open, and he mends in his appetite; these are certain signs of recovery.

The various and irregular symptoms that attend this slow fever, require great skill to direct the cure, and more knowledge of the symptoms of horses diseases than the generality of gentlemen are acquainted with. The experienced farrier should therefore be consulted and attended to, in regard to the symptoms; but very seldom as to the application of the remedy, which is generally above their comprehension; though it may be readily selected, by duly attending to the observations here inculcated.

First, then, a moderate quantity of blood, not exceeding three pints, may be taken away, and repeated in proportion to his strength, fullness, inward soreness, cough, or any tendency to inflammation. After this, the fever-drink first above mentioned may be given, with the addition of an ounce of snake-root, and three drams of saffron and camphor dissolved first in a little spirit of wine; the quantity of the nitre may be lessened, and these increased as the symptoms indicate.

The diet should be regular; no oats given, but scalded or raw bran sprinkled; the best flavoured hay should be given by handfuls, and often by hand, as the horse sometimes cannot lift up his head to the rack.

As drinking is so absolutely necessary to dilute the blood, if the horse refuses to drink freely of warm water or gruel, he must be indulged with having the chill only taken off by standing in the stable: nor will any inconvenience ensue, but oftener an advantage; for the nauseous warmth of water, forced on horses for a time, palls their stomachs, and takes away their appetites, which the cold water generally restores.

Should the fever after this treatment increase, the horse feed little, stale often, his urine being thin and pale, and his dung sometimes loose and at other times hard; should the moisture in his mouth continue, his skin being sometimes dry and at others moist, with his coat looking starting, and forfeited: upon these irregular symptoms, which denote great danger, give the following balls, or drink; for in these cases there is no time to be lost.

TAKE of contrayerva-root, myrrh, and snake-root, powdered, each two drams, saffron one dram, mithridate or Venice treacle half an ounce; make into a ball with honey, which should be given twice or thrice a-day, with two or three horns of an infusion of snake-root sweetened with honey; to a pint and a half of which may be added half a pint of treacle-water or vinegar, which latter is a medicine of excellent use in all kinds of inflammatory and putrid disorders, either external or internal.

Should these balls not prove successful, add to each a dram of camphor, and, where it can be afforded, to a horse of value, the same quantity of calomel. Or the following drink may be substituted in their stead for some days.

TAKE of contrayerva and snake-root of each two ounces, liquorice-root sliced one ounce, saffron two

drams; infuse in two quarts of boiling water clove covered for two hours; strain off, and add half a pint of distilled vinegar, four ounces of spirit of wine, wherein half an ounce of camphor is dissolved, and two ounces of mithridate or Venice treacle; give a pint of this drink every four, six, or eight hours.

Should the horse be costive, recourse must be had to glysters, or the opening drink: should he purge, take care not to suppress it, if moderate; but if, by continuance, the horse grows feeble, add dialcordium to his drinks, instead of the mithridate; if it increases, give more potent remedies.

Let it be remembered, that camphor is a very powerful and effectual medicine in these kinds of putrid fevers; being both active and attenuating, and particularly calculated to promote the secretions of urine and perspiration.

Regard should also be had to his staling; which if in too great quantities, so as manifestly to depress his spirits, should be controlled by proper restraints, or by preparing his drinks with lime-water. If, on the contrary, it happens that he is too remiss this way, and stales so little as to occasion a fullness and swelling of the body and legs, recourse may be had to the following drink:

TAKE of salt prunella, or nitre, one ounce; juniper-berries, and Venice turpentine, of each half an ounce: make into a ball with oil of amber.

Give him two or three of these balls, at proper intervals, with a decoction of marsh-mallows sweetened with honey.

But if, notwithstanding the method we have laid down, a greenish or reddish gleet is discharged from his nostrils, with a frequent sneezing; if he continues to lose his flesh, and becomes hide-bound; if he altogether forsakes his meat, and daily grows weaker; if he swells about the joints, and his eyes look fixed and dead; if the kernels under his jaws swell, and feel loose; if his tail is raised, and quivers; if his breath smells strong, and a purging ensues with a discharge of fetid dark-coloured matter; his case may then be looked on as desperate, and all future attempts to save him will be fruitless.

The signs of a horse's recovery are known by his hide keeping open, and his skin feeling kindly; his ears and feet will be of a moderate warmth, and his eyes brisk and lively; his nose grows clean and dry; his appetite mends, he lies down well, and both stales and dungs regularly.

Be careful not to overfeed him on his recovery; let his diet be light, feeds small, and increased by degrees as he gets strength: for, by overfeeding, horses have frequent relapses or great surfeits, which are always difficult of cure.

If this fever should be brought to intermit, or prove of the intermitting kind, immediately after the fit is over give an ounce of Jesuit's bark, and repeat it every six hours till the horse has taken four or six ounces: should eruptions or swellings appear, they ought to be encouraged; for they are good symptoms at the decline of a fever, denote a termination of the distemper, and that no further medicines are wanted.

The true reasons, perhaps, why so many horses miscarry in fevers, are, that their masters, or doctors, will

not

not wait with patience, and let nature have fair play : that they generally neglect bleeding sufficiently at first ; and are constantly forcing down sugar-fops, or other food, in a horn, as if a horse must be starved in a few days if he did not eat : then they ply him twice or thrice a-day with hot medicines and spirituous drinks, which (excepting a very few cases) must be extremely pernicious to a horse, whose diet is naturally simple, and whose stomach and blood, unaccustomed to such heating medicines, must be greatly injured, and without doubt are often inflamed by such treatment.

Dilute the blood with plenty of water, or white drink ; let his diet be warm bran-mashes, and his hay sprinkled. Should the fever rise, which will be known by the symptoms above described, give him an ounce of nitre thrice a-day in his water, or made up in a ball with honey. Let his body be kept cool and open, with the opening drink, given twice or thrice a-week ; or an ounce of salt of tartar may be given every day, dissolved in his water, for that purpose, omitting then the nitre. After a week's treatment in this manner, the cordial ball may be given once or twice a-day, with an infusion of liquorice-root sweetened with honey ; to which may be added, when the phlegm is tough, or cough dry and husky, a quarter of a pint of linseed or salad oil, and the same quantity of oxymel squills.

The following cooling purge is very proper to give at the decline of the distemper, and may be repeated three or four times.

Take two ounces of fenna, annised and fennel bruised each half an ounce : salt of tartar three drams ; let them infuse two hours in a pint of boiling water ; strain off, and dissolve in it three ounces of Glauber's salt, and two of cream of tartar ; give for a dose in the morning.

This purge generally works before night very gently ; and in fevers, and all inflammatory disorders, is infinitely preferable to any other physic.

Before we close this section on fevers, it may be no improper hint to the curious, to take notice, that a horse's pulse should more particularly be attended to than is customary, as a proper estimate may thereby be made both of the degree and violence of the fever present, by observing the rapidity of the blood's motion, and the force that the heart and arteries labour with to propel it round. The highest calculation that has been made of the quickness of the pulse in a healthy horse, is, that it beats about forty strokes in a minute ; so that in proportion to the increase above this number, the fever is rising, and if farther increased to above fifty the fever is very high.

How often the pulse beats in a minute may easily be discovered by measuring the time with a stop-watch, or minute sand-glass, while your hand is laid on the horse's near side, or your fingers on any artery : those which run up on each side the neck are generally to be seen beating, as well as felt, a little above the chest ; and one within side each leg may be traced with the finger.

A due attention to the pulse is so important an article, in order to form a proper judgment in fevers, that it would appear amazing it has so much been neglected, if one did not recollect, that the generality of farriers are so egregiously ignorant, that they have no manner of conception of the blood's circulation, nor in general have they ability enough to distinguish the dif-

ference between an artery and a vein.—With such pretty guardians do we intrust the healths and lives of the most valuable of animals !

SECT. V. *Of a Pleurisy, and an Inflammation of the Lungs, &c.*

1. THESE disorders have scarce been mentioned by any writer on farriery before Mr Gibbon ; who, by frequently examining the carcases of dead horses, found them subject to the different kinds of inflammations here defined.

In order to distinguish these disorders from others, we shall describe the symptoms in Mr Gibbon's own words.

“ A pleurisy then, which is an inflammation of the pleura ; and a peripneumony, which is an inflammation of the lungs ; have symptoms very much alike ; with this difference only, that in a pleurisy a horse shews great uneasiness, and shifts about from place to place ; the fever, which at first is moderate, rises suddenly very high ; in the beginning he often strives to lie down, but starts up again immediately, and frequently turns his head towards the affected side, which has caused many to mistake a pleuritic disorder for the gripes, this sign being common to both, though with this difference : in the gripes, a horse frequently lies down and rolls ; and, when they are violent, he will also have convulsive twitches, his eyes being turned up, and his limbs stretched out, as if he were dying ; his ears and feet are sometimes occasionally hot, and sometimes as cold as ice ; he falls into profuse sweats, and then into cold damps ; strives often to stale and dung, but with great pain and difficulty ; which symptoms generally continue, till he has some relief : but, in a pleurisy, a horse's ears and feet are always burning hot, his mouth parched and dry, his pulse hard and quick : even sometimes, when he is high dying, his fever is continued and increasing ; and though in the beginning he makes many motions to lie down, yet afterwards he reins back as far as his collar will permit, and makes not the least offer to change his posture, but stands panting with short stops, and a disposition to cough, till he has relief, or drops down.

“ In an inflammation of the lungs, several of the symptoms are the same ; only in the beginning he is less active, and never offers to lie down during the whole time of his sickness ; his fever is strong, breathing difficult, and attended with a short cough : and whereas, in a pleurisy, a horse's mouth is generally parched and dry ; in an inflammation of the lungs, when a horse's mouth is open, a ropy slime will run out in abundance ; he gleets also at the nose a reddish or yellowish water, which sticks like glue to the inside of his nostrils.

“ In a pleurisy, a horse heaves and works violently at his flanks, with great restlessness, and for the most part his belly is tucked up ; but, in an inflammation of the lungs, he always shews fullness ; the working of his flanks is regular, except after drinking and shifting his posture ; and his ears and feet are for the most part cold, and often in damp sweats.”

2. The cure of both these disorders is the same. In the beginning a strong horse may lose three quarts of blood, the next day two quarts more ; and, if symptoms do not abate, the bleedings must be repeated, a quart

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 Of a Pleu-
rify, &c.

quart at a time; for it is speedy, large, and quick-repeated bleedings that are in these cases chiefly to be depended on. But if a horse has had any previous weakness, or is old, you must bleed him in less quantities, and oftener. Mr Gibbon recommends rowels on each side the breast, and one on the belly; and a blistering ointment to be rubbed all over his brisket upon the foremost ribs.

The diet and medicines should be both cooling, attenuating, relaxing, and diluting; and the horse should have warm mashes and plenty of water or gruel. The following balls may be given thrice a-day.

TAKE of spermaceti and nitre, of each one ounce; oil of anniseed, 30 drops; honey enough to make a ball.

A pint of barley-water, in which figs and liquorice-root have been boiled, should be given after each ball; to which the juice of lemons may be added; and if the lungs are greatly oppressed with a dry short cough, two or three horns full of the decoction may be given three or four times a-day, with four spoonfuls of honey and linseed oil. A strong decoction of the rattle-snake-root is also much recommended in pleuritic disorders, and may be given to the quantity of two quarts a-day, sweetened with honey. It remarkably attenuates the blood, disperses the inflammation, and in some parts is deemed a specific for this complaint.

An emollient glyster should be injected once a-day, to which may be added two ounces of nitre or cream of tartar.

In two or three days he will probably run at the nose, and begin to feed; but should he not, and continue hot and short-breathed, you must bleed him again, and give the following glyster.

TAKE fenna and marshmallows, of each two ounces; fennel and bay-berries, each one ounce; boil in five pints of clear water, to two quarts; pour off the clear, and add four ounces of purging salts, two or three of syrup of buckthorn, and half a pint of linseed or any common oil.

If by these means he grows cooler, and his pain moderates, repeat the glyster the next day, unless it worked too much; then intermit a day; and when he comes to eat scalded bran and picked hay, leave off the balls, and continue only the decoction, with now and then a glyster.

But let it be observed, that a horse seldom gets the better of these disorders, unless he has relief in a few days; for if the inflammation is not checked in that time, it usually terminates in a gangrene, or collection of matter, which, for want of expectoration, soon suffocates him.

But as pleuritic disorders are apt to leave a taint on the lungs, great care should be taken of the horse's exercise and feeding, which should be light and open for two or three weeks.

There is also an external pleurisy, or inflammation of the muscles between the ribs, which, when not properly treated, proves the foundation of that disorder called the *chest-founder*; for if the inflammation is not dispersed in time, and the viscid blood and juices so attenuated by internal medicines that a free circulation is obtained, such a stiffness and inactivity will remain on these parts, as will not easily be removed, and which is generally known by the name of *chest-*

founder.

The signs of this inflammation, or external pleurisy, are a stiffness of the body, shoulders, and fore-legs; attended sometimes with a short dry cough, and a shivering when handled in those parts.

Bleeding, soft pectorals, attenuants, and gentle purges, are the internal remedies; and, externally, the parts affected may be bathed with equal parts of spirit of sal armoniac and ointment of marshmallows or oil of camomile.

These outward inflammations frequently fall into the inside of the fore-leg, and sometimes near the shoulder; forming abscesses, which terminate the disorder.

The membrane which separates the lungs, and more particularly the diaphragm or midriff, is often also inflamed; which is scarce to be distinguished from the pleurisy, only in this, that when the midriff is greatly inflamed, the horse will sometimes be jaw-set, and his mouth so much closed that nothing can be got in; but the method of cure is the same.

SECT. VI. Of a Cough, and Asthma.

THE consequence often of the preceding disorders injudiciously treated, are settled habitual coughs; which frequently degenerate into asthmas and broken-wind.

Nothing has more perplexed practitioners than the cure of settled coughs; the cause of which, perhaps, has been their want of attention to the different symptoms which distinguish one cough from another; for without strict observance thereof, it is impossible to find out the true method of cure.

Thus, if a horse's cough is of long standing, attended with loss of appetite, wasting of flesh, and weakness, it denotes a consumption; and that the lungs are full of knotty, hard substances, called tubercles, which have often been discovered on dissection.

The following signs denote when the cough proceeds from phlegm and slimy matter that stop up the vessels of the lungs.

The horse's flanks have a sudden quick motion; he breathes thick, but not with his nostrils open like a horse in a fever or that is broken-winded; his cough is sometimes dry and husky, sometimes moist, before which he wheezes, rattles in the throat, and sometimes throws out of his nose and mouth great gobs of white phlegm, especially after drinking, or when he begins or ends his exercise, which discharge commonly gives great relief. Some such horses wheeze and rattle to such a degree, and are so thick-winded, that they can scarce move on, till they have been out some time in the air; though then they will perform beyond expectation.

The above asthmatic case proves often very obstinate; but, if it happens to a young horse, and the cough is not of long standing, it is greatly relieved, if not totally cured, by the following method.

If the horse is full of flesh, bleed him plentifully; if low in flesh, more sparingly; which may occasionally be repeated, on very great oppressions and difficulty of breathing, in proportionate quantities.

As mercurial medicines are found remarkably useful in these cases, give a mercurial ball (with two drams of calomel) over night, and a common purge next morning; or the following, which is recommended by Mr Gibbon.

TAKE gum-galbanum, ammoniacum, and asa fetida,

of

of each two drams, fine aloes one ounce, saffron one dram, oil of anniseeds two drams, oil of amber one dram; with honey enough to form into a ball.

They may be repeated at proper intervals, with the usual cautions. In the intermediate days, and for some time after, one of the following balls may be given every morning.

TAKE cinnabar of antimony, finely levigated, six ounces; gum ammoniacum, galbanum, and asa fetida, of each two ounces; garlic four ounces; saffron half an ounce: make into a paste for balls, with a proper quantity of honey.

TAKE of the pectoral or cordial ball one pound, balsam of Peru half an ounce, balsam of sulphur annisified one ounce, flowers of benjamin half an ounce, honey as much as is sufficient to form them into a paste; give the size of a pigeon's egg every morning.

Exercise in a free open air is very serviceable, and the diet should be moderate.

The following are the symptoms of a dry cough, or asthma.

The horse afflicted with this cough eats heartily, hunts and goes through his business with alacrity, appears well coated, and has all the signs of perfect health; yet he coughs at particular times almost incessantly, without throwing up any thing, except that the violence of the cough will cause a little clear water to distil from his nose. Though this cough is not periodical, yet some of these horses cough most in a morning, after drinking.

This may properly be styled a *nervous asthma* in a horse, as probably it chiefly affects the nerves in the membranous parts of the lungs and midriff; and is a case very doubtful at least, if not incurable: but when the horse is young, the following method may be successful.

Take away first a moderate quantity of blood; then give him two drams of calomel, mixed up with an ounce of diapente, for two nights; and the next morning a purging ball. Keep him well clothed and littered, and feed him with scalded bran and warm water.

Once in eight or ten days this purge may be repeated, with one mercurial ball only, given over night.

The following balls may then be taken, one every day, about the size of a pullet's egg, the horse fasting two hours afterwards; and should be continued two months or longer, to be of real service.

TAKE native cinnabar, or cinnabar of antimony, half a pound; gum guaiacum four ounces; myrrh, and gum armoniac, of each two ounces; Venice soap half a pound: the cinnabar must be finely levigated, as before observed, and the whole mixed up with honey, or oxymel squills.

The following also will be found a useful remedy in obdurate dry coughs.

TAKE gum ammoniacum, squills, and Venice soap, of each four ounces; balsam of sulphur with anniseeds one ounce; beat up into a mass, and give as the former.

Before we close this section, it may be necessary to observe here, that some young horses are subject to coughs on cutting their teeth; their eyes also are affected from the same cause. In these cases, always bleed; and if the cough is obdurate, repeat it, and

give warm mashes; which, in general, are alone sufficient to remove this complaint.

SECT. VII. Of a Broken Wind.

THIS disorder hitherto seems to have been little understood; but Mr Gibson is inclined to think, that the source of it is frequently owing to injudicious or hasty feeding of young horses for sale; by which means the growth of the lungs, and all the contents within the chest, are so increased, and in a few years so preternaturally enlarged, that the cavity of the chest is not capacious enough for them to expand themselves in and perform their functions.

A narrow contracted chest with large lungs may sometimes naturally be the cause of this disorder: and it has been observed, that horses rising eight years old are as liable to this distemper, as, at a certain period of life, men are to fall into asthma, consumptions, and chronic diseases.

The reason why this disorder becomes more apparent at this age, may be, that a horse comes to his full strength and maturity at this time; at six, he commonly finishes his growth in height; after that time he lets down his belly and spreads, and all his parts are grown to their full extent; so that the pressure on the lungs and midriff is now more increased.

But how little weight these reasons may have, repeated dissections have given ocular proofs of a preternatural largeness, not only of the lungs of broken-winded horses, but of their heart and its bag, and of the membrane which divides the chest; as well as of a remarkable thinness in the diaphragm, or midriff.

This disproportion has been observed to be so great, that the heart and lungs have been almost of twice their natural size, perfectly found, and without any ulceration whatever, or any defect in the wind-pipe or its glands.

Hence it appears, that this enormous size of the lungs, and the space they occupy, by hindering the free action of the midriff, is the chief cause of this disorder: and as the substance of the lungs was found more fleshy than usual, they of course must lose a great deal of their spring and tone.

Whoever considers a broken-wind in this light, must own that it may be reckoned among the incurable distempers of horses; and that all the boasted pretensions to cure are vain and frivolous, since the utmost skill can amount to no more than now and then palliating the symptoms, and mitigating their violence.

We shall therefore only lay down such methods as may probably prevent this disorder, when pursued in time. But if they should not succeed, we shall offer some remedies and rules to mitigate its force, and make a horse as useful as possible under this malady.

It is usual, before a broken wind appears, for a horse to have a dry obdurate cough, without any visible sickness or loss of appetite; but, on the contrary, a disposition to food feeding, eating the litter, and drinking much water.

In order then to prevent, as much as possible, this disorder, bleed him, and give him the mercurial physic above prescribed, which should be repeated two or three times.

The following balls are then to be taken for some time, which have been found extremely efficacious in

[b] removing

Of a
Broken-
Wind.

removing obstinate coughs.

TAKE aurum mosaicum, finely powdered, eight ounces; myrrh and elcampane, powdered, each four ounces; anniseeds and bay-berries, each an ounce; saffron, half an ounce; and make into balls with oxymel squills.

The aurum mosaicum is made of equal parts of quick-silver, tin, sal armoniac, and sulphur. We give this medicine as strongly recommended by Mr Gibbon; but how far the aurum mosaicum may contribute to its efficacy, may perhaps justly be disputed: as a substitute in its room, therefore, for this purpose, we recommend the same quantity of powdered squills, or gum ammoniacum, or equal parts of each.

Broken-winded horses should eat sparingly of hay, which as well as their corn may be wetted with chamber ley, or fair water; as this will make them less craving after water.

The volatile salts in the urine may make it preferable to water, and may be the reason why garlick is found so efficacious in these cases; two or three cloves given at a time in a feed, or three ounces of garlick bruised, and boiled in a quart of milk and water, and given every other morning for a fortnight, having been found very serviceable; for by warming and stimulating the solids, and dissolving the tenacious juices which choke up the vessels of the lungs, these complaints are greatly relieved.

Careful feeding, and moderate exercise, has greatly relieved broken-winded horses.

Horses sent to graze in order to be cured of an obstinate cough, have often returned completely broken-winded, where the pasture has been rich and succulent, so that they have had their bellies constantly full. As the ill consequence therefore is obvious, where you have not the conveniency of turning out your horse for a constancy, you may foil him for a month or two with young green barley, tares, or any other young herbage.

To purify thick-winded horses, Barbadoes and common tar have often been given with success to the quantity of two spoonfuls mixed with the yolk of an egg, dissolved in warm ale, and given fasting two or three times a-week, especially those days you hunt or travel.

But in order to make all these sorts of horses of any real service to you, the grand point is to have a particular regard to their diet, observing a just economy both in that and their exercise; giving but a moderate quantity of hay, corn, or water, at a time, and moistening the former, to prevent their requiring too much of the latter, and never exercising them but with moderation, as has before been observed. The following alterative ball may be given once a-fortnight or three weeks; and as it operates very gently, and requires no confinement but on those days it is given (when warm meat and water are necessary), it may be continued for two or three months.

TAKE fœcotorine aloes six drams; myrrh, galbanum, and ammoniacum, of each two drams; bay-berries half an ounce: make into a ball with a spoonful of oil of amber, and a sufficient quantity of syrup of buckthorn.

SECT. VIII. *Of a Consumption.*

When a consumption proceeds from a defect in a

horse's lungs or any principal bowel, the eyes look dull; the ears and feet are mostly hot; he coughs sharply by fits; sneezes much, and frequently groans with it; his flanks have a quick motion; he gleans often at the nose, and sometimes throws out a yellowish curdled matter; and he has little appetite to hay, but will eat corn, after which he generally grows hot.

As to the cure, one of the principal things is bleeding in small quantities (a pint, or pint and half, from some horses is sufficient), which should be repeated as often as the breath is more than ordinarily oppressed. Pectorals may be given to palliate present symptoms; but as dissections have discovered both the glands of the lungs and mesentery to be swelled, and often indurated, the whole stress lies on mercurial purges, and the following ponderous alternatives, given intermediately.

TAKE native cinnabar, or cinnabar of antimony, one pound, powdered very fine, and add the same quantity of gum guaiacum and nitre; give the horse an ounce of this powder twice a-day, wetting his feeds.

The spring graze is often extremely serviceable; but the salt marshes are to be preferred, and to be more depended on than medicines; for great alterations are thereby made in the blood and juices, and no small benefit arises from open air and proper exercise.

SECT. IX. *Of an Apoplexy or Staggers, Convulsive Disorders, Lethargy, Epilepsy, and Palsy.*

FARRIERS generally include all distempers of the head under two denominations, viz. *stagger* and *convulsion*, wherein they always suppose the head primarily affected. But in treating these disorders, we will distinguish between those that are peculiar to the head, as having their source originally thence; and those that are only concomitants of some other disease.

In an apoplexy a horse drops down suddenly, without other feise or motion than a working at his flanks.

The previous symptoms are, drowiness; watery eyes, somewhat full and inflamed; a disposition to reel; feebleness; a bad appetite; the head almost constantly hanging, or resting on the manger; sometimes with little or no fever, and scarce any alteration in the dung or urine; the horse is sometimes disposed to rear up, and apt to fall back when handled about the head; which is often the case with young horses, to which it does not suddenly prove mortal, but with proper help they may sometimes recover. If the apoplexy proceeds from wounds or blows on the head, or matter on the brain; besides the above symptoms, the horse will be frantic by fits, especially after his feeds, so as to start and fly at every thing. These cases seldom admit of a perfect recovery; and when horses fall down suddenly, and work violently at their flanks, without any ability to rise after a plentiful bleeding, they seldom recover.

All that can be done is to empty the vessels as speedily as possible, by striking the veins in several parts at once, bleeding to four or five quarts; and to raise up the horse's head and shoulders, supporting them with plenty of straw. If he survives the fit, cut several rowels; give him night and morning glysters prepared with a strong decoction of fenna and salt, or the purging glyster mentioned in the directions; blow once a-day up his nostrils a dram of powder of asarabacca, which will promote a great discharge; afterwards two

Of a
Consumption,
&c.

Of an
Apoplexy,
&c.

Of a
Lethargy,
&c.

or three aloetic purges should be given; and to secure him from a relapse, by attenuating and thinning his blood, give him an ounce of equal parts of antimony and crocus metallorum for a mouth; or, which is preferable, the same quantity of cinnabar of antimony and gum guaiacum.

If the fit proceeds only from fulness of blood, high feeding, and want of sufficient exercise, or a fizy blood (which is often the case with young horses, who though they reel, stagger, and sometimes suddenly fall down, yet are easily cured by the above method), an opening diet with scalded bran and barley will be necessary for some time; and the bleeding may be repeated in small quantities.

As to the other disorders of the head, such as lethargy or sleeping evil, epilepsy or falling-sickness, vertigo, frenzy, and madness, convulsions, and paralytical disorders, as they are most of them to be treated as the apoplexy and epilepsy, by bleeding and evacuations, with the alteratives there directed, we shall wave treating of them separately; but mention some particular rules to distinguish them, according to the plan we laid down; and then offer some general remedies for the several purposes.

In an epilepsy, or falling sickness, the horse reels and staggers, his eyes are fixed in his head, he has no sense of what he is doing, he stales and dungs insensibly, he runs round and falls suddenly; sometimes he is immovable, with his legs stretched out as if he was dead, except only a quick motion of his heart and lungs, which causes a violent working of his flanks; sometimes he has involuntary motions, and shaking of his limbs, so strong, that he has not only beat and spurned his litter, but the pavement with it; and with these alternate symptoms a horse has continued more than three hours, and then has as surprisingly recovered: at the going off of the fit, he generally foams at the mouth, the foam being white and dry, like what comes from a healthful horse when he champs on the bit.

But in all kinds of gripes, whether they proceed from disorders in the guts, or retention of urine, a horse is often up and down, rolls and tumbles about; and when he goes to lie down, generally makes several motions with great seeming carefulness, which shews he has a sense of his pain; and if he lays stretched out for any time, it is generally but for a short space.

Epilepsies and convulsions may arise from blows on the head, too violent exercise, and hard straining; and from a fulness of blood, or impoverished blood, and surfeits; which are some of the causes that denote the original disorder.

In lethargic disorders, the horse generally rests his head with his mouth in the manger, and his pole often reclined to one side; he will shew an inclination to eat, but generally falls asleep with his food in his mouth, and he frequently swallows it whole without chewing: emollient glysters are extremely necessary in this case, with the nervous balls recommended for the staggers and convulsions; strong purges are not requisite, nor must you bleed in too large quantities, unless the horse be young and lusty. In old horses, rowels and large evacuations are improper; but volatiles of all kinds are of use, when they can be afforded: the alterative purge mentioned at the end of this section may be given, and repeated on amendment.

This dilemma is to be cured by these means, if the horse is not old and past his vigour. It is a good sign if he has a tolerable appetite, and drinks freely without flabbering, and if he lies down, and rises up carefully, though it be but seldom.

But if a lethargic horse does not lie down; if he is altogether stupid and careless, and takes no notice of any thing that comes near him; if he dungs and stales seldom, and even while he sleeps and dozes; it is a bad sign: if he runs at the nose thick white matter, it may relieve him; but if a viscid gleet, that sticks to his nostrils like glue, turn to a profuse running of rosy, reddish and greenish matter, it is an infallible sign of a great decay of nature, and that it will prove deadly.

Young horses from four to six years, are very subject to convulsions, from bots in the spring; and the large coach breed, more than the saddle. They are seized without any previous notice; and if bots and worms are discovered in their dung, the cause seems to be out of doubt, more especially if they have lately come out of a dealer's hands.

When this convulsion proceeds from a distemperature of the midriff, or any of the principal bowels, it is to be distinguished from bots and vermin by previous symptoms: the horse falls off his stomach, and grows gradually weak, feeble, and dispirited in his work, and turns short-breathed with the least exercise.

The lively description of that universal cramp or convulsion, called by some the *flag-evil*, which seizes all the muscles of the body at once, and locks up the jaws, so that it is impossible almost to force them open, we shall give in Mr Gibbon's own words, who says: As soon as the horse is seized, his head is raised with his nose towards the rack, his ears pricked up, and his tail cocked, looking with eagerness as an hungry horse when hay is put down to him, or like a high-spirited horse when he is put upon his mettle; insumuch, that those who are strangers to such things, when they see a horse stand in this manner, will scarce believe any thing of consequence ails him; but they are soon convinced, when they see other symptoms come on apace, and that his neck grows stiff, cramped, and almost immovable: and if a horse in this condition lives a few days, several knots will arise on the tendinous parts thereof, and all the muscles both before and behind will be so much pulled and cramped, and so stretched, that he looks as if he was nailed to the pavement, with his legs stiff, wide, and straddling; his skin is drawn so tight on all parts of the body, that it is almost impossible to move it; and if trial be made to make him walk, he is ready to fall at every step, unless he be carefully supported; his eyes are so fixed with the inaction of the muscles, as give him a deadness in his looks; he snorts and sneezes often, pants continually with shortness of breath; and this symptom increases continually till he drops down dead; which generally happens in a few days, unless some sudden and very effectual turn can be given to the distemper.

In all these cases the horse should first be bled plentifully, unless he is low in flesh, old, or lately come off any hard continued duty; then you must be more sparing of his blood: afterwards give the following ball.

Take asa fetida half an ounce, Russia castor powdered two drams, valerian root powdered one ounce; make into a ball with honey and oil of amber.

This ball may be given twice a-day at first; and then once, washed down with a decoction of mistletoe or valerian sweetened with liquorice or honey: an ounce of asa fetida may be tied up in a piece of strong coarse linen rag, and put behind his grinders to champ on.

The laxative purges and emollient glysters should be given immediately to keep the body open; but when the former balls have been taken a week or ten days, the following may be given once a-day with the valerian decoction.

TAKE cinnabar of antimony six drams; asa fetida half an ounce; aristolochia, myrrh, and bay-berries, of each two drams; make into a ball with treacle and oil of amber.

This is the most effectual method of treating these disorders; but when they are suspected to arise from bots, and worms, which is generally the case, mercurial medicines must lead the way, thus:

TAKE mercurius dulcis and philonium, of each half an ounce; make into a ball with conferves of roses, and give the horse immediately; half the quantity may be repeated in four or five days.

The following infusion should then be given, to the quantity of three or four horns, three or four times a-day, till the symptoms abate; when the above nervous balls may be continued till they are removed.

TAKE penny-royal and rue of each two large handfuls, camomile flowers one handful, asa fetida and castor of each half an ounce, saffron and liquorice-root sliced of each two drams; infuse in two quarts of boiling water; pour off from the ingredients as wanted.

If the castor is omitted, add an ounce of asa fetida.

The following ointment may be rubbed into the cheeks, temples, neck, shoulders, spine of the back, and loins, and where-ever there is the greatest contractions and stiffness.

TAKE nerve and marshmallow ointment of each four ounces, oil of amber two ounces, with a sufficient quantity of camphorate spirit of wine; make a liniment.

When the jaws are so locked up that medicines cannot be given by the mouth, it is more eligible to give them by way of glyster: for forcing open the jaws by violence often puts a horse into such agonies, that the symptoms are thereby increased.

In this case also he must be supported by nourishing glysters, made of milk-pottage, broths, &c. which must be given to the quantity of three or four quarts a-day: glysters of this kind will be retained, and absorbed into the blood; and there have been instances of horses thus supported for three weeks together, who must otherwise have perished.

Mr Gibbon mentions some extraordinary instances of success in cases of this sort by these methods, and repeated frictions, which are extremely serviceable in all convulsive disorders, and often prevent their being jaw-set; they should be applied with unwearied diligence every two or three hours, where-ever any stiffness or contractions in the muscles appear; for a horse in this condition never lies down till they are in some measure removed.

The use of rowels in these cases is generally unsuccessful, the skin being so tense and tight, that they seldom digest kindly, and sometimes mortify; so that if

they are applied they should be put under the jaws, and in the breast.

Theried-hot iron so frequently run through the forehead and mane, near the occipital bone, for this purpose, has often been found to have destroyed the cervical ligament.

In paralytic disorders, where the use of a limb or limbs is taken away, the internals above recommended should be given, in order to warm, invigorate, and attenuate the blood; and the following stimulating embrocation should be rubbed into the parts affected.

TAKE oil of turpentine four ounces, nerve ointment and oil of bays of each two ounces, camphor rubbed fine one ounce, rectified oil of amber three ounces, tincture of cantharides one ounce.

With this liniment the parts affected should be well bathed for a considerable time, to make it penetrate; and when the hind parts chiefly are lame, the back and loins should be well rubbed with the same. To the nervous medicines above recommended, may be added snake-root, contrayerva, mustard-feed, horse-radish root steeped in strong beer, or wine where it can be afforded. Take the following for an example, which may be given to the quantity of three pints a-day alone, or two horns full may taken after the nervous balls.

TAKE snake-root, contrayerva, and valerian, of each half an ounce; mustard-feed and horse-radish root scraped, of each two ounces; long pepper two drams: infuse in three pints of strong wine.

When the horse is recovering from any of the above disorders, the following alterative purge may be repeated two or three times, as it operates very gently.

TAKE socotrine aloes one ounce, myrrh half an ounce, asa fetida and gum ammoniacum of each two drams, saffron one dram; make into a ball with any syrup.

Where a retention of dung is the cause of this disorder, the great gut should first be raked thoroughly with a small hand, after which plenty of emollient oily glysters should be thrown up, and the opening drink given, till the bowels are thoroughly emptied of their imprisoned dung. Their diet should for some days be opening, and consist chiefly of scalded bran, with flour of brimstone, scalded barley, &c.

SECT. X. *Of the Strangles, and Vives.*

1. The strangles is a distemper to which colts and young horses are very subject; and begins with a swelling between the jaw-bones, which sometimes extends to the muscles of the tongue; and is attended with fo great heat, pain, and inflammation, that sometimes, till matter is formed, the horse swallows with the utmost difficulty.

The symptoms are, extraordinary heat and feverishness, with a painful cough, and a great inclination to drink without being able; some horses losing their appetite entirely, others eating but little, by reason of the pain which chewing and swallowing occasions: when the swelling begins on the inside of the jaw-bones, it is much longer in coming to matter than when more to the middle; when it arises among the glands, and divides into several tumours, the cure is generally tedious, as it breaks in different places; and when it forms upwards on the wind-pipe and gullet, there is sometimes danger of suffocation, unless the swelling soon

foen breaks. But the most dangerous kind is, when, besides the above symptoms, the horse runs at the nose; this is by some called the *bastard strangles*.

As this disorder seems to be critical, the most approved method is to assist nature in bringing the swellings to maturity, by keeping them constantly moist with ointment of marshmallows, and covering the head and neck with a warm hood. But as all swellings in glandular parts suppurate slowly, the following poultice may be applied hot twice a-day.

TAKE leaves of marshmallows ten handfuls, white-lily root half a pound, linseed and fenugreek-seed bruised of each four ounces: boil them in two quarts of water till the whole is pulpy; and add four ounces of ointment of marshmallows, and a sufficient quantity of hogs-lard, to prevent its growing stiff and dry.

In five or six days, by these means, the matter is generally formed, and makes its way through the skin; and if the discharge is made freely and with ease, the opening need not be enlarged; but should be dressed with the following ointment spread on tow, till continuing the poultice over it to promote the digestion, and prevent any remaining hardness.

TAKE rosin and Burgundy pitch of each a pound and a half, honey and common turpentine each eight ounces, yellow wax four ounces, hogs-lard one pound, verdigrease finely powdered one ounce; melt the ingredients together, but do not put in the verdigrease till removed from the fire; and it should be stirred in by degrees, till the whole is grown stiff and cool.

If the fever and inflammation run high, and the swelling be so situated as to endanger suffocation, a moderate quantity of blood must be taken away, and the remainder diluted with plenty of water-gruel, or warm water, mashes, &c.

The running at the nose which often attends the strangles is dangerous, especially if it continues after they have ripened and broke, as the horse will be greatly weakened thereby. To prevent this waste and decay, give him every day for some time an ounce of Jesuit's bark; or a strong decoction of guaiacum shavings, which hath been found extremely beneficial in restraining these glandular discharges when too liberal, and in drying up ulcers of all kinds in horses.

If a hardness remains after the forces are healed up, they may be anointed with the mercurial ointment; and when the horse has recovered his strength, purging will be necessary.

2. The vives or ives differ from the strangles only in this; that the swellings of the kernels under the ears of the horse, (which are the parts at first chiefly affected), seldom gather, or come to matter, but by degrees perspire off and disperse by warm cloathing, anointing with the marshmallow ointment, and a moderate bleeding or two. But should the inflammation continue notwithstanding those means, a suppuration must be promoted by the methods above recommended in the strangles.

When these swellings appear in an old or full-aged horse, they are signs of great malignity, and often of an inward decay, as well as forerunners of the glanders.

The mercurial ointment above-mentioned, may be prepared thus:

TAKE of crude mercury or quicksilver one ounce, Venice turpentine half an ounce; rub together in a mortar till the globules of the quicksilver are no longer visible; then add two ounces of hogs-lard.

SECT. XI. Of the Diseases of the Eyes.

1. In order to make the disorders of the eyes well understood, we shall consider them as arising from different causes; external injuries affecting the globe of the eye; and from internal causes affecting the humours within the globe. We shall consider also the eye as naturally weak from a bad conformation, which possibly may often be hereditary.

2. In all recent disorders of the eye from external injuries, such as blows, bites, &c. attended with a swelling of the lid, and a running from the eye, you must first sponge the part often with cold spring-water and vinegar; and if much swelled, bleed immediately, and apply over it a poultice made of the pulps of roasted or boiled apples, cleared from their seeds and husks; or of conserve of roses and vinegar, with a little holt, and the white of an egg. When the swelling is abated, either of the following washes will complete the cure.

TAKE white vitriol half an ounce, sugar of lead two drams; dissolve in a pint of spring-water; to which may occasionally be added, when the rheum is very great, and inflammation removed, half an ounce of tutty or compound powder of cerus.

3. Let the eye and eyelid be bathed three or four times a-day with a clean sponge dipped in this wash; or it may be applied with a feather, leaving a few drops on the eye. When the veins under the eye have been turgid, opening them with a lancet has often been found successful.

4. Mr Gibson, from his own experience, recommends the following, with which alone he has succeeded in most common cases.

TAKE two drams of rose-buds, infuse them in half a pint of boiling water; when cold, pour off the infusion, and add to it twenty grains of sugar of lead.

This is to be used as the former; but the quantity of sugar of lead may occasionally be increased.

5. Sometimes from the violence of the inflammation, succeeding blows, and external injuries, the coats of the eye shall lose their transparency, thicken, and turn white or of a pearl-colour: in the latter case, the horse has some glimmering of light; in the former, he is blind while the eye continues in this state.

6. If the horse be fleshy and of a gross constitution, bleeding may be repeated, and a rowel will be necessary; let his diet be scalded bran or barley; avoiding for some days oats, beans, or any thing hard to chew.

The cooling opening drink, (p. 5. col. 2. par. 4.) should be given every other day, which will answer better than aloetic purges.

7. If the eyelids continue swelled and moist, and the under side of the eye inflamed, an ounce of honey may be added to four ounces of the above waters; or the part may be well bathed with an ounce of honey of roses, and half a dram of sugar of lead, dissolved in three ounces of spring-water: to which may be added, when the eye is very watery, a spoonful or two of red wine, which will help to thicken the matter and dry it up.

Diseases of
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the Eyes.

8. If a film or thick slough should remain, it may be taken off, by blowing into the eye equal parts of white vitriol and sugar-candy finely powdered.

Glass finely powdered, mixed up with honey and a little fresh butter, is much recommended by Dr Bracken for this purpose; as also the following ointment.

TAKE ointment of tully one ounce, honey of roses two drams, white vitriol burnt one scruple; this, with a feather, may be smeared over the eye twice a-day.

9. Let it be remembered, that it has long been observed in practice, that the eye in its first state of inflammation is so very tender, that the eye-waters prepared with tully and other powders aggravate the disorder; consequently, during this state, the tinctures of vegetables and solutions of salts are greatly preferable.

10. Wounds of the eye may be dressed with honey of roses alone, or with a little sugar of lead mixed with it; adding thereto, after a few days, an eighth part of tincture of myrrh; all the preceding directions in regard to inflammation being attended to, especially bleeding, rowels, and gentle cooling physic.

11. When the humours of the eye are thickened, and the disorder is within the globe, sharp external applications are not only useless, but extremely detrimental by the irritation they occasion, and consequently should be avoided.

12. In all cases of this sort, whether moon-eyes, which are only cataracts forming, or in confirmed ones attended with a weeping; general evacuations, with internal alteratives, can only take place.

These generally make their appearance, when a horse is turned five coming fix; at which time one eye becomes clouded, the eyelids being swelled, and very often shut up; and a thin water generally runs from the diseased eye down the cheek, so sharp as sometimes to excoriate the skin; the veins of the temple, under the eye, and along the nose, are turgid and full: though sometimes it happens that the eye runs but little.

This disorder comes and goes till the cataract is ripe; then all pain and running disappears, and the horse becomes totally blind, which is generally in about two years. During this time some horses have more frequent returns than others; which continue in some a week or more, in others three or four; returning once in two or three months, and they are seldom so long as five without a relapse.

13. There is another kind of moon-blindness which is also the forerunner of cataracts, where no humour or weeping attends. The eye is never shut up or closed here, but will now and then look thick and troubled, at which time the horse sees nothing distinctly: when the eyes appear sunk and perishing, the cataracts are longer coming to maturity; and it is not unusual in this case for one eye to escape.

These cases generally end in blindness of one if not of both eyes; the most promising signs of recovery are when the attacks come more seldom, and their continuance grows shorter, and that they leave the cornea clear and transparent, and the globe plump and full.

14. The attempts to cure the cataracts have hitherto been only palliative and mitigating the symptoms; yet early care has sometimes been successful. To this end the horse should be rowel'd and bled at proper intervals; except where the eyes appear sunk and perishing, where

it is often pernicious. During the violence of the symptoms, observe the cooling treatment above recommended, giving him two ounces of nitre every day mixed into a ball with honey; and bathe the parts above the eye with verjuice, or vinegar, wherein rose-leaves are infused; to four ounces of which, half a dram of sugar of lead may be added. The swelling on the lid may afterwards be bathed with a sponge dipped in equal parts of lime and Hungary water, mixed together: the cooling physic, (p. 3. col. 1. par. 4. from bottom) should be given every fourth day, till the eye becomes clear, and recovers, its usual brightness. The following is also very proper physic for this purpose.

TAKE lenitive electuary and cream of tartar of each four ounces, Glauber's salts three ounces, syrup of buckthorn two ounces.

When the weeping is by these means removed, the alterative powders (See the section, OF ALTERATIVE MEDICINES) should be given every day, till two or three pounds are taken, and after an interval of three months the same course should be repeated. This method has often been attended with good success, where the eyes have been full, and no way perished; in that case, bathe or foment them with the following, twice a-day.

TAKE crude sal armoniac two drams, dissolve in a pint of lime-water, and add to it four ounces of brandy or Hungary water.

This will act as a stimulus, and may help to thin and rarify the gummy juices, and bring new supplies of nourishment to the perishing eyes.

This course not succeeding, in order more powerfully to open the vessels of the crystalline humour, (which in these cases is always found opaque, and, when the cataract is confirmed, entirely loses its transparency,) and hinder as much as possible the forming of obstructions, mercurials are chiefly to be depended on: thus give every other day, for three or four mornings, two drams of calomel, mixed up with conserve of roses; and then purge off with the common ball.

During this course, particular care should be taken of the horse: after repeating this, the alterative powders before-mentioned should be given for some weeks or months if you expect any benefit from them; or they may be beat up into a ball with live millepedes, and an ounce and a half given every day; if these should not succeed, and the horse is a valuable one, the turbithe course recommended in the section on alteratives seems to be the most promising method left. But to horses that are not so, an ounce of antimony, ground into an impalpable powder, may be given every day in one of his feeds for three months or longer; or a strong decoction of guaiacum shavings may be given for some time, to which crude antimony may be added, in the following manner.

TAKE guaiacum shavings one pound, crude antimony tied in a rag the same quantity; boil in two gallons of forge-water to one, and give a quart a day, either alone, or mixed with his water.

15. The haws is a swelling and sponginess that grows in the inner corner of the eye, so large sometimes as to cover a part of the eye. The operation here is easily performed by cutting part of it away; but the farriers are apt to cut away too much: the wound may be dressed with honey of roses; and if a fungus or spongy flesh arises, it should be sprinkled with burnt alum, or touched

touched with blue vitriol.

SECT. XII. *Of the Glanders.*

THE cause and seat of the glanders has till lately been so imperfectly handled, and so little understood by the writers of this distemper, that it is no wonder it should be ranked among the incurables: but a new light having been thrown on this whole affair by the study of M. La Fosse, the king of France's farrier, who has been at the pains to trace out, and discover, by dissections, the source and cause of this disorder; we hope the method he has proposed, with some further experiments and improvements, will soon bring to a certainty of cure (in most cases at least) a distemper so dangerous to our horses, and that hitherto has eluded the force of art.

M. de la Fosse has distinguished seven different kinds of glanders, four of which are incurable.

The first proceeds from ulcerated lungs, the purulent matter of which comes up the trachea, and is discharged through the nostrils, like a whitish liquor, sometimes appearing in lumps and grumes: in this disorder, though the matter is discharged from the nostrils, yet the malady is solely in the lungs.

The second is a wasting humour, which usually seizes horses at the decline of a disease, caused by too hard labour; this defluxion also proceeds from the lungs.

The third is a malignant discharge, which attends the strangles sometimes, and falls upon the lungs, which runs off by the nostrils.

The fourth is, when an acrimonious humour in the farcy seizes these parts, where it soon makes terrible havoc.

The fifth kind we shall describe by and by, as arising from taking cold.

The sixth kind is a discharge from the strangles, which sometimes vents itself at the nostrils.

These are the various disorders which have been observed sometimes to throw matter out from the nostrils; let us now describe the real glanders.

The matter, then, discharged from the nostrils of a glandered horse, is either white, yellow, or greenish, sometimes streaked or tinged with blood: when the disease is of long standing, and the bones are fouled, the matter turns blackish, and becomes very fetid; and is always attended with a swelling of the kernels or glands under the jaws; in every other respect the horse is generally healthy and sound, till the distemper has been of some continuance.

It is always a bad sign when the matter sticks to the inside of the nostrils like glue or stiff paste; when the inside of the nose is raw, and looks of a livid or lead colour; when the matter becomes bloody, and stinks; and when it looks of an ash-colour. But when only a limpid fluid is first discharged, and afterwards a whitish matter, the gland under the jaw not increasing, and the disorder of no long continuance, we may expect a speedy cure; for in this case, which arises from taking cold after a horse has been overheated, the pituitary membrane is but slightly inflamed, the lymph in the small vessels condensed, and the glands overloaded, but not yet ulcerated.

From these symptoms, and some observations made both by Bracken and Gibbon, it is plain they were not absolute strangers to the seat of this disorder, though

they neglected pushing their inquiries to the fountain-head, and consequently were at a loss to know how to apply the remedy to the parts affected.

But our author, after examining by dissection the carcases of glandered horses, and making a strict scrutiny into the state of the viscera, assited for that purpose by ingenious and expert anatomists, for ten years together, affirms this disease to be altogether local; and that the true seat of it is in the pituitary membrane which lines the partition along the inside of the nose, the maxillary sinuses or cavities of the cheek-bones on each side the nose, and the frontal sinuses or cavities above the orbits of the eyes. That the viscera, as liver, lungs, &c. of glandered horses, are in general exceeding sound; and consequently that the seat of this disorder is not in those parts, as has been asserted by most authors. Nor indeed is it probable it should: for how could such horses preserve their appetite, their good appearance, sleek and shining coats; in a word, all the signs of health, for many years together (which many glandered horses are known to enjoy), with such distempered bowels?

But on nicely examining the heads of such horses, he found the cavities above-mentioned more or less filled with a viscous slimy matter, and the membrane which lines both them and the nostrils inflamed, thickened, and corroded with fordid ulcers, which in some cases had eat into the bones.

He observes, that when glandered horses discharged matter from both nostrils, both sides of the membrane and cavities were affected; but when they ran at one nostril only, that side only was found distempered.

It is a curious remark of our author, that the sublingual glands, or the kernels situated under the jaw-bone, which are always swelled in this distemper, do not discharge their lymph into the mouth, as in man, but into the nostrils; and that he constantly found their obstruction agreed with the discharge: if one gland only was affected, then the horse discharged from one nostril only; but if both were, then the discharge was from both.

The seat of this disorder thus discovered, our author with great ingenuity has paved the way for cure, by trepanning these cavities, and taking out a piece of bone, by which means the parts affected may be washed with a proper injection, and in fine the ulcers deterged, healed, and dried up.

But as, from the observations since made by this gentleman, there are different species of the glanders, so the cure of the milder kinds may first be attempted by injections and fumigations: thus, after taking cold, should a horse for 15 or 20 days discharge a limpid fluid or whitish matter from one or both nostrils, the glands under the jaw rather growing harder than diminishing, we may expect it will degenerate into a true glanders. To prevent which, after first bleeding, and treating him as we have directed for a cold, let an emollient injection, prepared with a decoction of linseed, marsh-mallows, elder, camomile flowers, and honey of roses, or such like, be thrown up as far as possible with a strong syringe, and repeated three times a-day; should the running not lessen or be removed in a fortnight by the use of this injection, a restraining one may now be prepared with tincture of roses, lime-water, &c. and the nostrils fumigated with the powders of frankincense, mastic,

maffich, amber, and cinnabar, burnt on an iron heated for that purpose; the fume of which may easily be conveyed through a tube into the nostrils.

This method has been found successful when used in time : but the methods of cure depend on the stubbornness of the disorder; and when inveterate, recourse must be had to the operation above described.

SECT. XIII. *Of the Colic or Gripes, and Pains in the Bowels, from sudden accidents.*

THERE seems to be no dilemma so little understood by the common farrier, as the colic or gripes in horses, one general remedy or method serving them in all cases : but as this disorder may be produced by very different causes, the method of cure must also vary; otherwise the intended remedy, injudiciously applied, will not only aggravate the complaint, but make it fatal. We shall divide this disorder into three different species; the flatulent or windy, the bilious or inflammatory, and the dry gripes; each of which we shall distinguish by their different symptoms, and then point out the proper remedies.

1. The flatulent or windy colic is thus known. The horse is often lying down, and as suddenly rising again with a spring; he strikes his belly with his hinder feet, stamps with his fore-feet, and refuses his meat; when the gripes are violent, he will have convulsive twitches, his eyes be turned up and his limbs stretched out as if dying, his ears and feet being alternately very hot and cold; he falls into profuse sweats, and then into cold damps; strives often to stale, and turns his head frequently to his flanks; he then falls down, rolls about, and often turns on his back; this last symptom proceeds from a stoppage of urine, that almost always attends this sort of colic, which may be increased by a load of dung pressing on the neck of the bladder.

These are the general symptoms of colic and gripes from wind, drinking cold water when hot, and when the perspirable matter is retained, or thrown on the bowels by catching cold; in all which cases they are violently distended. Cribbing horses are more particularly subject to this complaint, by reason they are constantly sucking in great quantities of air.

The first intention is to empty the strait gut with a small hand dipt in oil, which frequently makes way for the confined wind to discharge itself; and by easing the neck of the bladder, the suppression of urine is taken off, and the horse stales and gets ease.

The following ball and glyster seldom fail of giving relief in these cases.

TAKE Strasbourg or Venice turpentine, and juniper-berries pounded, of each half an ounce; salt-prunella or salt-petre, an ounce; oil of juniper, one dram; salt of tartar, two drams: make into a ball with any syrup; it may be given whole, and washed down with a decoction of juniper-berries, or a horn or two of ale.

If the horse does not break wind, or stale plentifully, he will find no relief: therefore in an hour or two give him another ball, and add to it a dram of salt of amber; which may be repeated a third time, if found necessary. During the fit the horse may be walked and trotted gently; but should by no means be harassed beyond his ability, or dragged about till he is jaded.

The following glyster may be given, between the

balls, or alone, and repeated occasionally.

TAKE camomile flowers two handfuls; annise, coriander, and fennel seeds, of each an ounce; long pepper half an ounce; boil in three quarts of water to two; and add Daffy's elixir, or gin, half a pint; oil of amber half an ounce, and oil of camomile eight ounces.

The signs of a horse's recovery, are his lying quiet, without starting, or tumbling, and his gathering up his legs, and ceasing to lash out; and if he continues an hour in this quiet posture, you may conclude all danger over.

2. The next species of colic we shall describe, is the bilious or inflammatory; which besides most of the preceding symptoms, is attended with a fever, great heat, panting, and dryness of the mouth: the horse also generally throws out a little loose dung, with a hot scalding water; which, when it appears blackish, or of a redish colour, and fetid smell, denotes an approaching mortification.

In this case the horse should immediately be bled to the quantity of three quarts; and it should be repeated, if the symptoms do not abate in a few hours. The emollient glyster, with two ounces of nitre dissolved in it, should be thrown up twice a-day, to cool the inflamed bowels; plenty of gum-arabic water should be taken, and a pint of the following drink given every two or three hours till several loose stools are procured, and then it should be given only night and morning till the disorder is removed.

TAKE fenna three ounces, salt of tartar half an ounce; infuse in a quart of boiling water an hour or two; then strain off, and add two ounces of lenitive electuary, and four of Glauber's salts.

If this disorder is not removed by these means, but the inflammation and fever increase, attended with a discharge of the flesh-coloured water above described, the event will most probably be fatal: and the chief thing to be depended on now, must be a strong decoction of Jesuit's bark, given to the quantity of a pint every three hours, with a gill of red port-wine.

A quart of the same may be used for a glyster, with two ounces of Venice turpentine, dissolved with the yolks of two eggs, an ounce of diacordium, and a pint of red wine, and given twice a-day: if the horse recovers, give two or three mild rhubarb purges.

3. The last we shall describe is the dry gripes, or the colic, which arises often from costiveness; it is discovered by the horse's frequent and fruitless motion to dung, the blackness and hardness of the dung, the frequent and quick motion of his tail, the high colour of his urine, and his great restlessness and uneasiness.

In this case the strait gut should be examined and emptied with a small hand oiled properly for that purpose; the emollient oily glyster (p. 4. col. 1. par. 2.) should be thrown up twice a-day; and the above purging drink given, till the bowels are unloaded, and the symptoms removed.

The diet for a horse in the gripes, should be scalded bran, warm water-gruel, or white water, made by dissolving four ounces of gum-arabic in a quart of water, and mixing it with his other water.

4. From this history and division of gripes and colics, with their different treatment, it appears how absolutely necessary it is they should be well understood, in order

Of the
Lax and
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order to be managed skilfully: it is plain too, that violent hot medicines should in every species of this disorder be guarded against, and given with great caution and discretion, even in the first kind of flatulent colic, where indeed they can only be wanted; yet too often, when prepared by the farriers with oil of turpentine, geneva, pepper, and brine, &c. they even increase that disorder, by stimulating the neck of the bladder, too forcibly heating the blood, and inflaming the bowels, till a mortification is brought on them. There are, in general, the constant appearances of horses that die of this disorder; whose bowels being examined for that purpose, have been found inflamed, full of red and livid spots, sometimes quite black, crisped with extreme heat, and rotten.

SECT. XIV. *Of the Lax and Scouring, with other Disorders of the Stomach and Bowels.*

It is sometimes a nice matter to form a proper judgment when to controul or encourage a looseness; but these general rules may be a direction: If a healthy full horse, on taking cold, or upon hard riding, overfeeding, eating unwholesome food, or with a slight fever, should have a moderate purging, by no means think of stopping it; but rather encourage it with an open diet, and plenty of warm gruel: but if it continues long, with gripings, the mucus of the bowels coming away, and the horse losing his appetite and flesh, it is then high time to give him proper medicines; if he voids great quantities of slime and greasy matter, give him the following drench, and repeat it every other day for three times.

TAKE lenitive electuary and cream of tartar of each four ounces, yellow rosin finely powdered one ounce, and four ounces of sweet oil; mix with a pint of water-gruel.

The following alterative ball alone has been found successful for this purpose when given twice a-week, with scalded bran and warm gruel.

TAKE socotorine aloes half an ounce, diapente one ounce; make into a ball with the juice of Spanish liquorice dissolved in water, and a spoonful of oil of amber.

To this may be added two drams of myrrh, and a dram of saffron, and (where it can be afforded) half an ounce of rhubarb.

When the purging is attended with a fever, rhubarb should first be given to the quantity of half an ounce, with an ounce and half of lenitive electuary; at night, after the working, give half an ounce or more of diascordium in a pint of red wine mulled with cinnamon; and repeat it every day, and the rhubarb-ball once in two or three.

But if the distemper increases, the horse's flanks and belly look full and distended, and he appears griped and in pain, let this glyster be given, and the quantity of diascordium increased an ounce in his night-drink.

TAKE camomile flowers one handful, red roses half a handful, pomegranate and balaustines of each an ounce; boil in two quarts of water to one; strain off, and dissolve in it two or three ounces of diascordium, and one of mithridate; to which may be added a pint of port wine: repeat it once a-day.

If the flux continues violent, give an ounce of rock-

alum, with an ounce and a half of bole, twice a-day; or, dissolve double this quantity with two ounces of diascordium, and the cordial ball, in two quarts of hartshorn drink; to which may be added a pint of port; and give the horse, three or four times a-day, a pint of this drink. For this purpose also a strong decoction of oak-bark may be given, with either of the above remedies, and to the same quantity; even by itself, it will be found on trial no inconsiderable remedy.

When the discharge is attended with an acrid mucus or slime, the griping and pains are very severe, the common lining of the bowels being washed away; in this case the following glyster should frequently be injected warm.

TAKE of tripe-liquor or thin starch two quarts, oil of olives half a pint, the yolk of six eggs well broke, and two or three ounces of coarse sugar.

Some horses, having naturally weak stomachs and bowels, throw out their aliment undigested; their dung is habitually soft and of a pale colour; they feed poorly, and get no flesh: to remedy this complaint, give the following purge two or three times; and then the infusion to the quantity of a pint every morning.

TAKE socotorine aloes six drams, rhubarb powdered three drams, myrrh and saffron each a dram; make into a ball with syrup of ginger.

Infusion.—TAKE zedoary, gentian, winters-bark, and orange-peel, of each two ounces; pomegranate-bark and balaustines of each an ounce; camomile-flowers and centaury, each a handful; cinnamon and cloves, each an ounce: infuse in a gallon of port or strong beer.

The bloody-flux is a distemper horses are not very subject to; however, as it sometimes does occur, whenever blood is discharged, attended with gripings and great pain in the bowels, if the flux is not speedily restrained the horse probably may be soon lost: we recommend therefore the following glyster and drink for that purpose.

TAKE oak-bark four ounces, tormentil-root two ounces, burnt hartshorn three ounces; boil in three quarts of forge-water to two; strain off, and add two ounces of diascordium, four ounces of starch, and half a dram of opium.

A glyster may also be prepared with the same quantity of fat broth, starch, and opium, in order to plaster over the coats of the bowels, and abate their violent irritations. Also,

TAKE soft chalk two ounces, mithridate or diascordium one ounce, powder of Indian-root half a dram, liquid laudanum 50 or 60 drops; dissolve in a pint of hartshorn drink, and add to it four ounces of cinnamon-water and red wine; give it twice a-day.

Gum-arabic dissolved in hartshorn drink, or in common water, should be the horse's usual drink.

When horses are apt to be colicive, from whatever cause it arises, gentle openers should be given; such as cream of tartar, Glauber's salts, and lenitive electuary: four ounces of any two of these dissolved in warm ale, whey, or water, given every other morning for two or three times, will answer this purpose; especially if assisted by an oily emollient glyster, prepared with a handful of salt. Scalded bran or barley, with an ounce of fenugreek and linseed, occasionally given, will prevent

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vent this complaint: but where it is constitutional, and proceeds from the power and force of digestion in the stomach and guts, as sometimes happens, and the horse is in perfect health, no inconvenience will arise from it; and it is observed that such horses are able to endure great fatigue and labour.

SECT. XV. Of Worms and Botts.

AUTHORS have described three different sorts of worms that affect horses, *viz.* *Botts*, which young horses are often troubled with in the spring; the *Rotundi*, or those resembling earth-worms; and the *Ascarides*, or those about the size of the largest sewing needle, with flat heads.

The botts which breed in the stomachs of horses, and are sometimes the cause of convulsions, appear to be very large maggots, composed of circular rings, with little sharp prickly feet along the sides of their bellies (like the feet of hog-lice), which by their sharpness (like the points of the finest needles) seem to be of use to fasten them to the part where they breed and draw their nourishment, and to prevent their being loosened from such adhesion before they come to maturity. The eggs from whence these botts are produced, are dispersed into clusters all round the lower orifice of the stomach, and are laid under the inner coat or thin membrane of the stomach; so that when the animals come to form and life, they burst through this inner coat with their breech and tail straight outwards, and their trunks so fixed into the muscular or fleshy coat of the stomach, that it sometimes requires a good pull to disengage them; from the blood of this last coat they draw their nourishment, which they suck like so many leeches, every one ulcerating and purging up the part where it fixes like a honey-comb; and they often make such quick havock, as to destroy the horse.

The symptoms of worms are various. The botts that many horses are troubled with in the beginning of the summer, are always seen sticking on the strait gut, and are often thrust out with the dung, with a yellowish coloured matter like melted sulphur: they are no ways dangerous there; but are apt to make a horse restless and uneasy, and rub his breech against the posts. The season of their coming is usually in the months of May and June; after which they are seldom to be seen, and rarely continue in any one horse above a fortnight or three weeks. Those that take their lodgment in the stomach, are extremely dangerous by causing convulsions; and are seldom discovered by any previous signs before they come to life, when they throw a horse into violent agonies. The other kinds are more troublesome than dangerous; but are known by the following signs: The horse looks lean and jaded, his hair stares as if he was starved, and nothing he eats makes him thrive; he often strikes his hind-feet against his belly; is sometimes griped, but without the violent symptoms that attend a colic and strangury; for he never rolls and tumbles, but only shews uneasiness, and generally lays himself down quietly on his belly for a little while, and then gets up and falls a feeding; but the surest sign is when he voids them with his dung.

For the cure of botts in the stomach, calomel should first be given in large quantities, and repeated at proper intervals; *Æthiops mineral*, or some of the under-men-

tioned forms, may be given afterwards.

But botts in the strait gut may be cured by giving the horse a spoonful of favin, cut very small, once or twice a-day in his oats or bran, moistened; and three or four of cloves of garlick may be added to advantage. Give also an aloetic purge between whiles; the following stands recommended.

TAKE fine focotrine aloes, ten drams; fresh jalap, one dram; aristolochia, or birthwort, and myrrh powdered, of each two drams; oil of favin and amber, of each one dram; syrup of buckthorn enough to form into a ball.

But as the source of worms in general proceeds from a vitiated appetite and a weak digestion, recourse must first be had to mercurials, and afterwards to such things as are proper to strengthen the stomach, promote digestion, and, by destroying the suppoled ova, prevent the regeneration of these animals. Thus, two drams of calomel may be given with half an ounce of diapente, and mixed up with conserve of wormwood, over-night; and the next morning the above purge: these may be repeated six or eight days. Or the following mercurial purge may be given, which will be less troublesome, and no less efficacious.

TAKE crude quick-silver two drams, Venice turpentine half an ounce; rub the quick-silver till no glistering appears; then add an ounce of aloes, a dram of grated ginger, 30 drops of oil of favin, and a sufficient quantity of syrup of buckthorn to make a ball.

One of these balls may be given every six days, with the usual precautions in regard to mercurial physic; and the following powder intermediately.

TAKE powdered tin and *Æthiops mineral* of each half an ounce: give every night in a mash, or among his corn.

The various preparations of antimony and mercury must be given several weeks together, in order to get entire riddance of these vermin. The *Æthiops mineral* may be given to the quantity of half an ounce a-day; the *mercurius alkalifatus* to two drams a-day, incorporated with a bit of cordial ball. The cinnaubar powders, as directed in the farcy, are no less effectual: and when worms are bred from high feeding, or unwholesome food; rue, garlick, tansey, favin, box, and many other simples, may be given successfully; being for that purpose mixed with their food; as also cut tobacco, from half an ounce to an ounce a-day.

SECT. XVI. Of the Yellows, or Jaundice.

HORSES are frequently subject to this distemper; which is known by a dusky yellowness of the eyes; the inside of the mouth and lips, the tongue, and bars of the roof of the mouth, looking also yellow. The horse is dull, and refuses all manner of food; the fever is slow, yet both that and the yellowness increase together. The dung is often hard and dry, of a pale yellow, or light pale green. His urine is commonly of a dark dirty brown colour; and when it has settled some time on the pavement, it looks red like blood. He stales with some pain and difficulty; and if the distemper is not checked soon, grows delirious and frantic. The off-side of the belly is sometimes hard and distended; and in old horses, when the liver has been long diseased, the cure is not practicable, and ends fatally.

Of the
Yellows.

Disorders
of the
Kidneys
and Bladder.

Disorders
of the
Kidneys
and Bladder.

tally with a waſting diarrhoea: but when the diſtemper is recent, and in young horſes, there is no fear of a recovery, if the following directions are obſerved.

Fiſt of all bleed plentifully; and give the laxative glyſter (p. 5. col. 2. par. 1.) as horſes are apt to be very colive in this diſtemper; and the next day give him this purge:

TAKE of Indian rhubarb powdered one ounce and a half, ſaffron two drams, ſcooterine aloes fix drams, ſyrup of buckthorn a ſufficient quantity.

If the rhubarb ſhould be found too expensive, omit it, and add the ſame quantity of cream of tartar, and half an ounce of Caſtile ſoap, with four drams more of aloes. This may be repeated two or three times, giving intermediately the following balls and drink.

TAKE of Ethiops mineral half an ounce, millepedes the ſame quantity, Caſtile ſoap one ounce; make into a ball, and give one every day, and waſh it down with a pint of the following decoction.

TAKE madder-root and turmeric of each four ounces, burdock-root ſliced half a pound, Monk's rhubarb four ounces, liquorice ſliced two ounces; boil in a gallon of forge-water to three quarts; ſtrain off, and ſweeten with honey.

Balls of Caſtile ſoap and tunicer may be given alſo for this purpoſe to the quantity of three or four ounces a-day, and will in moſt recent caſes ſucceed.

By theſe means the diſtemper generally abates in a week, which may be diſcovered by an alteration in the horſe's eyes and mouth; but the medicines muſt be continued till the yellowneſs is entirely removed. Should the diſtemper prove obſtinate, and not ſubmit to this treatment, you muſt try more potent remedies, viz. mercurial phyſic, repeated two or three times at proper intervals; and then the following balls.

TAKE ſalt of tartar two ounces, cinnabar of antimony four ounces, live millepedes and filings of ſteel of each three ounces, ſaffron half an ounce, Caſtile or Venice ſoap half a pound; make into balls, the ſize of a pullet's egg, with honey; and give one night and morning, with a pint of the above drink.

It will be proper, on his recovery, to give two or three mild purges; and, if a fat full horſe, to put in a rowel.

SECT. XVII. *Of the Disorders of the Kidneys and Bladder.*

THE ſigns of the kidneys being hurt or affected are, a weakneſs of the back and loins, difficulty of ſtaling, faintneſs, loſs of appetite, and deadneſs in the eyes; the urine is thick, foul, and ſometimes bloody, eſpecially after a violent ſtrain. A horſe diſeaſed in his kidneys can ſeldom back, that is, move ſtraight backwards, without pain, which is viſible as often as he is put to the trial: the ſame thing is obſervable indeed in horſes whoſe backs have been wrung and wrenched; but with this difference, that in the latter there is ſeldom any defect or alteration in the urine, except that it is higher coloured.

Bleeding is the prime remedy, and that plentifully, in order to prevent inflammation; and the more ſo, if a fever attends a difficulty in ſtaling, for then we may ſuſpect the kidneys already inflamed. A rowel in the belly has been found uſeful; and the following balls

may be given twice or thrice a-day, with a pint of marſhmallow decoction, in which half an ounce of gum arabic is diſſolved, with an ounce of honey.

TAKE Locatellus-balfam one ounce, ſpermaceti fix drams, ſal prunella half an ounce; mix into a ball with honey: if the urine is bloody, add half an ounce of Japan earth.

Should the fever continue, bleed largely, give emolient glyſters, and the cooling opening drink, (p. 5. col. 1. par. 5.) till it abates.

If the urine paſſes with difficulty and pain, notwithstanding theſe means, give this ball, and repeat it twice or thrice a-day till the horſe ſtales freer and without pain, his urine become of a right conſiſtence, and free from any purulent ſediment.

TAKE balfam of copivi or Straſburg turpentine, and Venice ſoap, of each one ounce, nitre fix drams, myrrh powdered two drams; make into a ball with honey, and waſh it down with the marſhmallow decoction.

As a ſuppreſſion of urine ariſes ſometimes from an inflammation of the kidneys; ſo at others, from a paralytic diſorder, diſabling them in their office of ſeparating the urine from the blood: in this latter caſe, the bladder is uſually empty, ſo that a horſe will make no motion to ſtale; and if he continues a few days in this condition, his body will ſwell to a great degree, break out in blotches all over, and death will ſoon cloſe the ſcene.

If it ariſes from inflammation, bleed largely, and treat the horſe as above recommended; but if not, give ſtimulating glyſters, and ſtrong diuretics, ſuch as the following balls, once in four hours: for if a horſe ſtales not in 30 hours, his danger muſt be great.

TAKE juniper-berries powdered one ounce, ſal prunella fix drams, ethereal oil of turpentine half an ounce, camphor one dram, oil of juniper two drams; make into a ball with honey, and give after it three or four horns of the marſhmallow decoction and honey.

Or, TAKE ſquills powdered two or three drams, nitre half an ounce of fix drams; make into a ball with honey.

If the complaint is not removed by theſe means, rub the horſe's reins well with two parts of oil of turpentine, and one of oil of amber; and apply a poultice of garlic, horſe-radish, muſtard-feed, camphor, and green ſoap, ſpread on thick cloth, over them. Give the horſe alſo two drams of calomel over night, and a moderate purge the next morning. Theſe perhaps are the chief and beſt remedies that can be given in this generally fatal diſorder.

When the ſtrangury in a horſe does not ariſe from wind, or dung preſſing on the neck of the bladder (as was obſerved in the Section on Colics), the cauſe is from inflammation, or too long a retention of the urine. Such horſes make frequent motions to ſtale, ſtand wide and ſtraddling, are full, and have their flanks diſtended. In this caſe bleed largely; give the following drink, and repeat it every two hours, for two or three times, till the horſe is relieved.

TAKE Venice turpentine, broke with the yolk of an egg, one ounce, nitre or ſal prunella fix drams, half a pint of ſweet oil, and a pint of white wine. If this drink ſhould not have the deſired effect, the

diuretic ball abovementioned may be given in the same manner, omitting the myrrh.

Give the horse plenty of the marshmallow-decoction; in a quart of which dissolve an ounce of nitre and gum arabic, and two of honey.

Horses subject to a *diabetes*, or profuse staling, if old, or of a weak constitution, are seldom cured; they soon lose their flesh and appetite, grow feeble, their coat flaring, and they die rotten. Of a young horse there are more hopes; but he must not be indulged with too much water, or moist food. Give him the following:

TAKE jessuits bark four ounces, bilsoft and tormentil-root of each two ounces; boil in two gallons of lime-water to the consumption of half, and give a pint three times a day.

As this disorder generally proceeds from too violent exercise, over-straining, &c. repeated bleedings in small quantities are absolutely necessary, till the mouths of the vessels close up.

SECT. XVIII. Of Molten-grease.

By molten-grease is meant a fat or oily discharge with the dung; and it arises from a colliquation or melting down of the fat of a horse's body by violent exercise in very hot weather. It is always attended with a fever, heat, restlessness, starting and tremblings, great inward sickness, shortness of breath, and sometimes with the symptoms of a pleurisy. His dung will be extremely greasy, and he will fall into a scouring; his blood will have a thick skin or fat over it when cold, of a white or yellow hue, but chiefly the latter; the congealed part or sediment is commonly a mixture of size and grease, which makes it so extremely slippery, that it will not adhere to the fingers, and the small portion of serum feels also slippery and clammy. The horse soon loses his flesh and fat, which probably is dissolved and absorbed into the blood; and those that survive this shock commonly grow hide-bound for a time, their legs swelling both before and behind, and continue in this state till the blood and juices are rectified; and if this is not done effectually, the farcy, or some obstinate surfeit, generally follows very difficult to remove.

In the first place bleed plentifully, and repeat it for two or three days successively in smaller quantities; two or three rowels should also be immediately put in, and the cooling emollient glysters (p. 5. col. 2. par. 2, 3.) daily thrown up to abate the fever, and drain off the greasy matter from the intestines. By the mouth give plenty of warm water or gruel, with cream of tartar or nitre, to dilute and attenuate the blood, which in this case is greatly disposed to run into grumes, and endanger a total stagnation.

When the fever is quite gone off, and the horse has recovered his appetite, gentle aloeic purges should be given once a-week, for a month or six weeks, in order to bring down the swelled legs. To this end give the following; which, repeated for some time, will entirely remove this disorder.

TAKE of socotorine aloes six drams, of gum guaiacum powdered half an ounce, of diaphoretic antimony and powder of myrrh of each two drams; make into a ball with syrup of buckthorn.

These will seldom take a horse from his business a-

bove two or three days in a week; neither will he lose his flesh or appetite with them, but on the contrary mend in both; which cannot be obtained by any other method of purging, and gives this greatly the preference in many cases.

SECT. XIX. Of Surfeits, Mange, and Hide-bound.

SURFEITS arise from various causes; but are commonly the effects of some diseases not attended to, or that have been ill cured.

A horse is said to be surfeited, when his coat flares, and looks rusty and dirty, though proper means have not been wanting to keep him clean. The skin is full of scales and dander, that lies thick and mealy among the hair, and is constantly supplied with a fresh succession of the same, for want of due transpiration. Some horses have hurdles of various sizes, like peas or tares; some have dry fixed scabs all over their limbs and bodies; others a moisture, attended with heat and inflammation; the humours being so sharp, and violently itching, that the horses rub so incessantly, as to make themselves raw. Some have no eruptions at all; but an unwholesome look, and are dull, sluggish, and lazy; some appear only lean and hide-bound; others have flying pains and lameness, resembling a rheumatism; so that in the surfeits of horses, we have almost all the different species of the scurvy and other chronic distempers.

The following method is usually attended with success in the dry species. First take away about three or four pounds of blood, and then give the following mild purge, which will work as an alterative, and should be repeated once a-week or ten days for some time.

TAKE socotorine aloes six drams or one ounce, gum guaiacum half an ounce, diaphoretic antimony and powder of myrrh of each two drams; make into a ball with syrup of buckthorn.

In the intermediate days, an ounce of the following powder should be given, morning and evening, in his feeds.

TAKE native cinnabar, or cinnabar of antimony, finely powdered, half a pound; crude antimony, in fine powder, four ounces; gum guaiacum, also in powder, four ounces; make into 16 doses for eight days.

This medicine must be repeated till the horse coats well, and all the symptoms of surfeit disappear.

The wet surfeit, which is no more than a moist running scurvy, appears on different parts of the body of a horse, attended sometimes with great heat and inflammation; the neck oftentimes swells so in one night's time, that great quantities of a hot briny humour issue forth, which, if not alayed, will be apt to collect on the poll or withers, and produce the poll-evil or fistula. This disease also frequently attacks the limbs, where it proves obstinate and hard to cure, and in some horses shows itself spring and fall.

In this case bleed plentifully, avoid externally all repellers, and give cooling physic twice a-week; as, four ounces of lenitive electuary, with the same quantity of cream of tartar; or the latter, with four ounces of Glauber's salts, quickened, if thought proper, with two or three drams of powder of jalap, dissolved in water-

Of Surfeits,
&c.

Of the
Farcy.Of the
Farcy.

water-gruel, and given in a morning fasting.

After three or four of these purges, two ounces of nitre made into a ball with honey may be given every morning for a fortnight; and if attended with success, repeat it for a fortnight longer.

The powders above-mentioned may be also given with the horse's corn; or a strong decoction of guaiacum shavings or logwood may be given alone to the quantity of two quarts a-day. These, and indeed all alterative medicines, must be continued for a long time where the disorder proves obstinate.

The diet should be cool and opening, as scalded bran or barley; and if the horse is hide-bound, an ounce of fenugreek seeds should be given in his feeds for a month or longer; and, as this disorder often proceeds from worms, give the mercurial physic too, and afterwards the cinnabar powders, as above directed. But as in general it is not an original disease, but a symptom only of many, in the cure regard must be had to the first cause: thus, as it is an attendant on furcuits, fevers, worms, &c. the removal of this complaint must be variously effected.

In a mangy horse the skin is generally tawny, thick, and full of wrinkles, especially about the mane, the loins, and tail; and the little hair that remains in those parts stands almost always straight out or bristly; the ears are commonly naked and without hair, the eye and eye-brows the same; and when it affects the limbs, it gives them the same aspect: yet the skin is not raw, nor peels off, as in the hot inflamed furcuit.

Where this distemper is caught by infection, if taken in time it is very easily cured: and we would recommend a sulphur ointment as most effectual for that purpose, rubbed in every day. To purify and cleanse the blood, give antimony and sulphur for some weeks after. There are a great variety of external remedies for this purpose, such as train-oil and gun-powder, tobacco steeped in chamber ley, &c. Solissey recommends the following.

TAKE burnt alum and borax in fine powder of each two ounces, white vitriol and verdigris powdered of each four ounces; put them into a clean pot, with two pounds of honey, stirring till they are incorporated; when cold, add two ounces of strong aqua-fortis.

But when this disorder is contracted by low feeding, and poverty of blood, the diet must be mended, and the horse properly indulged with hay and corn. The following ointments are effectually used for this disorder rubbed into the parts affected every day.

TAKE powdered brimstone, train-oil, and tar, of each equal quantities; to which may be added ginger, or white hellebore.

Or, TAKE sulphur vivum half a pound, crude sal armoniac one ounce, hogs lard or oil a sufficient quantity to form into an ointment.

These are both very powerful remedies for this disorder, and can scarce fail of success.

SECT. XX. Of the Farcy or Farcy.

THE true farcy is properly a distemper of the blood-vessels, which generally follows the tract of the veins, and, when inveterate, thickens their coats and integuments, so that they become like so many chords. We shall not describe the different sorts of farcies, seeing

they are only degrees of one and the same distemper but proceed to paint the distemper by its symptoms, which are pretty manifest to the eye.

At first, one or more small swellings, or round buds like grapes or berries, spring out over the veins, and are often exquisitely painful to the touch; in the beginning they are hard, but soon turn into soft blisters, which when broke discharge an oily or bloody ichor, and turn into very foul and ill-disposed ulcers. In some horses it appears on the head only; in some on the external jugular; in others on the plate-vein, and runs downwards on the inside of the fore-arm towards the knee, and very often upwards towards the brisket: in some the farcy shews itself on the hind-parts, about the pasterns, and along the large veins on the inside of the thigh, rising upwards into the groin, and towards the sheath; and sometimes the farcy makes its appearance on the flanks, and spreads by degrees towards the lower belly, where it often becomes very troublesome.

When the farcy appears on the head only, it is easily cured; especially when it is seated in the cheeks and fore-head, the blood-vessels being here small: but it is more difficult when it affects the lips, the nostrils, the eyes, the kernels under the jaws, and other soft and loose parts, especially if the neck-vein becomes corded. When it begins on the outside of the shoulder or hips, the cure is seldom difficult: but when the farcy arises on the plate-vein, and that vein swells much, and turns corded, and the glands or kernels under the arm-pit are affected, it is hard to cure; but more so when the crural veins within side of the thigh are corded, and beset with buds, which affects the kernels of the groin and the cavernous body of the yard. When the farcy begins on the pasterns or lower limbs, it often becomes very uncertain, unless a timely stop is put to it; for the swelling in those dependant parts grows so excessively large in some constitutions, and the limbs so much disfigured thereby with foul sores and callous ulcerations, that such a horse is seldom fit for any thing afterwards but the meanest drudgery: but it is always a promising sign, wherever the farcy happens to be situated, if it spreads no further. It is usual to affect only one side at a time; but when it passes over to the other, it shews great malignancy: when it arises on the spines, it is then for the most part dangerous; and is always more so to horses that are fat and full of blood, than to those that are in a more moderate case. When the farcy is epidemical, as sometimes happens, it rises on several parts of the body at once, forms nasty foul ulcers, and makes a profuse running of greenish bloody matter from both nostrils; and soon ends in a miserable rot.

When the farcy makes its first appearance on the head, it rises on the cheeks and temples, and looks like a network, or small creeping twigs full of berries. Sometimes it inflames the eye, and sometimes little blisters or buds run along the side of the nose. It arises often on the outside of the shoulder, running along the small veins with heat and inflammation; and sometimes a few small buds appear near the withers, and on the outside of the hip. In all these appearances, the disease being superficial, and affecting only the smaller vessels, is easily conquered by the following method, when taken in time; for the simplest farcy, if neglected, may degenerate into the worst sort.

This distemper, then, being of an inflammatory nature,

ture, and in a particular manner affecting the blood-vessels, must necessarily require large bleeding, particularly where the horse happens to be fat and full of blood. This always checks the beginning of a farcy, but is of small service afterwards; and if a horse is low in flesh, the loss of too much blood sometimes proves injurious. After bleeding, let the horse have four ounces of cream of tartar and lenitive electuary; which may be given every other day for a week, to cool the blood and the body; and then give nitre three ounces a-day for three weeks or a month, and anoint the buds or swellings with the following ointment twice a-day.

TAKE ointment of elder four ounces, oil of turpentine two ounces, sugar of lead half an ounce, white vitriol powdered two drams; mix together in a gally-pot.

The buds sometimes by this method are dispersed, leaving only little bald spots which the hair soon covers again. When they break and run, if the matter be thick and well digested, they will soon be well: but in order to confirm the cure, and to disperse some little lumps which often remain for some time on the skin without hair, give the liver of antimony for a month; two ounces a-day for a fortnight, and then one ounce a-day for the other fortnight: by following this method, a farcy which affects only the small vessels may be stopped in a week or ten days, and soon after totally eradicated.

When the farcin affects the larger blood-vessels, the cure is more difficult; but let it always be attempted early: therefore, on the plate, thigh, or neck-veins appearing corded, bleed immediately on the opposite side, and apply the following to the corded vein.

TAKE oil of turpentine in a pint-bottle six ounces, oil of vitriol three ounces; drop the oil of vitriol into the oil of turpentine by little at a time, otherwise the bottle will burst; when it has done smoking, drop in more oil of vitriol, and so on till all is mixed.

This mixture is one of the best universals in a beginning farcy; but where it is seated in loose fleshy parts, as flanks or belly, equal parts of the oil of vitriol and turpentine are necessary.

Rub the parts first with a woollen cloth, and then apply some of the mixture over the buds, and wherever there is any swelling, twice a-day. Give the cooling physic every other day, and then three ounces of nitre every day for some time.

When the farcy begins on the flanks, or towards the lower belly, it often takes its rise from a single puncture of a sharp spur. The pain and smarting is one sure sign to distinguish the farcy from common accidents; the staring of the hair, which stands up like a tuft all round the buds or blisters, and the matter that issues from the buds, which is always purulent and of a clammy greasy consistence, are other certain signs. After bathing with the mixture above mentioned till the ulcers are smooth and healing, should the swelling not subside, to prevent the spreading of the buds, and to disperse them, bathe with either of these mixtures as far as the centre of the belly; and at the same time give a course of antimonials as will presently be prescribed.

TAKE spirits of wine four ounces, oil of vitriol and turpentine of each two ounces, white-wine vinegar or verjuice six ounces.

Or the following:

TAKE spirits of wine rectified four ounces, camphor half an ounce, vinegar or verjuice six ounces, white vitriol dissolved in four ounces of spring-water one ounce: mix together.

In the lower limbs the farcy lies sometimes concealed for a great while; and makes so slow a progress, that it is often mistaken for grease, or for a blow or kick, and goes by the general appellation of a *humour settled there*. In order to distinguish the one from the other, we shall observe, that a kick or bruise is generally attended with a sudden swelling, or a contused wound, which for the most part digests easily: the grease is also a smooth swelling that breaks out above the bending of the patterns backwards; but the farcy begins on the pattern joint usually with one bud, and runs upwards like a knotty crab-tree.

Very simple means have sometimes stopped it, before it has begun to spread; a poultice with bran and verjuice bound round the part and renewed once a-day will often alone succeed; and if proud flesh should arise, touch it with oil of vitriol, or aqua-fortis, an hour before you apply the poultice; for when the distemper is local, as we suppose it here, it is to be conquered by outward applications.

When the distemper grows inveterate, and resists the above method, and the vessels continue corded, Gibson recommends the following mixture.

TAKE linseed oil half a pint; oil of turpentine and salt-petre, of each three ounces; tincture of euphorbium and hellebore, of each two drams; the soldiers ointment, two ounces; or oil of bays, or oil of origanum, half an ounce: double aqua-fortis, half an ounce: after the ebullition is over, add two ounces of Barbadoes tar.

Rub this into the corded veins, and where ever there is a swelling, once in two or three days; but if the orifices are choked up with proud flesh, or the skin so much thickened over the ulcers as to confine the matter, in either case it is necessary to make an open passage with a small hot iron, and destroy the proud flesh; after which it may be kept down by touching with oil of vitriol, aqua-fortis, or butter of antimony. A salve may be prepared with quicksilver and aqua-fortis, rubbing any quantity of the former with enough of the latter to the consistence of a liniment; smear the ulcers with this whenever they appear foul, and you will find it preferable to most other eating medicines.

Our farriers, after opening the buds, put in usually a small quantity of corrosive sublimate or arsenic, which they call *coring out the farcy*; this may answer where the buds are few, and not situated near large blood-vessels, joints, or tendons: others use Roman vitriol, or sublimate and vitriol in equal quantities; but let it be remembered, that many a horse has been poisoned by these medicines ignorantly used, and in too large quantities.

The following balls are proper in every state of the farcy; and when the distemper has been in its infancy, before the skin was much defaced, has often cured it in a week or two, by giving them only once or twice a-day: but in an old farcy they should be given for two or three months together.

TAKE of native cinnabar, or cinnabar of antimony, eight

eight ounces; long bithwort and gum guaiacum powdered, of each four ounces: make into a paste with honey, and form into balls of the size of a large walnut, and roll them into liquorice-powder.

The tediousness of this course has encouraged the giving of mercurials; and indeed, where they are directed with skill, they must be attended with success: the stronger preparations, as the red and white precipitates, and turbit, being combined with sharp saline parts, may be hazardous and injurious; but the latter given in small quantities have been found very successful in such kind of inveterate disorders. Mr Gibson says, he has given it to a dram at a dose, where the limbs have been greatly swelled; that in 48 hours the sores were all dried up, and the limbs reduced; but that it made the horse so violently sick for several days, and scoured him to such a degree, that it could not be repeated.

One would have thought that the success attending this medicine so suddenly, might have encouraged Gibson to have made further trials in smaller quantities; which had he done, it is more than probable he would not have been disappointed: for the grand secret in giving mercurials as alteratives, is the introducing them into the blood, without operating on the stomach and bowels; and to do this effectually, they must be given in small quantities, and so bridled as to controul their force on the first passages; taken in this manner, they will mix gradually with the blood and juices, and operate both effectually and safely.

Dr Braken recommends the knots and chords to be rubbed with the mercurial ointment before they break in order to disperse them; and after breaking, to dress the sores with equal parts parts of Venice turpentine and quicksilver: if by these means the mouth should become sore, treat as above.—This method seems to be effectual, with proper care.

The following is also recommended by the same gentleman:

TAKE butter of antimony and bezoar mineral, of each one ounce; beat up with half a pound of cordial ball; and give the bigness of a walnut, or three quarters of an ounce, every day for two or three weeks, falling two or three hours after it.

We shall here take notice of what is called the *water farcy*; which has no resemblance to a true farcy, either in its cause, symptoms, or effects, but has only obtained this name through custom and ignorance.

This water-farcy, then, is of two kinds: one the product of a feverish disposition, terminating on the skin, as often happens in epidemical colds; the other is dropsical, where the water is not confined to the belly and limbs, but shews itself in several parts of the body by soft swellings yielding to the pressure of the finger. This last kind usually proceeds from foul feeding, or from the latter grafts and fog that often comes up in great plenty with continued cold rains, and breeds a sluggish viscid blood. In the former case, we have seen the limbs and whole body enormously swelled, and very hard, the belly and sheath greatly distended; which were as surprisingly reduced in 24 hours, by slight scarifications within-side the leg and thigh with a sharp pen-knife, and three or four strokes on the skin of the belly on each side the sheath: from these scarifications there was a constant and surprising large dripping of water,

which soon relieved the horse; when a few purges completed his recovery.

In the other species of droply the curative intentions are to discharge the water, recover the crasis or strength of the blood, and brace up the relaxed fibres throughout the whole body. To this end, purge once a-week or ten days; and give intermediately either of the following.

TAKE black hellebore fresh gathered, two pounds; wash, bruise, and boil in six quarts of water, to four; and then strain out the liquor, and put two quarts of white-wine on the remaining hellebore, and let it infuse warm 48 hours: then strain off, mix both together, and give the horse a pint night and morning.

TAKE nitre two ounces, squills powdered three drams or half an ounce, camphor one dram, honey enough to form into a ball, to be given once a-day alone, or washed down with a horn or two of the above drink.

Before we close this section, it is proper to lay down the symptoms of an incurable farcy, that the owners of such horses may save themselves unnecessary expence and trouble in their endeavours to obtain a cure.

When a farcy, by improper applications, or by neglect, has spread and increased, or after long continuance resisted the medicines above recommended; if fresh buds are continually spouting forth, while the old ones remain foul and ill-conditioned; if they rise on the spines of the back and loins; if the horse grows hide-bound, and runs at the nose; if abscesses are formed in the fleshy parts between the interstices of the large muscles; if his eyes look dead and lifeless; if he forsakes his food, and scours often, and his excrements appear thin and of a blackish colour; if the plate or thigh vein continues large and chorded after firing and other proper applications; these symptoms denote the distemper to have penetrated internally, and that it will degenerate into an incurable consumption: it is most probable also that the whole mass of fluids are tainted, and become irremediable by art.

SECT. XXI. Of Alterative Medicines.

By alteratives, or altering medicines, are to be understood such as, having no immediate sensible operation, gradually gain upon the constitution, by changing the humours or juices from a state of distemperature to health. This intention in some cases may perhaps be effected by correcting the acrimony of the juices, and accelerating the blood's motion; and in others by attenuating or breaking its particles, and dividing those cohesions which obstruct the capillaries or finer vessels, and so promote the due secretions of the various fluids. It is certain, that many have but an indifferent opinion of a medicine that does not operate externally, and gratify their senses with a quantity of imagined humours ejected from the body: but let such people remember, that there are good humours as well as bad, which are thrown off together; that no evacuating medicine has a power of selecting or separating the bad from the good; and consequently that they are thrown out only in a proportionate quantity. These few hints may be sufficient to convince the judicious reader of the great advantages arising from alteratives, and the preference

ference due to them in most cases over purgatives; unless it could be proved, as already mentioned, that the latter could cull out and separate from the blood the bad humours solely, leaving the good behind: but this selective power has long been justly exploded as ridiculous and uncertain; since it is plain, that all kinds of purging medicines differ only in degree of strength, and operate no otherwise upon different humours than as they stimulate more or less.

We shall therefore take this opportunity of recommending some alterative medicines which are not so generally known as they ought to be; and that too on the surest grounds, a proper experience of their good effects in repeated trials. The first, then, is nitre or purified salt-petre; which has long been in great esteem, and perhaps is more to be depended on in all inflammatory fevers than any other medicine whatever: but besides this extensive power of allaying inflammatory disorders, it is now offered as an alterative remedy, taken in proper quantities for surfeits, molten-grease, hide-bound, grease-heels, &c. And as it has been known to succeed even in the cure of the farcy; what other distempers in horses, arising from vitiated fluids, may it not be tried on, with a strong probability of success? This great advantage will arise from the use of this medicine over most others, that, as its operation is chiefly by urines, it requires no confinement or clothing; but the horse may be worked moderately throughout the whole course. This medicine has been found equally efficacious (by many trials made in one of our hospitals) in correcting the acrimony of the juices, and disposing of the most obdurate and inveterate sores to heal up; and hence probably it came recommended as an alterative to our horses.

The quantity of nitre given at a time should be from two to three ounces a-day; let it be finely powdered, and then mix with it by little at a time as much honey as will form it into a ball: give it every morning fasting for a month; or it may be given at first for a fortnight only, intermitting a fortnight, and then repeat it. If it be observed that the horse shews an uneasiness at the stomach after taking it; a horn or two of any liquor should be given after it, or it may be dissolved at first in his water, or mixed with his corn; though the ball, where it agrees, is the easiest method of giving.

When horses take drinks with great reluctance, powders must be given in their feeds: thus crude antimony, or liver of antimony finely powdered, may be given to the quantity of half an ounce, night and morning; but in all surfeits, gum guaiacum mixed with antimony is found more efficacious. Thus,

TAKE of crude antimony finely powdered, or, where it can be afforded, cinnabar of antimony, and gum guaiacum, of each a pound: mix together with an oily pistle to prevent the gum's caking: divide the whole into 32 dozes, viz. an ounce each doze: let one be given every day in the evening-feed. Or, TAKE of cinnabar of antimony, gum guaiacum, and Castile or Venice soap, of each half a pound; salt of tartar, four ounces: beat them up into a mass, and give an ounce every day. To these may be added very advantageously, an ounce and an half of camphor.

Æthiops mineral, given to the quantity of half an ounce a-day, is a very good sweetener and corrector of

the blood and juices; but it has been observed, after having been taken a week or ten days, to make some horses flabby, and unable to chew their hay and oats; and the same symptoms have arisen, where only two drams of crude mercury has been given, and continued about the same space of time.

Diet-drinks.—1. A decoction of logwood, prepared like that of guaiacum, is also successfully given in surfeits.

2. Lime-water prepared with shavings of salaffras and liquorice, is a good diet-drink to sweeten and correct a horse's blood; and may be given with the nitre-balls for that purpose.

3. Tar-water also, as has before been hinted, may in many cases be well worth trial: but let it be remembered, that all medicines of this kind should be continued a considerable time in obstinate cases.

SECT. XXII. Of Rowelling.

THESE seems to be no remedy so much made use of, and so little understood by farriers in general, as rowels; for which reason we shall endeavour to set the whole affair in a clearer light than hitherto it has appeared in.

We shall begin, then, by describing *rowelling*; which is an artificial vent made between the skin and flesh, in order to unload and empty the vessels in general, and thereby relieve particular parts when too much oppressed by a fullness or redundancy.

The general and absurd reasoning of farriers on the effects and use of rowelling, in some measure makes this section the more necessary, as it is too notorious how impertinently they talk on this subject: for in short, with them, a rowel is to draw off all the bad and corrupt humours from the blood by a sort of magic.

It is necessary to observe, that the matter generally discharged by a rowel, is nothing more than an oozing from the extremities of the vessels divided in the making of it; in fact, then, it is blood, which loses its colour, by being shed out of the vessels, by the warmth of the part, and by its confinement.

If this is granted, it will evidently appear, that the good effects ensuing from this operation must be owing to a gradual depletion or emptying of the vessels in general; by which means the surcharge or load on a particular part is taken off and removed, and impurities or bad juices (generally called *humours*) run off with the good in proportion to their quantity in the blood.

Thus, to lean hide-bound horses, and those of a dry hot constitution, the discharge, by depriving the constitution of so much blood and fluids, is daily exhausting the strength of the animal; and may be productive of bad consequences, by defrauding the constitution of a necessary fluid.

But in disorders from fullness, attended with acrimony or sharpness of the juices, and with defluxions on the eyes, lungs, or any part of consequence; the gradual discharge, brought on by these means, will contribute to lessen the fullness on the parts affected, and give the vessels an opportunity of recovering their tone, while evacuating and alterative medicines are doing their office.

It may be necessary, however, to observe, that there is a wonderful communication between the vessels of the cellular membrane under the skin, which remarkably appears

appears, by inflating those of sheep, calves, &c. by the butchers: hence, probably, it is, that some disorders of this integument are so apparently relieved by issues, or rowels, without our having any recourse to that general depletion of the vessels, we have just observed, to account for it; and hence, also, may be deduced their utility, sometimes in draining off any extravasated fluids which may lodge between the interstices of the muscles, after violent strains of the shoulder; also in discharging such vicious or sharp fluids as are thrown on the membranes, and occasion those flying pains and lamenesses which we find are often removed by this local remedy.

SECT. XXIII. Of Strains in Various Parts.

1. It is necessary to observe, that, in all strains, the muscular or tendinous fibres are overstretching; and sometimes ruptured, or broke. To form, therefore, a true idea of these disorders, let us first consider every muscle and tendon as composed of springy elastic fibres, which have a proper power of their own to contract and extend themselves; or, to make their action more familiar, let us compare them to a piece of catgut, that we may the better judge with what propriety oily medicines are directed for their cure. Thus, then, if, by a violent extension of this catgut, you had so overstretching it as to destroy its springiness or elasticity, and was inclined to recover its lost tone, would you for that purpose think of soaking it in oil? And is not the method of treating strains, or overstretching muscles and tendons, full as preposterous, when you bathe or soak them in oily medicines, at a time that they want restringents to brace them up? Yet custom has so established this practice, and fallacious experience seemingly so confirmed it, that it would be a difficult task to convince the illiterate and prejudiced of the absurdity, who, by attributing effects to wrong causes, are led into this error, and the oils usurp the reputation that is due only to rest and quiet: they seem, however, to be aware of the ill consequences, by their adding the hot oils, as spike, turpentine, and organum; which, though they in some measure guard against the too suppling quality of the other oils, yet the treatment is still too relaxing to be of real service.

2. And indeed, in all violent strains of either tendons or muscles, whatever opinion we may entertain of bathing and anointing with favourite nostrums, which often succeed in slight cases, where perhaps bandage alone would have done; yet it is the latter, with proper resting the relaxed fibres till they have thoroughly recovered their tone, that are the chief things to be depended on; and frequently some months necessary for effecting the cure.

3. All violent strains of the ligaments, which connect the bones together, especially those of the thigh, require time, and turning out to grass, to a perfect recovery. External applications can avail but little here, the parts affected lying too deep, and so surrounded with muscles that medicine cannot penetrate to them. The sooner, in these cases, a horse is turned out to grass, the better; as the gentle motion in the field will prevent the ligaments and joint-oil from thickening, and of course the joint itself from growing stiff.

4. When a horse's shoulder is overstrained, he does not put out that leg as the other; but, to prevent pain, sets the found foot hardly on the ground to save the

other; even though he be turned short on the lame side, which motion tries him the most of any. When trotted in hand, instead of putting his leg forward in a right line, he forms a circle with the lame leg; and when he stands in the stable, that leg is advanced before the other.

5. In order to cure this lameness, first bleed him, and let the whole shoulder be well bathed three times a-day with hot verjuice or vinegar, in which may be dissolved a piece of soap; but if the lameness continues without swelling, or inflammation, after resting two or three days, let the muscles be well rubbed for a considerable time, to make them penetrate, with good opodeldoch, or either of the following mixtures:

TAKE camphorated spirit of wine, two ounces; oil of turpentine, one ounce; this proportion will prevent the hair coming off.

Or, TAKE the best vinegar, half a pint; spirit of vitriol, and camphorated spirit of wine, of each two ounces.

6. When the shoulder is very much swelled, it should be fomented with woollen cloths (large enough to cover the whole) wrung out of hot verjuice and spirit of wine; or a fomentation prepared with a strong decoction of wormwood, bay-leaves, and rosemary, to a quart of which may be added half a pint of spirit of wine.

7. A rowel in the point of the shoulder in this case often does great service; especially if the strain has been very violent, and the swelling very large: but as to boring up the shoulder with a hot iron, and afterwards inflating it, it is both a cruel and absurd treatment: and the pegging up the found foot, or setting on a patten shoe, to bring the lame shoulder on a stretch, is a most preposterous practice, and directly calculated to render a horse incurably lame; for it can only be necessary in cases the very opposite to this, where the muscles have been long contracted, and we want to stretch them out.

8. Where poultices can be applied, they are at first undoubtedly very effectual, after bathing with hot vinegar or verjuice; and are to be preferred greatly to cold charges, which, by drying so soon on the part, keep it stiff and uneasy: let them be prepared with oatmeal, rye flour, or bran boiled up in vinegar, strong-beer or red-wine lees, with lard enough to prevent their growing stiff; and when by these means the inflammation and swelling is brought down, bathe the part twice a-day with either of the above mixtures, opodeldoch, or camphorated spirit of wine; and roll the part three or four inches, both above and below, with a strong linen roller, of about two fingers width; which contributes not a little to the recovery, by bracing up the relaxed tendon; and perhaps is more to be depended on than the applications themselves.

9. In strains of the *coffin joint*, that have not been discovered in time, there will grow such a stiffness in the joint, that the horse will only touch the ground with his toe; and the joint cannot be played with the hand: the only method here is repeated blistering, and then firing superficially.

10. Strains of the *back sinews* are very common; and are easily discovered by the swelling, which extends sometimes from the back-side of the knee down to the heel, but for the most part the horse feels that foot before the other. The tendon should be well bathed three

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Of Strains. or four times a-day with hot vinegar; and if much swelled, apply the poultices above recommended; and when the swelling is down, bathe with the mixtures above, or with camphorated spirit of wine and oil of amber, in which is dissolved as much camphor as the spirits will take up; and roll up the tendon with a proper bandage, or laced stocking; which last, properly fitted to the limb, might be wore to great advantage, not only in these sort of injuries, but in most others, where there is a disposition to the grease, or other swellings of the limbs, from weak and relaxed fibres. Curriers shavings wetted with vinegar have been found useful for this purpose; as has also tar and spirit of wine: but where the tendons have suffered by repeated injuries of this kind, the case will demand blistering, firing, and proper rest.

11. Strains of the *knees* and *pasterns* arise frequently from kicks or blows: if they are much swelled, apply first the poultices; and when the swelling is abated, bathe with the above, or the following.

TAKE vinegar, one pint; camphorated spirit of wine, four ounces; white vitriol, dissolved in a little water, two drams.

Or, TAKE the white of three or four eggs, beat them into a froth with a spoon; to which add an ounce of rock alum, finely powdered; spirit of turpentine, and wine, of each half an ounce; mix them well together.

12. As great weakness remains in the pasterns after violent strains, the best method is to turn the horse out to grass till he is perfectly recovered; when this cannot be complied with, the general way is to blister and fire.

13. When a horse is lame in the *stifle*, he generally treads on his toe, and cannot set the heel to the ground. Treat him at first with the vinegar and cooling restraints; but if a large swelling, with puffiness, ensues, foment it well with the discutient fomentation till it disperses; and then bathe the part with any of the above medicines.

14. A lameness in the *whirl-bone* and hip, is discovered by the horse's dragging his leg after him, and dropping backward on his heel when he trots. If the muscles of the hip are only injured, this kind of lameness is cured easily; but when the ligaments of the joint are affected, the cure is often very difficult, tedious, and uncertain. In either case, at first bathe the parts well with the cooling medicines, four or five times a-day: in the muscular strain, this method alone may succeed; but in the ligamentous, it is rest and time only can restore the injured parts to their proper tone.

15. Strains in the *hock* are to be treated by soaking the parts with coolers and repellers; but when the ligaments are hurt, and they are attended with great weakness and pain, use the fomentation. If a hardness should remain on the outside, it may be removed by repeated blistering; if within, it may be out of the power of any external applications to remove: however, the joint should be fired gently with small razes or lines pretty close together, and then covered with a mercurial plaster. To the discutient fomentation above mentioned may be added crude sal armoniac, with a handful of wood-ashes boiled in it.

16. The blistering ointment for the above purposes

may be found in the Section of *Bone-spavin*; but the sublimate should be omitted.

17. The *firing*, used for the strengthening relaxed sinews or tendons, should act only on the skin, which, by contracting and hardening it all round the sinews, compresses them more firmly like a bandage. The bowmen of old submitted to this operation, in order to give strength to the muscles and tendons of their arms. A proper degree of skill is very requisite to perform it effectually on a horse; for a due medium should be observed, and the instrument neither so slightly applied as to scarify the skin only superficially, nor so deep as to wound or cauterize the sinew or its sheath. The lines should be drawn pretty close together, on each side of the joint or sinew, following the course of the hair; no cross lines should be made, as they but disfigure the horse afterwards, without any real use. The firing instrument, or knife, ought to be a little rounded on the edge, gradually thickening to the back, that it may retain the heat for some time, but should not be applied till the flaming redness is partly gone off. The cauterized parts may be bathed with spirit of wine at first; and anointed afterwards with bees-wax and oil, which alone is sufficient to complete the cure.

SECT. XXIV. *Of Tumours and Impossibilities.*

TUMOURS, or swellings, arise either from external injuries, or internal causes.

Swellings caused by external accidents, as blows and bruises, should at first be treated with restraints; Thus, let the part be bathed frequently with hot vinegar or verjuice; and, where it will admit of bandage, let a flannel wetted with the same be rolled on: if by this method the swelling does not subside, apply, especially on the legs, a poultice with red-wine lees, strong-beer grounds, and oatmeal, or with vinegar, oil, and oatmeal: either of these may be continued twice a-day, after bathing, till the swelling abates; when, in order to disperse it entirely, the vinegar should be changed for camphorated spirit of wine, to four ounces of which may be added one of spirit of sal armoniac; or it may be bathed with a mixture of two ounces of crude sal armoniac boiled in a quart of chamber-ley twice a-day, and rags dipped in the same may be rolled on.

Fomentation made by boiling wormwood, bay-leaves, and rosemary, and adding a proper quantity of spirits, are often of great service to thin the juices, and fit them for transpiration; especially if the injury has affected the joints.

But in bruises, where the extravasated blood will not by these means be dispersed, the shortest way is to open the skin, and let out the grumes.

Critical tumours, or swellings, which terminate fevers, should by no means be dispersed; except when they fall on the pastern or coffin joint, so as to endanger them: in this case the discutient fomentation, (p. 25. col. 2.) should be applied three or four times a-day, and a cloth or flannel frequently wrung out of the same should be bound on, in order to keep the joint continually breathing.

But if the swelling fixes under the jaws, behind the ears, on the poll, withers, or in the groins and sheath, &c. it should be encouraged and forwarded by ripening poultices wherever they can be applied; oatmeal boiled

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posthumes.

boiled soft in milk, to which a proper quantity of oil and lard is added, may answer this purpose; or the poultice recommended in the Section of *Strangles*: these must be applied twice a-day, till the matter is perceived to fluctuate under the fingers, when it ought to be let out; for which purpose, let the tumour be opened with a knife or strong lancet, the whole length of the swelling, if it can be done safely; for nothing contributes so much to a kind healing, as the matter's having a free discharge, and the opening's being big enough to dress to the bottom.

Pledgets of tow, spread with black or yellow basilicon (or the wound ointment), and dipped in the same, melted down with a fifth part of oil of turpentine, should be applied to the bottom of the sore, and filled up lightly with the same, without cramming: it may be thus dressed once or twice a-day, if the discharge is great, till a proper digestion is procured; when it should be changed for pledgets spread with the red precipitate ointment, applied in the same manner.

Should the sore not digest kindly, but run a thin water and look pale, foment, as often as you dress, with the above fomentation; and apply over your dressing the strong-beer poultice, and continue this method till the matter grows thick, and the sore florid.

The following ointments will generally answer your expectations in all common cases; and may be prepared without, as well as with, the verdigrease.

TAKE Venice turpentine and bees-wax of each a pound, oil of olives one pound and a half, yellow rosin 12 ounces; when melted together, two or three ounces of verdigrease, finely powdered, may be stirred in, and kept so till cold, to prevent its subsiding.

TAKE of yellow basilicon, or the above ointment, without verdigrease, four ounces; red precipitate, finely powdered, half an ounce; mix them together cold with a knife or spatula.

This last, applied early, will prevent a fungus, or proud flesh, from shooting out: for if you dress too long with the above digestive, the fungus will rise fast, and give some trouble to suppress it; when it will be necessary to wash the sore, as often as you dress, with a solution of blue vitriol in water, or to sprinkle it with burnt alum and precipitate. If these should not be powerful enough, touch with a caustic, or wash with the sublimate water made by dissolving half an ounce of corrosive sublimate in a point of lime-water.

But this trouble may in a great measure be prevented, if the sore is on a part where bandages can be applied with compresses of linen cloth: for even when these excreescences regerminate, as it were, under the knife, and spring up in spite of the caustics above mentioned, they are to be subdued by moderate compression made on the sprouting fibres by these means.

Authors on farriery have given in general very proper receipts to answer every intention of this kind by medicines: but as they have not laid down sufficient rules for their application in those cases where they are most wanted, the following general directions will not be unacceptable; as the difficulty in healing some kinds of sores arises frequently from the unskilful manner of dressing them.

It may be necessary then to observe here, once for all, that the cures of most sores are effected by the

Of Wounds

simplest methods; and that it is often of much more consequence to know how to dress a sore, than what to dress it with. And in this consists indeed the chief art of this branch of surgery: for the most eminent in that profession have long since discovered, that variety of ointments and faves are unnecessary in the cure of most wounds and sores; and they have accordingly discarded the greatest part formerly in repute for that purpose; repeated observations having taught them, that, after the digestion, nature is generally disposed to heal up the wound fast enough herself; and that the surgeon's chief care is to prevent a luxuriancy, commonly called *proud flesh*; which all ointments, wherein lard or oil enters, are but too prone to encourage, as they keep the fibres too lax and supple; and which dry lint alone, early applied, as easily prevents, by its absorbing quality, and light compression on the sprouting fibres.

Thus, if a hollow wound or sore is crammed with tents, or the dressings are applied too hard, the tender shoots of flesh from the bottom are prevented pushing up; and the sides of the sore from this distention may in time grow horny and turn fistulous; nor has the matter by this method a free discharge.

On the other hand, if sores of any depth are dressed superficially, the external parts being more disposed to heal and come together than the internal, they will fall into contact, or heal too soon; and the sore, not filling up properly from the bottom, will break out afresh.

Hence we may justly conceive how little dress is to be laid on famous ointments, or family faves, unskilfully applied; for unless this due medium is observed, or obtained in the dressing, no hollow sore can heal up properly.

As soon then as a good digestion is procured (which is known by the thickness and whiteness of the matter discharged, and the florid red colour at the bottom of the sore) let the dressings be changed for the precipitate medicine; or the sore may be filled up with dry lint, alone, or dipped in lime-water with a little honey and tincture of myrrh, or brandy, about a fifth part of the latter to one of the former: a pledget of lint, dipped in this mixture should also be applied to the bottom of the sore, which should be filled up with others to the surface or edges, but not crammed in too hard, as before observed, nor yet applied too loosely.

By this method, the sore would incarn, or heal up properly, and soft spongy flesh would be prevented or suppressed in time; whereas when ointments or faves are too long continued, a fungus, or proud flesh, is thereby so encouraged in its growth, that it requires some time to destroy and eat it down again: a proper compress of cloth, and a linen roller, is absolutely necessary both for this purpose, and to secure on the dressings, wherever they can conveniently be applied.

SECT. XXV. Of Wounds in general.

In all fresh wounds made by cutting instruments, there is nothing more required than bringing the lips of the wound into contact by future or bandage, provided the part will allow of it; for on wounds of the hips, or other prominent parts, and across some of the large muscles, the stitches are apt to burst on the horse's lying down and rising up in the stall. In such cases, the lips should not be brought close together: one

[d 2] stitch

Of Wounds flitch is sufficient for a wound two inches long ; but in large wounds, they should be at an inch or more distance ; and if the wound is deep in the muscles, care should be taken to pass the needles proportionably deep, otherwise the wound will not unite properly from the bottom.

Should the wound bleed much from an artery divided, the first step should be to secure it, by passing a crooked needle underneath, and tying it up with a waxed thread : if the artery cannot be got at this way, apply a button of lint or tow to the mouth of the bleeding vessels, dipped in a strong solution of blue vitriol, styptic water, oil of vitriol, or hot oil of turpentine, powdered vitriol, or colcothar, &c. and remember always to apply it close to the mouth of the bleeding vessels, and take care that it is kept there by proper compress and bandage till an eschar is formed ; otherwise it will elude your expectations, and frequently alarm you with fresh bleedings.

In a memoir presented to the Royal Academy of Sciences by M. La Fosse, he gives an account of the success he had met with in stopping the bleedings of very considerable arteries in horses, by the application of the powder of puff-balls, the arteries cicatrizing by this means only, without any succeeding hæmorrhage. The lycoperdon, or puff-ball, was made use of for this purpose in human subjects, about 170 years ago, by Felix Wurtz, a famous old surgeon in Germany ; but he does not seem to have thought of trusting to it in such considerable arteries as M. La Fosse mentions, *viz.* those of the leg and thigh, the bleedings from which divided vessels he stopped in a few minutes by the use of this powder only. The agaric of the oak may also be used for this purpose, where it can be retained by a proper bandage.

These applications, as indeed all styptics, seem to act by constringing the extremity of the vessel, or choking it up, till a grume of blood is formed internally, which plugs up the orifice ; and has been found to adhere to it so as to constitute one body with the vessel.

We avoid setting down any famous receipts for fresh wounds, whether ointments, or Friar's balsams, being well assured, that, in a healthy sound constitution, nature furnishes the best balsam, and performs herself the cure, which is so often attributed to the medicine ; when it is otherwise, and the blood is deprived of its balsamic state, as will appear from the aspect of the wound and its manner of healing, it must be rectified by proper internal medicines, before a good foundation for healing can be laid by any external application whatever.

The lips of the wound then being brought together by the needle or bandage, it needs only to be covered with rags dipped in brandy, or a pledget of tow spread with the wound ointment, (see p. 27. col. 1.) the directions in the preceding sections being observed and the wounded part kept as much as possible from motion.

Punctured wounds from thorns, or any other accidents, should be treated in the same manner ; applying the beer or bread and milk poultice over the dressing, till some signs of digestion appear ; and fomenting the part well every day. This method is also very successfully used to those swellings which often arise on the

neck from bleeding ; the sores being sprinkled with *Of Ulcers.* precipitate, and burnt alum powdered, to fetch out the core, or fungus, which chokes up the orifice. The usual method is to introduce a piece of vitriol, or sublimate, which often brings on a plentiful discharge, fetches out the core, and makes a cure ; but it is often with the loss of the vein, and it sometimes leaves a large swelling and impohtumation.

In gun-shot wounds, when the ball has not penetrated too deep, it should be extracted, if it can be fetched away without disturbance, together with any extraneous bodies that might pass in with it ; the wound should be dressed with the old digestive of Venice or common turpentine, divided with the yolks of eggs, to which may be added some honey and tincture of myrrh. The entrance of these wounds frequently requires to be enlarged, and a depending orifice should always be procured if possible ; and if the wound should not digest kindly, apply the beer poultice, and foment with the discutient fomentation before mentioned.

In scalds, or burns from gun-powder, or any other cause, when the skin remains entire, bathe the part well, and keep it soaked with rags dipped in spirit of wine camphorated : salt bound thick on the part has been found very effectual for this purpose ; and indeed all saline and spirituous applications excel others, while the skin is yet unbroken ; but when the skin is separated, anoint the part, and keep it constantly supple with linseed or salad oil, and a plaster spread with bees-wax and oil ; if the skin is so scorched, that sloughs must be digested out, dress with the wound-ointment and oil of turpentine, and finish the cure with any drying ointment. Should the horse be feverish from the pain, bleed him, give cooling glysters, and treat him as we have directed in simple fevers.

SECT. XXVI. *Of Ulcers in General.*

We shall not here enter into a description of each particular species of ulcers, but only lay down some directions for their general treatment ; by which means we shall avoid the usual prolixity of authors on this subject, and yet give so general an idea of the nature of ulcers, as we hope will be sufficiently instructive both of the application and of the proper remedy to each.

It may be necessary to observe, that we may often in vain pursue the best methods of cure by external applications, unless we have recourse to proper internal remedies ; for as all ulcers, difficult to heal, proceed from a particular indispotion of the blood and juices, before the former can be brought into any order, the latter must be corrected by alteratives and sweetening medicines.

The first intention in the cure of ulcers is bringing them to digest, or discharge a thick matter ; which will, in general, be effected by the green ointment, or that with precipitate ; but should the fore not digest kindly by these means, but discharge a gleety thin matter, and look pale, you must then have recourse to warmer dressings, such as balsam, or oil of turpentine, melted down with your common digestive, and the strong-beer poultice over them ; it is proper also in these kind of sores where the circulation is languid, and the natural heat abated, to warm the part, and quicken

quicken the motion of the blood, by fomenting it well at the time of dressing; which method will thicken the matter, and rouse the native heat of the part, and then the former dressings may be re-applied.

If the lips of the ulcer grow hard or callous, they must be pared down with a knife, and afterwards rubbed with the caustic.

Where soft fungous flesh begins to rise, it should carefully be suppressed in time, otherwise the cure will go on but slowly: if it has already sprouted above the surface, pare it down with a knife, and rub the remainder with a bit of caustic; and to prevent its rising again, sprinkle the fore with equal parts of burnt alum and red precipitate; or wash with the sublimate water, and dress with dry lint even to the surface, and then roll over a compress of linen as tight as can be borne; for a proper degree of pressure, with mild applications, will always oblige these spongy excrescences to subside, but without bandage the strongest will not so well succeed.

All sinuses, or cavities, should be laid open as soon as discovered, after bandages have been ineffectually tried: but where the cavity penetrates deep into the muscles, and a counter opening is impracticable or hazardous; where, by a continuance, the integuments of the muscles are constantly dripping and melting down; in these cases injections may be used, and will frequently be attended with success. A decoction of colcothar boiled in forge-water; or solution of lapis medicamentosus in lime-water, with a sixth part of honey and tincture of myrrh, may be first tried, injected, three or four ounces twice a-day; or some resin, melted down with oil of turpentine, may be used for this purpose: if these should not succeed, the following, which is of a sharp and caustic nature, is recommended on Mr Gibbon's experience.

TAKE of Roman vitriol half an ounce; dissolve in a pint of water; then decant and pour off gently into a large quart-bottle: add half a pint of camphorated spirit of wine, the same quantity of the best vinegar, and two ounces of Egyptiacum.

This mixture is also very successfully applied to ulcerated greasy heels, which it will both cleanse and dry up.

These sinuses, or cavities, frequently degenerate into *fistule*, that is, grow pipey, having the inside thickened, and lined, as it were, with a horny callous substance. In order to their cure, they must be laid open, and the hard substance all cut away; where this is impracticable, scarify them well, and trust to the precipitate medicine made strong, rubbing now and then with caustic, butter of antimony, or equal parts of quicksilver and aquafortis.

When a rotten or foul bone is an attendant on an ulcer, the flesh is generally loose and flabby; the discharge oily, thin, and stinking; and the bone discovered to be carious, by its feeling rough to the probe passed thro' the flesh for that purpose. In order to a cure, the bone must be laid bare; that the rotten part of it be removed: for which purpose, destroy the loose flesh, and dress with dry lint; or the doffils may be pressed out of tincture of myrrh or euphorbium. The throwing off the scale is generally a work of nature, which is effected in more or less time, and in proportion to the depth the bone is affected; though burning the foul

bone is thought by some to hasten its separation.

Where the cure does not properly succeed, mercurial physic should be given, and repeated at proper intervals: and to correct and mend the blood and juices, the antimonial and alterative powders, with a decoction of guaiacum and lime waters, are proper for that purpose.

SECT. XXVII. Of a Bone-Spavin.

WITHOUT entering at all into the cause of this disorder, which is a bony excrescence, or hard swelling, growing on the inside of the hock of a horse's leg, we shall content ourselves with describing the different kinds thereof by their symptoms, and then enter on their cure.

A spavin, that begins on the lower part of the hock, is not so dangerous as that which puts out higher, between the two round processes of the leg-bone; and a spavin near the edge is not so bad as that which is more inward toward the middle, as it does not so much affect the bending of the hock.

A spavin, that comes by a kick or blow, is at first no true spavin, but a bruise on the bone, or membrane which covers it; therefore not of that consequence, as when it proceeds from a natural cause: and those that put out on colts, and young horses, are not so bad as those that happen to horses in their full strength and maturity; but in very old horses they are generally incurable.

The usual method of treating this disorder is by blisters and firing; without any regard to the situation, or cause whence it proceeds. Thus, if a fulness on the fore-part of the hock comes upon hard riding, or any other violence, which threatens a spavin; in that case, cold coolers and repellers are proper, as are recommended in strains and bruises. Those happening to colts and young horses are generally superficial, and require only the milder applications; for it is better to wear them down by degrees, than to remove them at once by severe means.

Various are the prescriptions for the blistering ointment; but the following, on proper experience, stands well recommended by Mr Gibbon.

TAKE nerve and marsh-mallow ointment, of each two ounces; quicksilver, one ounce, thoroughly broke with an ounce of Venice turpentine; Spanish flies powdered, a dram and a half; sublimate, one dram; oil of origanum, two drams.

The hair is to be cut as close as possible, and then the ointment applied pretty thick over the part; this should be done in the morning, and the horse kept tied up all day without any litter till night; when he may be untied, in order to lie down; and a pitch or any sticking plaster may be laid over it, and bound on with a broad tape or bandage to keep all close.

After the blister has done running, and the scabs begin to dry and peel off, it may be applied a second time, in the same manner as before; this second application generally taking greater effect than the first, and in colts and young horses makes a perfect cure.

When the spavin has been of long standing, it will require to be renewed, perhaps, five or six times: but after the second application, a greater distance of time must be allowed, otherwise it might leave a scar, or cause a baldness; to prevent which, once a fortnight

Of a Curb, &c.
or three weeks is often enough; and it may in this manner be continued six or seven times, without the least blemish, and will generally be attended with success.

But the spavins that put out on older or full-aged horses are apt to be more obstinate, as being seated more inward; and when they run among the sinuities of the joint, they are for the most part incurable, as they then lie out of the reach of applications, and are arrived to a degree of impenetrable hardness.

The usual method in these cases is to fire directly, or to use the strongest kind of caustic blisters; and sometimes to fire and lay the blister immediately over the part: but this way seldom succeeds farther than putting a stop to the growth of the spavin, and is apt to leave both a blemish and stiffness behind; besides the great risk run (by applications of these fiery and caustic medicines to the nervous and tendinous parts about the joints) of exciting violent pain and anguish, and destroying the limb.

The best and safest way, therefore, is to make trial of the blistering ointment above, and to continue it according to the directions there laid down, for some months, if found necessary; the horses in the intervals working moderately: the hardness will thus be dissolved by degrees, and wear away insensibly.

Where the spavin lies deep, and runs so far into the hollow of the joint that no application can reach it, neither firing nor medicines can avail, for the reasons above-mentioned; though bold ignorant fellows have sometimes succeeded in cases of this sort (by men of judgment deemed incurable) by the application of caustic ointments with sublimate, which act very forcibly, enter deep, and make a large discharge, and by that means destroy a great part of the substance, and dissolve away the remainder: though, whoever is at all acquainted with the nature of these medicines, must know how dangerous in general their operation is on these occasions; and that a proper prepared cautery made like a fleam, under the direction of a skilful hand, may be applied with less danger of injuring either tendons or ligaments. After the substance of the swelling has been properly penetrated by the instrument, it must be kept running by the precipitate medicine, or mild blistering ointment. Where the spavin lies not deep in the joint, and the blistering method will not succeed, the swelling may be safely fired with a thin iron forced pretty deep into the substance, and then should be dressed as is above directed.

SECT. XXVIII. Of a Curb and Ring-bone.

1. As a spavin rises among the bones on the fore-part of the hock, so a curb takes its origin from the junctures of the same bones, and rises on the hind-part, forming a pretty large tumour over the back part of the hind-leg, attended with stiffness, and sometimes with pain and lameness.

A curb proceeds from the same causes that produce spavins; viz. hard riding, strains, blows, or kicks. The cure at first is generally easy enough effected by blistering, repeated two or three times, or oftener. If it does not submit to this treatment, but grows excessively hard, the quickest and surest way is to fire with a thin iron, making a line down the middle from top to bottom, and drawing several lines in a penniform

manner pretty deep; and then to apply a mild blistering plaster or ointment over it.—This method will entirely remove it.

There is another swelling taken notice of on the outside of the hock, which is called a *jardon*. This commonly proceeds from blows and kicks of other horses; but frequently happens to menaged horses, by setting them on their haunches: it is seldom attended with much lameness, unless it has been neglected, or some little process of the bone be broke. It should first be treated with the coolers and repellers in sect. xxxi.; but if any swelling continues hard, and insensible, the best way is to blister or fire; but the mild blisters alone generally succeed.

2. The *ring-bone* is a hard swelling on the lower part of the pastern, which generally reaches half-way round the fore-part thereof, and from its resemblance to a ring has its denomination. It often arises from strains, &c.; and, when behind, from putting young horses too early upon their haunches; for in that attitude a horse throws his whole weight as much, if not more, upon his pasterns, than on his hocks.

When it appears distinctly round the pastern, and does not run downwards toward the coronet, so as to affect the coffin-joint, it is easily cured: but if it takes its origin from some strain or defect in the joint originally, or if a callosity is found under the round ligament that covers that joint, the cure is generally dubious, and sometimes impracticable; as it is apt to turn to a quittor, and in the end to form an ulcer upon the hoof.

The ring-bones that appear on colts and young horses, will often insensibly wear off of themselves, without the help of any application; but when the substance remains, there needs no other remedy besides blistering, unless when by long continuance it is grown to an obstinate hardness, and then it may require both blistering and firing.

To fire a ring-bone successfully, let the operation be performed with a thinner instrument than the common one, and let the lines or razes be made not above a quarter of an inch distant, crossing them obliquely, somewhat like a chain; apply a mild blister over all, and, when quite dried up, the rupture-plaster; and then turn the horse to graze for some time.

SECT. XXIX. Of Splints.

THESE are hard excrescences that grow on the shank-bone, and are of various shapes and sizes. Some horses are more subject to splints than others; but young horses are most liable to these infirmities, which often wear off and disappear of themselves. Few horses put out splints after they are seven or eight years old, unless they meet with blows or accidents.

A splint that arises in the middle of the shank-bone is nowise dangerous; but those that arise on the back part of this bone, when they grow large and press against the back finew, always cause lameness or stiffness, by rubbing against it: the others, except they are situated near the joints, seldom occasion lameness.

As to the cure of splints, the best way is not to meddle with them, unless they are so large as to disfigure a horse, or are so situated as to endanger his going lame.

Splints in their infancy, and on their first appearance,

Of the
Poll evil.

Of a Fi-
stula, &c.

ance, should be well bathed with vinegar, or old verjuice; which, by strengthening the fibres, often put a stop to their growth: for the membrane covering the bone, and not the bone itself, is here thickened; and in some constitutions purging, and afterwards diuretic drinks, will be a great means to remove the humidity and moisture about the limbs, which is what often gives rise to such excrescences.

Various are the remedies prescribed for this disorder; the usual way is to rub the splent with a round stick or the handle of a hammer, till it is almost raw, and then touch it with oil of origanum. Others lay on a pitch-plaster, with a little sublimate, or arsenic, to destroy the substance; some use oil of vitriol; some tincture of cantharides: all which methods have at times succeeded; only they are apt to leave a scar, with the loss of hair. Those applications that are of a more caustic nature often do more hurt than good, especially when the splent is grown very hard, as they produce a rotteness, which keeps running several months before the ulcer can be healed, and then leaves an ugly scar.

Mild blisters often repeated, as recommended in the section upon the *Bone Spavin*, should first be tried as the most eligible method; and will generally succeed, even beyond expectation: but if they fail, and the splent be near the knee or joints, you must fire and blister in the same manner as for the bone-spavin.

Splents on the back part of the flank-bone are difficult to cure, by reason of the back sinews covering them: the best way is to bore the splent in several places with an iron not very hot; and then to fire in the common way, not making the lines too deep, but very close together.

SECT. XXX. Of the Poll-evil.

THE poll-evil is an abscess near the poll of a horse, formed in the sinuses between the poll-bone and the uppermost vertebrae of the neck.

If it proceeds from blows, bruises, or any external violence, at first bathe the swelling often with hot vinegar; and if the hair be fretted off with an ouzing thro' the skin, make use of two parts of vinegar, and one of spirit of wine; but if there be an itching, with heat and inflammation the safest way is to bleed, and apply poultices with bread, milk, and elder flowers: this method, with the assistance of physic, will frequently disperse the swelling and prevent this evil.

But when the tumour is critical, and has all the signs of matter, the best method then is to forward it by applying the ripening poultices already taken notice of, till it comes to maturity, and bursts of itself; or if opened with a knife, great care should be taken to avoid the tendinous ligament that runs along the neck under the mane; when matter is on both sides, the opening must be made on each side, and the ligament remain undivided.

If the matter flows in great quantities, resembles melted glue, and is of an oily consistence, it will require a second incision, especially if any cavities are discovered by the finger or probe; these should be opened by the knife, the orifices made depending, and the wound dressed with the common digestive of turpentine, honey, and tincture of myrrh, and, after digestion, with the precipitate ointment; or wash with the following

made hot, and fill up the cavity with tow soaked in it.

TAKE vinegar or spirit of wine half a pint, white vitriol dissolved in spring-water half an ounce, tincture of myrrh four ounces.

This may be made sharper by adding more vitriol; but if the flesh is very luxuriant, it should first be pared down with a knife before the application. With this wash alone Mr Gibbon has cured this disorder without any other formality of dressing, washing with it twice a-day, and laying over the part a quantity of tow soaked in vinegar and the white of eggs beat together.

But the most compendious method of cure, is found by observation to be by *scalding*, as the farriers term it; and is thus prosecuted when the fore is foul, of a bad disposition, and attended with a profusion of matter.

TAKE corrosive sublimate, verdigrease in fine powder, and Roman vitriol, of each two drams; green copperas half an ounce, honey or *Ægyptiacum* two ounces, oil of turpentine and train-oil of each eight ounces, rectified spirit of wine four ounces; mix together in a bottle.

The manner of scalding is first to clean the abscess well with a piece of sponge dipped in vinegar; then put a sufficient quantity of the mixture into a ladle with a spout; and when it is made scalding hot, pour it into the abscess, and close the lips together with one or more stitches. This is to remain in several days; and if good matter appears, and not in an over great quantity, it will do well without any other dressing, but bathing with spirit of wine; if the matter flows in great abundance, and of a thin consistence, it must be iced again, and repeated till the matter lessens and thickens.

SECT. XXXI. Of a Fistula, and Bruises on the Withers, Warbles on the Back, and Sit-safs.

1. BRUISES on the withers frequently impoſthumate, and for want of care turn fistulous. They arise often from pinches of the saddle, and should be treated with repellers: for this purpose bathe the tumour well with hot vinegar three or four times a-day; if that does not succeed alone, an ounce of oil of vitriol may be put to a quart of vinegar, or half an ounce of white vitriol dissolved in a little water, and added to the same quantity. These are generally very effectual repellers for this purpose in horses, and will frequently prevent impoſthumation: when the swelling is attended with heat, smarting, and little hot water pimples, the following mixture will then be more proper to bathe with.

TAKE two ounces of crude sal ammoniac, boiled in a quart of lime-water; where that cannot be had, a handful of pearl or wood ashes may be boiled in common water: pour off the decoction when settled, and mix with it half a pint of spirit of wine: anoint the part afterwards with linseed oil, or elder ointment, to soften and smooth the skin.

But when the swellings are critical, the consequence of a fever settled on this part, you must avoid the repelling method, and assist in bringing the swelling to matter, by means of suppurating poultices: experienced farriers advise, never to open these tumours till they break of themselves: for if they are opened before they are ripe, the whole fore will be spongy, and discharge a bloody ichor, which soon degenerates into a fœtid ulcer.

Of Wind-galls. ulcer. But take care to enlarge the openings, and pare away the lips, that your dressings may be applied easily; and avoid the ligament which runs along the neck to the withers: if a gathering forms on the opposite side, open it in the same manner; but take care they incline downwards, for the sake of depending orifices, and letting the matter flow off easily. For the method of dressing, we must refer to the preceding Section; and if the bones should be found foul, they must be dressed with tincture of myrrh till they scale off: if the fungus is very troublesome, and the discharge oily, yellow, and viscid, pledgets soaked in the following, made hot, have been found very effectual, bathing the swelling round with spirit of wine and vinegar.

TAKE half an ounce of blue vitriol dissolved in a pint of water; oil of turpentine, and rectified spirit of wine, of each four ounces: white-wine vinegar, six ounces; oil of vitriol and *Ægyptiacum*, of each two ounces.

When the cavities are truly fistulous, the callosities must be cut out, where it can be done, with a knife; and the remainder destroyed by corrosives, *viz.* precipitate, burnt alum, and white vitriol, as we have already observed in the Section on *Ulcers*.

2. *Warbles* are small hard tumours under the saddle-part of the horse's back, occasioned by the heat of the fiddle in travelling, or its uneasy situation. A hot greasy dish-clout, at first frequently applied, will sometimes remove them. Camphorated spirits of wine are also very effectual for this purpose to disperse them, to which a little spirit of sal armoniac may be added. The repellers above-mentioned are successfully applied in these cases; and if you are obliged to work the horse, take care your saddle is nicely chambered.

3. A *sit-fast* proceeds generally from a warble, and is the horse's hide turned horny; which, if it cannot be dissolved and softened by rubbing with the mercurial ointment, must be cut out, and treated then as a fresh wound.

SECT. XXXII. Of Wind-galls, Blood and Bog Spavins.

1. A *WIND-GALL* is a stultent swelling, which yields to the pressure of the finger, and recovers its shape on the removal thereof: the tumour is visible to the eye, and often seated on both sides of the back finew, above the fetlocks, on the fore-legs, but most frequently on the hind-legs; though they are met with in various parts of the body, wherever membranes can be so separated, that a quantity of air and ferocities may be included within their duplicatures.

When they appear near the joints and tendons, they are generally caused by strains, or bruises on the sinews, or the sheath that covers them; which, by being over-stretched, have some of their fibres ruptured; whence probably may issue out that fluid which is commonly found with the included air: though, where these swellings shew themselves in the interstices of large muscles, which appear bloyn up like bladders, air alone is the chief fluid; and these may safely be opened, and treated as a common wound.

On the first appearance of wind-galls, their cure should be attempted by refringents and bandage: for which purpose, let the swelling be bathed twice a-day with vinegar, or verjuice alone; or let the part be fo-

mented with a decoction of oak-bark, pomegranate, and alum boiled in verjuice, binding over it, with a roller, a woollen cloth soaked in the same. Some, for this purpose, use red-wine lees, others curriers shavings wetted with the same, or vinegar, bracing the part up with a firm bandage.

If this method, after a proper trial, should not be found to succeed, authors have advised the swelling to be pierced with an awl, or opened with a knife: but mild blistering has in general the preference given to these methods; the included fluids being thereby drawn off, the impacted air dispersed, and the tumour gradually diminished.

2. A *blood-spavin* is a swelling and dilatation of the vein that runs along the inside of the hock, forming a little soft swelling in the hollow part, and is often attended with a weakness and lameness of the hock.

The cure should be first attempted with the refringents and bandage above recommended, which will contribute greatly to strengthen all weaknesses of the joints, and frequently will remove this disorder if early applied; but if by these means the vein is not reduced to its usual dimensions, the skin should be opened, and the vein tied with a crooked needle and wax-thread passed underneath it, both above and below the swelling, and the turgid part suffered to digest away with the ligatures: for this purpose, the wound may be daily dressed with turpentine, honey, and spirit of wine, incorporated together.

3. A *bog-spavin* is an encysted tumour on the inside of the hough; or, according to Dr Bracken, a collection of brownish gelatinous matter, contained in a bag, or cyst, which he thinks to be the lubricating matter of the joint altered, the common membrane that incloses it forming the cyst. This case he has taken the pains to illustrate in a young colt of his own, where he says, When the spavin was pressed hard on the inside of the hough, there was a small tumour on the outside, which convinced him the fluid was within-side the joint: he accordingly cut into it; discharged a large quantity of this gelatinous matter; dressed the sore with doffils dipped in oil of turpentine; putting into it, once in three or four days, a powder made of calcined vitriol, alum, and bole: by this method of dressing, the bag sloughed off, and came away, and the cure was successfully completed without any visible scar.

This disorder, according to the above description, will scarcely submit to any other method, except firing, when the cyst ought to be penetrated to make it effectual; but in all obdurate cases that have resisted the above methods, both the cure of this and of the swellings called *wind-galls* should be attempted in this manner. If, through the pain attending the operation or dressings, the joint should swell and inflame, foment it twice a-day, and apply a poultice over the dressings till it is reduced.

SECT. XXXIII. Of Mallenders and Sallenders.

MALLENDERS are cracks in the bend of the horse's knee, that discharge a sharp indigelted matter; they are often the occasion of lameness, stiffness, and the horse's tumbling.

SALLENDERS are the same distemper, situated on the bending of the hough, and occasion a lameness behind.

They

Of Lam-
pas, &c.

They are both cured by washing the parts with a lather of soap warmed, or old chamber-lye; and then apply over the cracks a strong mercurial ointment spread on tow, with which they should be dressed, night and morning, till all the scabs fall off: if this should not succeed, anoint them night and morning with a little of the following, and apply the above ointment over it.

TAKE hogs lard, two ounces; sublimate mercury, two drams.

Or, TAKE hogs lard, two ounces; oil of vitriol, two drams.

Take the next from Gibson, which is to be depended on.

ÆTHIOPS mineral, half an ounce; white vitriol, one dram; soft green soap, six ounces.

Anoint with this often; but first clip away the hair, and clear the scabs. On their drying up, it may be proper to give a gentle purge or two; or the nitreballs may be taken advantageously, for a fortnight or three weeks.

SECT. XXXIV. Of Lampas, Barbs, and Wolves-teeth.

1. THE *Lampas* is an excrescence in the roof of the horse's mouth, which is sometimes so luxuriant, that it grows above the teeth, and hinders his feeding. The cure is in lightly cauterizing the flesh with a hot iron, taking care that it does not penetrate too deep, so as to scale off the thin bone that lies under the upper bars; the part may be anointed with burnt alum and honey, which is proper for moist sores in the mouth.

This operation is by some thought to be entirely unnecessary; it being a general observation with them, that all young horses have their mouths more or less full of what are called *lampas*; and that sometimes they rise higher than the fore-teeth; but they further observe, in proportion as a horse grows older, the roof flattens of itself, and the teeth then appear to rise. We are obliged to the ingenious M. La Fosse for this remark, and hope it will be the means of abolishing this cruel and unnecessary operation.

2. *Barbs* are small excrescences under the tongue, which may be discovered by drawing it aside, and are cured by cutting close off, and washing with brandy or salt and water.

3. A horse is said to have *wolves-teeth*, when the teeth grow in such a manner, that their points prick or wound either the tongue or gums in eating. Old horses are most liable to this infirmity, and whose upper overshoot the under teeth in a great degree.

To remedy this evil, you may either chop off the superfluous parts of the teeth with a chissel and mallet, or file them down, which is the better way, till you have sufficiently wasted them.

SECT. XXXV. Of the Grease.

In order to treat this disorder with some propriety, we shall consider it as arising from two different causes; a fault or relaxation in the vessels, or a bad disposition in the blood and juices. We must here observe, that the blood and juices (or humours, for there are always some in the best state of blood) are brought to the extreme parts by the arteries, and returned by the veins; in which latter, the blood is to rise in perpendicular

columns, to return the circulating fluids from the extremities: hence swellings in the legs of horses may easily be accounted for, from a partial stagnation of the blood and juices in the finer vessels, where the circulation is most languid; and especially when there is want of due exercise, and a proper muscular compression on the vessels, to push forward the returning blood, and propel the inert and half-stagnating fluids through their vessels; in short, the blood in such cases cannot so readily ascend as defend, or a greater quantity is brought by the arteries than can be returned by the veins.

The grease then, considered in this light, must be treated as a local complaint, where the parts affected are alone concerned, the blood and juices being yet untainted, and in good condition; or as a disorder where they are both complicated: but when it is an attendant on some other distemper, as the farcy, yellows, dropfy, &c. such diseases must first be cured before the grease can be removed. In the former case, moderate exercise, proper dressing, cleanliness, and external application, will answer the purpose; in the latter, internals must be called in to our assistance, with proper evacuations.

When a horse's heels are first observed to swell in the stable, and subside or go down on exercise; let care be taken to wash them very clean every time he comes in, with soap-suds, chamber-ley, or vinegar and water; which, with proper rubbing, will frequently prevent, or remove, this complaint: or let them be well bathed twice a-day with-old verjuice, or the following mixture, which will brace up the relaxed vessels; and if rags dipped in the same are rolled on, with a proper bandage, for a few days, it is most likely the swellings will soon be removed by this method only, as the bandage will support the vessels till they have recovered their tone. To answer this end, also, a laced stocking made of strong canvas or coarse cloth, neatly fitted to the part, would be found extremely serviceable, and might easily be contrived by an ingenious mechanic.

TAKE rectified spirit of wine, four ounces; dissolve in it half an ounce of camphor; to which add wine-vinegar, or old verjuice, six ounces; white vitriol, dissolved in a gill of water, one ounce; mix together, and shake the phial when used.

But if cracks or scratches are observed, which ooze and run, let the hair be clipped away, as well to prevent a lodgment (which becomes stinking and offensive by its stay), as to give room for washing out dirt or gravel, which, if suffered to remain there, would greatly aggravate the disorder.

When this is the case, or the heels are full of hard scabs, it is necessary to begin the cure with poultices, made either of boiled turnips and lard, with a handful of linseed powdered; or oatmeal and rye-flour, with a little common turpentine and hogs lard, boiled up with strong-beer grounds or red-wine lees. The digestive ointment being applied to the sores for two or three days, with either of these poultices over it, will, by softening them, promote a discharge, unload the vessels, and take down the swelling; when they may be dried up with the following:

TAKE white vitriol and burnt alum, of each two ounces; Ægyptiacum, one ounce; lime-water, a
[c] quart

quart or three pints : wash the fores with a sponge dipped in this, three times a-day ; and apply the common white ointment spread on tow, to an ounce of which may be added two drams of sugar of lead.

This method is generally very successful, when the distemper is only local, and requires no internal medicines ; but if the horse be full and gross, his legs greatly gorged, so that the hair itares up, and is what some term pen-feathered, and has a large stinking discharge from deep foul sores, you may expect to meet with great trouble, as these disorders are very obdurate to remove, being often occasioned by a poor dropical state of blood, or a general bad disposition in the blood and juices,

The cure in this case, if the horse is full and fleshy, must be begun by bleeding, rowels, and repeated purging ; after which, diuretic medicines are frequently given with success. Thus,

TAKE four ounces of yellow rosin, one of sal prunellæ ; grind them together with an oiled pottle ; add a dram of oil of amber ; and give a quart of forge-water every morning, fasting two hours before and after taking, and ride moderately.

As this drink is found very disagreeable to some horses, we would recommend the nitre-balls in its stead, given to the quantity of two ounces a-day, for a month or six weeks, mixed up with honey, or in his feeds : take the following also for that purpose.

Yellow rosin, four ounces ; salt of tartar, and sal prunellæ, of each two ounces ; Venice soap, half a pound ; oil of juniper, half an ounce ; make into balls of two ounce weight, and give one every morning.

The legs, in this case, should be bathed or fomented, in order to breathe out the stagnant juices, or to thin them, so that they may be able to circulate freely in the common current. For this purpose, foment twice a-day with the discutient fomentation, (p. 26. col. 1.) in which a handful or two of wood-ashes has been boiled ; apply then the above poultices, or the following, till the swelling has subsided, when the sores may be dressed with the green ointment till they are properly digested, and then dried up with the water and ointment above recommended.

TAKE honey, one pound ; turpentine, six ounces ; incorporate with a spoon ; and add of the meal of fennigreek and linseed, each four ounces ; boil in three quarts of red-wine lees to the consistence of a poultice ; to which add, when taken from the fire, two ounces of camphor in powder ; spread it on thick cloths, and apply warm to the legs, securing it on with a strong roller.

If the sores are very foul, dress them with two parts of the wound-ointment, and one of Ægyptiacum ; and apply the following, spread on thick cloths, and rolled on.

TAKE of black soap, one pound ; honey, half a pound ; burnt alum, four ounces ; verdigrease powdered, two ounces ; wheat-flour, a sufficient quantity.

If the diuretic balls should not succeed, they must be changed for the antimonial and mercurial alteratives, already mentioned : but turning a horse out in a field, where he has a hovel or shed to run to at pleasure,

would greatly contribute to quicken the cure, and indeed would in general effect it alone ; but if this cannot be complied with, let him be turned out in the day-time.

If the horse is not turned out, a large and convenient stall is absolutely necessary, with good dressing and care.

The last thing we shall recommend, is a method to oblige a horse to lie down in the stable. This undoubtedly is of the utmost consequence, as it will not a little contribute to the removal and cure of this disorder ; for by only changing the position of his legs, a freer circulation would be obtained, and the swelling taken down : whereas in general it is greatly aggravated by the obstinacy of the horse, who refuses to lie down at all (probably from the pain it gives him to bend his legs for that purpose), by which, means the stiffness and swelling increases, till the over-gorged and distended vessels are obliged to give way, and, by bursting, discharge the fluids, which should circulate thro' them.

SECT. XXXVI. Of Scratches, Crown-scabs, Rat-tails, and Capellets.

1. SCRATCHES in the heels have so much affinity with the grease, and are so often concomitants of that distemper, that the method of treating them may be selected chiefly from the preceding section ; which at first should be by the linseed and turnip poultice, with a little common turpentine, to soften them and relax the vessels ; the green ointment may then be applied for a few days to promote a discharge, when they may be dried up with the ointments and washes recommended in the above section. It is best afterwards to keep the heels supple, and softened with currier's dubbing, which is made of oil and tallow. This will keep the hide from cracking, and be as good a preservative as it is to leather ; and, by using it often before exercise, will prevent the scratches, if care is taken to wash the heels with warm water when the horse comes in. When they prove obstinate, and the sores are deep, use the following : but if any cavities or hollow places are formed, they should first be laid open ; for no foundation can be laid for healing, till you can dress to the bottom.

TAKE Venice turpentine, four ounces ; quicksilver, one ounce ; incorporate well together by rubbing some time ; and then add honey and sheeps fat, of each two ounces.

Anoint with this once or twice a-day ; and if the horse is full or fleshy, you must bleed and purge ; and if the blood is in a bad state, the alteratives must be given to rectify it.

2. The crown-scab is an humour that breaks out round the coronet, which is very sharp and itching, and attended with a fourfulness : sharp waters prepared with vitriol are generally used for the cure ; but the safest way is first to mix marsh-mallow and yellow basilicon, or the wound-ointment, equal parts, and to spread them on tow, and lay all round the coronet. A doze or two of phlegm may be very proper, with the diuretic medicines prescribed in the preced. col. and the alteratives above recommended, in rebellious cases. Vid. the Section on Alteratives.

3. Rat-tails are excrescences which creep from the pattern to the middle of the flanks, and are so called from

Of Rup-
tures, &c.

from the resemblance they bear to the tail of a rat. Some are moist, others dry; the former may be treated with the drying ointment and washes, p. 33. col. 2. par. ult. the latter with the mercurial ointment prescribed in the Section of *Strangles*, last paragr. If the hardness does not submit to the last medicine, it should be pared off with a knife, and dressed with turpentine, tar, and honey, to which verdigrease or white vitriol may occasionally be added; but before the use of the knife, you may apply this ointment.

TAKE black soap, four ounces; quick-lime, two ounces; vinegar enough to make an ointment.

4. There are particular swellings which horses are subject to, of a wenny nature, which grow on the heel of the hock, and on the point of the elbow, and are called by the French and Italians *capellets*: they arise often from bruises and other accidents; and when this is the case, should be treated with vinegar and other repellers. But when they grow gradually on both heels or elbows, we may then suspect the blood and juices in fault, and that some of the vessels are broke and juices extravasated: in this case, the suppuration should be promoted, by rubbing the part with marshmallow ointment; and when matter is formed, the skin should be opened with a lancet, in some dependent part towards one side, to avoid a scar: the dressings may be turpentine, honey, and tincture of myrrh. The relaxed skin may be bathed with equal parts of spirit of wine and vinegar, to which an eighth part of oil of vitriol may be added. The contents of these tumours are various; sometimes watery; at others fleshy, or like thick paste; which, if care be not taken to digest out properly with the cyst, will frequently collect again; was it not for the disfigurement, the shortest method would be to extirpate them with a knife, which, if artfully executed, and the skin properly preserved, would leave very little deformity.

SECT. [XXXVII.] XXXVIII. *Of Ruptures, Anticor, Colt-evil or Gonorrhoea, and Diseases of the Mouth.*

1. In regard to *ruptures*, though they are generally divided into particular classes, we shall only observe, that by violent efforts of the horse, or other accidents, the guts or caul may be forced between the muscles of the belly at the navel, and through the rings of the muscles into the scrotum or cod. The swellings are generally about the size of a man's fist, sometimes much larger, descending to the very hock: they are frequently soft, and yield to the pressure of the hand, when they will return into the cavity of the belly with a rumbling noise; and, in most, the vacuity may be felt through which they passed.

On their first appearance, endeavours should be made to return them by the hand; but if the swelling should be hard and painful, in order to relieve the stricture, and relax the parts through which the gut or caul has passed, let a large quantity of blood be immediately taken away, and the part fomented twice or thrice a-day, applying over it a poultice made of oatmeal, oil, and vinegar, which should be continued till the swelling grows soft and easier, or the gut is returned. In the mean time, it would be proper to throw up emollient oily glysters twice a-day, and to let the horse's chief diet be boiled barley, scalded malt, or bran.

Should the swelling afterwards return, we apprehend the restringent applications, usually recommended on these occasions, will avail little without a suspensory bandage; so that an ingenious mechanic in that art is chiefly to be relied on for any future assistance; though it has been observed, that with moderate feeding, and gentle exercise, some horses have continued to be very useful under this complaint.

2. The *anticor* is a disorder not very common among our horses, or those in northern climates; but is particularly taken notice of by the French, Spanish, and Italian writers; who describe it a malignant swelling in the breast, which extends sometimes to the very sheath under the belly; it is attended with a fever, great depressions and weakness, and a total loss of appetite.

The cure should be first attempted by large and repeated bleedings, to abate the inflammation; emollient glysters should be injected twice or thrice a-day, with an ounce of sal prunella in each, and the cooling drink in the Section on Fevers should be given inwardly; the swelling should be bathed with the marshmallow ointment; and a ripening poultice, with onions boiled in it, should be applied over it. If by this method, continued four or five days, the inflammation in the throat and gullet is removed, our attention should more particularly turn to encourage the swelling at the breast, and bring it, if possible, to matter: to which end, continue the poultice, and give two ounces of Venice treacle dissolved in a pint of beer every night; when the swelling is grown soft, it must be opened with the knife, and dressed with turpentine digestive, the danger now being over.

But should it be found impracticable to bring the swelling to matter, and it increases upwards, so as to endanger suffocation; authors have advised to pierce the tumour with a hot pointed cautery in five or six places; to dress with the above digestive; and, in order to stimulate and promote a greater discharge, to add to it a small quantity of Spanish flies and euphorbium in powder; fomenting at the same time, and bathing the circumjacent parts with ointment of marshmallows. M. Gueriniere, as well as Solysell, have advised opening the skin, when the tumour cannot be brought to matter, in order to introduce a piece of black hell-bore-root steeped in vinegar, and to confine it there for 24 hours: this also is intended as a stimulant; and is said to answer the intention, by occasioning sometimes a swelling as big as a man's head.

3. Besides the disorders of the mouth, which we have already animadverted on, there are frequently observed on the inside the lips and palate, little swellings or bladders called *giggs*. Slitting them open with a knife or lancet, and washing them afterwards with salt and vinegar, is in general their cure; but when they degenerate into what are called *cankers*, which are known by little white specks, that spread and occasion irregular ulcers, the best method then is to touch them daily with a small flat cautery, moderately heated till the spreading is stopped, and to rub the sores three or four times a day with *Ægyptiacum*, and tincture of myrrh sharpened with oil or spirit of vitriol; when by this dressing the sloughs are separated, they may be washed frequently with a sponge dipped in copperas, or sublimate water, if they continue to spread; or a tincture made by dissolving half an ounce of burnt alum,

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and two ounces of honey, in a pint of tincture of roses. Either of these will dry them up, and are very useful in most disorders of the mouth.

A relaxation and swelling of the palate sometimes happens to horses on catching cold. To remedy this disorder, blow pepper on the part, or anoint it with the same mixed up with honey. The tincture above mentioned may be used for this purpose, to which may be added half an ounce of spirit of sal armoniac.

4. The colt-evil is supposed to arise from stoned colts having full liberty with mares, before they are able to cover them; whence frequently ensues an excoriation or fretting on the glands and a swelling on the sheath. This last disorder frequently proceeds too from dirt or filth lodging there, and is often removed by washing the part clean with butter and beer: but when the yard itself is swelled, foment it twice a-day with marsh-mallows boiled in milk, to which may be added a little spirit of wine; anoint the excoriation with the white ointment, or wash it with a sponge dipped in lime, to a pint of which may be added two drams of sugar of lead: the yard should be suspended up to the belly; and if the swelling should increase with the inflammation, bleed, and give the cooling physic, anoint with ointment of alder, and apply the bread-and-milk poultice.

If a simple gonorrhœa or seminal gleet is observed to drip from the yard, (which is often the case in high-fed young horses, where a relaxation of the glands and seminal vessels has been brought on by frequent emissions), let the horse be plunged every day into a river or pond; give him two or three rhubarb purges, at proper distances; and intermediately the following balls.

TAKE of balsam of copivi, or Venice turpentine, oil-banum, and mastic powdered, of each two drams; bole armeniac, half an ounce: mix up into a ball with honey, and give it night and morning till the discharge lessens, and then every night till it goes off.

Balls prepared with rhubarb and turpentine may also be given for this purpose; two drams of the former, with half an ounce of the latter.

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SECT. XXXIX. Preliminary Remarks.

I. *Of Greasing, Oiling, and Stuffing Horses Hoofs.* The custom of keeping our best horses constantly standing upon dry litter and hot dung in the stable, is exceedingly hurtful to the feet and legs, particularly the former, which are always found to agree best with coolness and moisture. Hence we find, that horses hoofs, whilst running in the fields, are always in better condition than those that are kept hot and dry in the stable, which, beside being liable to many diseases, are hard, brittle, shattered, and often broken.

With respect to greasy or oily applications, so often prescribed for the hoofs of horses in order to preserve them found, tough, &c. Mr Clark* very justly condemns them as rather pernicious than salutary.

When young horses (he observes) are first taken from the fields, their hoofs are cool, found, and tough. These are found from experience to be good qualities. But horses are no sooner introduced into the stable, than their hoofs are greased or oiled two or three times a-week: and if they are kept much in the house standing upon hot dry

litter, without being frequently led abroad, and without having an opportunity of getting their hoofs cooled and moistened in wet ground, their hoofs grow so brittle, dry, and hard, that pieces frequently break off, like chips from a hard stone; and, when driving the nails in shoeing, pieces will split off, even although the nails are made very fine and thin. Now, if these same horses with brittle shattered hoofs are turned out to graze in the fields, their hoofs in time will become, as they were originally, found, tough, and good.

This change must undoubtedly be ascribed to the wet and moisture which the hoofs are exposed to in the fields, of which water is the principal ingredient; and it is a certain fact, of which we have daily proofs, that when all other means fail, horses are turned out to graze in order to recover their decayed brittle hoofs. It is known, that the hoofs of horses are porous; and that insensible perspiration is carried on through these pores, in the same manner, and according to the same laws, as take place in other parts of the body. Now, every body knows, that greasy or oily medicines applied to the skin of the human body, prevent perspiration, which is frequently attended with the worst consequences. The same reasoning will hold with respect to the hoofs of horses; for greasy or oily applications close or shut up the pores of the hoof, by being absorbed or sucked into its inner substance. Hence the natural moisture which should nourish the hoof, is thereby prevented from arriving at its surface; which, on that account, becomes as it were dead, and consequently dry, brittle, and hard.

The original practice of greasing or oiling horses hoofs, had probably taken its rise, from observing, that grease or oil softened dead substances, such as leather, &c. But this will by no means apply to the hoofs of horses, as there is a very great difference between the living and dead parts of animals. The former having juices, &c. necessary for their own nourishment and support, whilst the latter require such applications as will preserve them from decaying and rotting.

The dealers in horses about London, when they get a bad-footed horse in their hands, moisten his hoofs frequently in water; for which purpose, they keep a puddle of water and dung at the watering place, that when the horse comes to water, his fore-feet are sunk in the puddle, by which means they are cooled and moistened twice or thrice every day; so that, whilst they are making up his carcass for the market, his hoofs are likewise repaired, and sufficient to stand the test of a trial upon sale. But no sooner do horses with hoofs of this kind come into other hands, their hoofs at the same time being kept dry and greased, &c. than they degenerate into their former state. Hence the cause of so many complaints that horses turn soon lame after they come from dealers, when, in fact, it proceeds from greasy applications, and neglecting to cool or moisten the hoofs in water; for the careful groom, when airing his master's horses, rather than lead them into a puddle, will go about in order to keep their legs clean and dry.

Another practice equally pernicious, is the stuffing up horses hoofs (as it is called), with hot, resinous, and greasy mixtures, under the notion of cooling and softening them. Various are the prescriptions recommended for this purpose, many of which are of a quite opposite

* Observations on the shoeing of Horses, and on the diseases of their feet; from which judicious performance the following sections are extracted.

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opposite nature to the purpose intended.—There is likewise a great impropriety in stuffing up the hoofs with rotten dung and stale urine: this, it is true, is moisture; but of the very worst kind, on account of the salts contained in the urine, which of itself greatly contributes towards hardening and drying their hoofs, in place of softening them; besides the other bad effects which may arise to the frog, &c. from the rottenness of the dung. But, without commenting upon the various compositions or pompous prescriptions recommended in books, or those handed about as receipts for the softening and stuffing horses' hoofs, the author would recommend one which is more natural, and ought not to be despised for its simplicity, as it is only cooling and moistening the hoofs with water morning and evening: And, to those who are fond of stuffing, he would prescribe bran and water, or clay, &c. made into the consistency of a poultice; and, in particular cases, where horses stand much in the stable, and the hoofs are disposed to be very hard, dry, and brittle, a poultice of this kind, or any other emollient composition in which water is a principal ingredient, may be applied all round the hoof; or, in imitation of some dealers, to keep a equal of water at the watering place, which will answer equally well, if not better. From this manner of treatment, the hoofs will be preserved in their natural state, and a free and equal perspiration kept up, by which the nonstiffness natural to the hoof will have free access to its surface, as it is this only which causes that cohesion of the parts which constitutes a firm, sound, tough hoof.

II. *Of the natural Defects of the Feet.* It is very well known, that different climates and different soils greatly affect the feet of horses. Those that are bred in hot countries, standing mostly upon dry ground, have deep crufted hollow hoofs with small frogs; for, being but little exposed to wet or moisture, the fibres of the hoof contract more closely. And, even in Great Britain, there is a considerable difference, according to the dryness or wetness of the soil upon which horses are bred. Those that are bred upon the mountainous parts of England and Wales, and in the northern parts of Scotland, have generally good sound tough hoofs; whilst those horses that are bred upon low marshy grounds, (which are mostly of the big draught kind), have flat, large, soft hoofs; for being kept too moist, by always soaking in wet, the horny fibres of the hoof are too much relaxed.

Those hoofs which are either too large or too small, in proportion to the size of the body, and thickness of the bones of the legs, are generally, and not without foundation, looked upon as bad. Large broad hoofs, for the most part, have thin flat soles; large, soft, spongy frogs; a strong cruft, something hollow upon the upper and fore part, and full of wrinkles or rings, not unlike the rough outside of an oyster-shell. Hoofs of this shape are liable to that disease termed *sundered*; and to have high, round, or swelled soles, and low weak heels, &c.

Small hoofs are liable to the opposite extreme, especially those of that kind which generally go under the denomination of *after hoofs*, as they are deep crufted and narrow, the sole very hollow, the frog small, the heels high and strong, the cruft upon the outside clear and shining: these are naturally disposed to a contrac-

tion of the whole hoof, which is called *hoof-bound*; and likewise to corns, running thrushes, or frushes; either of which render a horse lame.

Some hoofs are pretty well proportioned, and look well to the eye; but, at the same time, they are thin and weak crufted, and not able to stand much fatigue in travelling upon hard stony grounds. On the other hand, very strong crufted hoofs are by no means the best, but are liable to cracks, &c. In such hoofs, the horny fibres appear very distinct, and run in a straight line from the coronet or top of the hoof to its basis, resembling the grain of some kinds of wood, particularly oak. Hence they are disposed to cracks or fissures, which cleave the hoof quite through, sometimes from the coronet down to the bottom of the hoof. In others, these cracks at first do not penetrate through the horn, but appear like a seam on the surface of the hoof, commonly named a *sand-crack*; which, from retaining the sand and gravel, at last works its way into the quick, and occasions lameness, &c. Another disadvantage attending very strong crufted hoofs is, that, when they stand long in a dry hot stable, they contract, and by their thickness and hardness bruise the internal parts of the foot. Hence the horse will be lame, though, at the same time, no visible defect will be seen about the hoof, excepting a great heat, pain, and tenderness in his feet; the true cause of which is seldom attended to or known; and hence the horse is said to be lame in some other part, perhaps the shoulders. Low thin heels are weak-crufted, and liable to lameness from injudicious shoeing. The opposite extreme, viz. very high heels, is equally bad; as these are subject to corns, and contraction of the hoof; and the deepness of the cruft causes a numbness in the feet, and unsteadiness in the horse's going, which make him liable to trip and stumble.

Much has been said by authors, with respect to the different colours of horses' hoofs, ascribing different qualities and temperaments to peculiar colours, such as hardness, dryness, brittleness, &c. But it is very well known to practitioners in shoeing horses, that there are good and bad hoofs of all colours; some being naturally weak and disposed to be brittle, whilst others are tough and strong. But a great deal depends upon the management of them in the stable, in keeping them properly moistened, in order to preserve a due medium between these opposite extremes. It is likewise generally remarked, by authors, as a sure sign of bad thin hoofs, that, when the shoe-nails are drove high up in the cruft, it is, say they, an evidence that the cruft is thin, and that there was not sufficient hold, without driving the nails high up. But this can be no true criterion to judge by; for, if the nails can be driven high up in the cruft with safety in a thin weak foot, the same may as certainly be done in a strong foot, with more ease and expedition, which indeed is frequently the case.

To form a right judgment of what may be called a good hoof, it must neither be too large nor too small in proportion to the size of the leg: at the same time, its shape must be regular, gradually enlarging from the coronet towards its basis; the cruft smooth, even, and free from seams, cracks, or wrinkles; the sole strong, and a little hollow; the heels firm and open; the frog tough, sound, and dry.

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SECT. XL. *Wounds in the Feet.*

WOUNDS in the feet happen frequently, but chiefly from want of proper care, and treating them injudiciously when they are first inflicted.

1. Wounds upon the coronet, or top of the hoof, when superficial, are easily cured, if not neglected or improperly treated. But the most simple wound, by bad management or neglect, may, especially if the horse should happen at the time to be in a bad habit of body, be attended with dangerous consequences: therefore, however trifling they may at first appear, they should be treated with attention.

When large deep wounds are inflicted upon the coronet, from which may be apprehended a great inflammation, and its consequences; to prevent these evils as much as possible, it will be necessary to have recourse to bleeding, and, at the same time, to give such internal remedies as are recommended in inflammatory cases; cooling salts, glysters, &c. together with a low soft diet, keeping the hoof moist and soft with emollient poultices applied around it, which may be made of turnip, mallows, or even bran and water.

Deep wounds upon the coronet are generally made by long sharp caulkers upon the heels of the shoes of the opposite foot, penetrating downwards between the coffin-bone and the hoof. In this case, as there is no depending orifice or passage for the matter contained in the wound to be discharged downwards, there is great danger of a fistula or sinuous ulcer being formed; to prevent which, an artificial drain or opening must be made through the hoof, first rasping or paring it very thin upon the outside where the perforation is to be made; then introduce a sharp-pointed instrument, a little bent, into the orifice of the wound, and, passing it to the bottom, force it outwards. This operation will be performed with less pain to the animal, if the instrument be concealed within a canula or hollow tube, till it reaches to the bottom of the wound; when the perforation is to be made by pushing it beyond the extremity of the canula; and, by applying a bandage pretty tight round the coronet, the sides or lips of the wound may be brought into contact and healed up, or a seton may be introduced, and continued till the inflammation, swelling, &c. is removed. If this operation be too long delayed, the matter confined in the wound forms a number of sinuses or fistulae, which frequently run in different directions under the hoof, and require a large portion of it to be cut away before they can be healed up, leaving an ugly blemish, and a weakness or tenderness on that part of the hoof, which never admits of a thorough cure. But, by treating it in the manner now mentioned, the annular ligament may be preserved entire, and a false quarter avoided: and, although there may remain an horizontal crack or fissure in the hoof where the perforation was made; yet, as the hoof grows downwards, it will likewise go along with it, and wear out, without leaving a blemish or any other bad consequence.

When the capsular ligament of the coffin-joint is wounded or perforated by any instrument, so as to admit the external air into its cavity, the glands there situated inflame; and, in place of secreting a lubricating mild liquor, they discharge a sharp ichorous fluid, which destroys and corrodes the very cartilages or

griffles upon the ends of the articulated bones, which at last grow together, and form what is termed an *anchylosis*, and of course lameness. There are many farriers who boast of their having cured wounds in the joints after they were affected with that symptom which they call a *joint-water*, that is, a discharge of the synovia or mucilaginous fluid contained within the cavity of the joint. But what they commonly call a *joint-water*, is only a yellow serum or lymph, which is frequently to be met with issuing in great abundance from wounds in the legs; and not the synovia or fluid contained within the cavity of the joint. Notwithstanding wounds of this kind happen frequently; yet, so little are the generality of practitioners acquainted with the nature of them and their consequences, that they make no distinction betwixt them and those of a more simple nature. Hence, therefore, they find themselves frequently mistaken in prognosticating the cure of a wound, to appearance of a very simple nature.

It is a certain fact, confirmed by experience, that, when the capsular ligament of any joint is perforated or cut through, there is but little chance of a complete cure being effected, so as the horse may be useful for the saddle or carriage; although, in other respects, to those who are willing to be at the expense, he may, if a strong horse, be useful in some kinds of drudgery.

As to the mode of dressing wounds of this kind, all that art can do, is to prevent, as much as possible, a violent inflammation or flux of humours to the affected limb, by bleeding, glysters, cooling salts, together with a low soft diet, applying digestive poultices to the wound, and injecting now and then into the cavity of the joint tincture of myrrh.

2. Wounds upon the coronet towards the back part of the foot or heel, which are commonly called an *over-reach*, are occasioned by the toe of the hind-shoe on the same side cutting the fore-heel. Some horses are much addicted to this, owing entirely to their manner of going, *viz.* the hind-foot moving in the same line of direction with the fore-foot; in riding fast, the fore-foot not giving place in time to the hind-foot, strikes against the fore-heel: hence some horses, in trotting, make a clattering noise with the hind-heels striking against the heel of the fore ones; hence, likewise, many horses are thrown down by the same cause.

Although an over-reach is a wound of the complicated kind, being at the same time a contusion or bruise together with a wound; yet they are nowise dangerous, and are easily cured by treating them in the manner hereafter mentioned; for, in two or three days, when the wound comes to suppurate properly, the bruised or dead parts fall off, and only leave a larger surface of a wound than was at first apprehended.

With respect to the dressing proper for recent wounds, farriers are too much prejudiced in favour of certain balsams, ointments, and tinctures; and too sanguine in the belief of their supposed specific virtues, the healing qualities of which they flatter themselves are irresistible. But the truth is, all that art can do in the healing of wounds, is to remove every impediment which may obstruct the uniting of the divided parts, and to forward the formation of laudable pus or matter; that being once effected, the rest is performed by nature, which is self-sufficient. All the balsams and remedies which

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nature by which they are said to generate new flesh, in fact only assist nature by excluding the external air, keeping the wounded parts warm, and confining the secreted humours, which, by remaining there a due time, are converted into laudable matter, which is the balsam of nature's preparing. Therefore, the most approved and rational method of treating recent wounds is, to endeavour to bring them to a suppuration or discharge of laudable matter; for which purpose, poultices are most eligible, as they may be easily made more or less of a digestive quality, by melting and mixing any proper digestive ointment with the poultice whilst warm.

1. *Digestive Ointment.* TAKE common turpentine and hog's lard, of each equal parts, melted together.

This ointment may be made stronger or weaker, by diminishing the one ingredient and increasing the other; and is very proper to be mixed with poultices, in order to keep them soft and pliable.

2. *Digestive Poultice.* TAKE oat-meal or coarse wheat-flour; digestive ointment, two ounces; beer-grounds, a sufficient quantity: boil the whole to the consistence of a poultice. The quantity of the ointment may be increased or diminished in proportion to the size of the poultice.

The experience the author has had of the good effects of poultices of this kind in recent wounds, makes him recommend them as preferable to any other mode of dressing, for promoting a quick suppuration, and leaving a smooth even cicatrix.

3. *Emollient Poultice.* TAKE oat-meal, or coarse wheat-flour, and sifted powdered, of each half a pound. Boil them in milk or water to the consistence of a poultice: to which add of sal armoniac, in powder, one ounce.

This emollient poultice may be applied when there is a great heat, inflammation, or swelling, attending wounds; and by the addition of fresh butter, lard, or oil, may be made of a more relaxing nature.

Many people are indeed prejudiced against the use of poultices, from a wrong notion, that they (as the phrase is) draw humours to the wounded part; but the absurdity of this way of reasoning will be evident to those who are acquainted with the healing art.

"Poultices (says Mr Bartlett) are of such real and extensive use in farriery, that we thought the composition of them could not be too general. How simple soever the ingredients may appear to some, (which are generally at hand), yet they will be found to answer most intentions, where present ease is to be obtained by warmth, softening, and relaxing the injured part. Many are the cases which demand such assistance, as recent swellings, inflammations, treads, bruises, cracked and swelled heels and feet, burns, scalds, bruised and lacerated wounds from flumps, thorns, glass, nails, &c. which last are much better treated with such simple emollient applications, than by hot oils or scalding plasters dropt into the wounds; which, under the absurd notion of drawing, but too often fear up the mouths of the vessels, hinder digestion, and consequently increase both pain and inflammation. In short, it is certain that very great services are daily done by the use of poultices, not only in those disorders to which the human body is incident, but also in those where-with the brute part of the creation is afflicted. One

advantage which they have over most outward applications is peculiar to them, that they convey and retain an additional heat, besides what is often in the ingredients; and as most of them have also something emollient in their composition, they must necessarily soften and relax the skin and vessels, abate tension, attenuate and thin viscid and obstructed juices, so that their return into the common course of circulation, or discharge by the pores of the skin, must in general be much better answered by poultices than by other methods."

Poultices may be continued till such time as the wound appears to be well digested, (that is, a kindly suppuration of white well-concocted matter), look smooth and equal, free from cavities or excrescences of proud flesh; in that case, the use of poultices may be left off, and the surface of the wound may be sprinkled over with the following mild escharotic powder.

4. TAKE burnt limestone, that breaks down on being exposed to the air without water, three ounces; Armenian bole, one ounce; rubbed together in a mortar, and put through a fine sieve.

After the wound is sprinkled with this powder, a pledget of dry lint may be fixed gently over it; and, when the surface of the wound is nearly equal with the skin, the powder will be sufficient, without any cloth or covering.

3. There is another species of wounds to which the feet are much exposed, called *punctures*, on account of their small orifice, as the parts immediately after the wound is inflicted readily close up, whereby it becomes difficult to know the depth of the wound. They are generally occasioned from treading upon sharp stones, broken glass, sharp bones, and nails, and likewise from nails in shoeing; either of these perforating the sole or frog, and wounding the internal parts of the foot; which, from their situation and confinement within the hoof, are attended with the most violent pain and inflammation, which are frequently increased by the injudicious method generally observed in treating these wounds when first inflicted, by the application of hot corrosive oils poured into the recent wound, in order to deaden it, which is productive of the worst of consequences. Thus, a fine young chaise-horse, upon a journey, was pricked with a nail in shoeing; which being immediately observed, the farrier poured into the wound oil of vitriol. The horse continued very lame; and, upon the third day, he gave up, not being able to travel any longer. The leg, immediately above the hoof, swelled to a most enormous size, broke out in different places, and discharged an incredible quantity of bloody matter, by which the whole limb was wasted, and the horse rendered entirely useless.

Punctures or pricks from nails in shoeing, are commonly said to proceed from ignorance or blundering. This may sometimes be the case; but, at the same time, it is an accident that may, and indeed does, happen to the most expert artill; and it is surprising, considering the narrow space there is in some hoofs for driving nails, that it does not happen more frequently. When it is discovered in time, it is easily cured, by opening a passage for the matter downwards, and dressing it with any digestive ointment or poultice, and keeping the foot moist, by applying an emollient poultice all round the hoof. But when it is overlooked, or

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a fragment of the nail remains in the wound, the inflammation increasing, it at last suppurates. The matter accumulating, and not finding a passage downwards, from the natural formation of the hoof, it moves upwards to the coronet or top of the hoof, and forms a round tumour, which afterwards breaks out and degenerates into a most malignant ulcer, commonly termed,

4. A *Quittor-bone*. This tumour is attended with great pain and inflammation, and a considerable swelling round its basis. The method of cure commonly practised, and indeed recommended by authors, especially Dr Braken, is to bore a number of holes into the substance of the tumour with a hot iron, pointed pyramidally; and to introduce into these holes small pieces of corrosive sublimate, (some even use arsenick), which corrodes and destroys the flesh for some space around them, and at last separates from the sound parts, in a hardened mass of dead mortified flesh, called a *core*, which falls off and leaves a large surface of a wound. But, frequently, a second or sometimes a third operation is found necessary, before the fistula or sinus can be opened to the bottom, and the proud flesh totally overcome, which grows very luxuriantly, and renders the cure tedious, uncertain, and very painful to the animal. Therefore, as this method of cure is attended with so many inconveniences, and is even dangerous from the quantity of sublimate, &c. made use of, which may as readily destroy the ligament of the joint, bones, &c. as the substance of the tumour, it ought never to be used but with caution, and when other means have failed, as it likewise endangers the life of the horse. The knife seems far preferable: first tie a ligature round the fetlock, in order to stop the bleeding; and, with a crooked sharp knife, cut out the tumour to the bottom; afterwards dress it like a fresh wound, till it is healed up.

In ulcers of this kind, as there are a number of sinuses or fistulae which run in different directions underneath the hoof, it is hardly possible to avoid destroying the annular ligament which lies below the coronet, and cutting away a large portion of the hoof; yet, in many cases, (especially when there is an opening in the tumour), the method proposed, at the beginning of this section, for curing the deep wounds upon the coronet with seton, may be first tried; and, if that does not succeed, either of the operations above mentioned may be performed.

Punctures differ little or nothing, in the manner of treating them, from wounds; only the sole or frog should be scraped thin all round the orifice of the wound, which, at the same time, if too small, should be enlarged, and the digestive poultice applied, taking care that no fragment or extraneous substance remain in the wound, and keeping the whole hoof moist and soft with emollient poultices around it; and, in cases attended with violent pain, recourse must be had to such internal remedies as are proper in inflammatory cases, such as the following mixture by way of a drink, in order to prevent, as much as possible, an inflammation, or a flux of humours to the affected limb, bleeding being first premised, together with using a low soft diet.

5. TAKE salt of nitre, two ounces; common treacle, two ounces. Dissolve in a quart of water.

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It will be necessary to repeat this draught morning and evening; if the horse should shew any uneasiness, or appear griped, the quantity of water may be increased, or the same quantity of nitre may be given the horse in a mash of bran twice a-day, if it does not cause him loath his food. If the coffin-bone should be wounded and turns carious, it will be tedious to wait for an exfoliation, as, from the spongy texture of this bone, it exfoliates but slowly; therefore, if it can conveniently be done, the carious parts may be scraped off with a knife, and afterwards dressed with pledgets of tow dipped in the tincture of myrrh; and let the poultice be applied above it.

In punctures, as above described, it is a common practice to pour into the wound hot corrosive oils, (some even run into the wound an iron nail made red hot), in order, as the phrase is, to deaden the parts. In superficial or slight wounds, when perhaps little more than the hoof is wounded, the application of hot oils can hardly be very hurtful. But the barbarous method of pushing a hot nail into a recent wound, cannot fail of being attended with bad consequences, as the cure is unquestionably worse than the disease. But, at all events, when the puncture is deep, either of these cruel methods is extremely hurtful. The wound is said to be of the most inveterate or desperate kind; when, in fact, the bad practice of injudicious applications, &c. escape the just censure they deserve.

5. *Contusions or bruises* happen frequently on the coronet or top of the hoof, from the treading of other horses feet, which will occasion lameness; although, at the same time, no external mark of violence will appear on the coronet, farther than a little swelling, or the horse will show a sense of pain when the affected part is touched or pressed upon. The following poultice in this case may be applied with success, if continued for some time.

6. TAKE thick lees of wine or vinegar, one pint; crude sal ammoniac, two ounces; oat-meal or bran, sufficient to make it of a due consistence. Dissolve the sal ammoniac in the lees first.

Before concluding this section, it may not be improper to mention the following rules, which ought carefully to be attended to by every practitioner.

1. The first thing to be observed in dressing of wounds is, to remove all foreign bodies, (if it can be done with safety), all lacerated or torn parts, whether of the flesh or of the hoof, &c. which, from their being left in the wound, would greatly impede the cure. 2. All wounds should be carefully inspected at every dressing, observing attentively whether any alteration has been made on their surface, whether they be clean at the bottom, and free from any extraneous substance that may hinder or retard the cure. 3. Whatever appears mortified, or any fungous or proud flesh, must be removed, either by suppuration, by the knife, or by caustic. 4. Cramming wounds with hard tents, or syringing them frequently with spirituous tinctures, are extremely hurtful. The former increases the pain and inflammation, &c. the latter produces a callus upon the internal surface of the wounds, which prevents their healing. 5. The dressings of wounds should lie smooth and easy upon the parts. 6. Over-tight ligatures or bandages should be carefully avoided. 7. As wounds in the feet or legs, for obvious reasons, are more

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more difficult to heal than on any other part of the body; therefore, rest and a wide stall are absolutely necessary, together with a low regimen or soft diet, in order to keep the body cool and open.

SECT. XLl. *Of that Disease in the Feet commonly called FOUNDERED.*

The term *foundered* is frequently applied to lame horses in a very vague manner, and without any determined or fixed meaning: for, when a horse shows any defect or impediment in moving his fore-feet, he is then pronounced to be *foundered*, whether he really has been so or not; that is, according to what is commonly understood by that term, owing to the want or neglect of not making proper distinctions of the different diseases in the feet. If we consult authors who have treated upon this subject, we shall find their accounts of it very dark and imperfect; they bewilder the reader, and convey but a very indistinct idea of the nature of the disease: hence many errors are committed in practice, to the destruction of a number of valuable horses, which otherwise, by proper management, might have been rendered sound and useful. When a horse is first attacked with this disorder, he shows a great restlessness, is hot and feverish, heaves much at the flanks, breathes quick, has a quick strong pulse, and groans much when moved about; at the same time, he shows symptoms of the most violent pain, sometimes in one, but more frequently in both fore-feet; for which reason, he lies down much; but, when forced to move forwards, he draws himself together, as it were into a heap, by bringing forward his hind-feet almost under his shoulders, in order to keep the weight of his body as much as possible from resting upon his fore-feet. In stepping forward, he sets his heel down first with great caution, as afraid of touching the ground. This last symptom should be particularly attended to, as from it we may conclude with certainty that the chief seat of the disorder is in the feet. The hoofs at the same time are exceedingly hot; and, if water is thrown upon them, they dry instantly: if an attempt is made to pull off any of the shoes, the horse shows great uneasiness upon the least twist or pressure made upon any part of the foot, and a great unwillingness to support the weight of his body upon the other foot, especially when they are both alike affected.

It is universally allowed, that the cause of this disease proceeds from too violent exercise, such as riding very hard upon stony grounds or turnpike roads, and that young horses are most liable to it; and to these we may likewise add, unequal pressure upon the internal parts of the foot, from the concave or hollow form of the common shoes. All these causes combined together, when a horse is of a plethoric or full habit of body, and not accustomed to violent exercise, occasion this disease in a greater or lesser degree. To form some faint idea of this malady in horses, we may in a great measure appeal to what we experience ourselves in running upon hard ground; for we find, that it occasions a great heat, attended with a smart pain in our feet, which would be greatly increased from uneasy shoes, especially if compelled (like horses) to continue the running for any considerable time. The feet likewise become turgid and painful after a long

day's journey, especially if the person is not accustomed to travel; and this inflammation frequently terminates in blisters upon the soles of the feet. Hence it is evident, that, in proportion to the habit of body the horse is in at the time, and the violence of the labour or exercise he has undergone, the inflammation in the internal parts of the foot will be more or less violent, and attended with all the symptoms already mentioned.

This disease, then, appears from the symptoms attending it, and the effects it afterwards produces in the feet, to be, in its first stage, an inflammation of the internal parts of the feet, arising from the violent exercise, which occasions a more than ordinary determination of the blood to the feet: hence that rapid circulation of the blood in the vessels within the hoof, which frequently terminates in a rupture of these vessels, and of course an extravasation of the blood, and, in some cases, a total separation of the horny substance of the hoof from the aponeurotic fibres upon the fore part of the coffin-bone; whilst in others, where it has been less violent, a concretion or growing together of the parts within the hoof has taken place, so as to appear upon dissection one solid mass; and hence lameness.

Thus, a young chaise-horse, after a hard day's work, was attacked with all the symptoms already mentioned, and was treated in the common manner as above related, that is, rowelled, &c. In a few weeks after the disease had taken its course in the ordinary way, he was put under the author's care. The sole, a little before the point of the frog in one of his fore-feet, became soft; and having a curiosity to see the cause of it, the author cut away the sole, which was but thin, and found a cavity containing a reddish coloured liquor: after removing the ragged parts of the hoof, a large transverse opening showed itself, into which a probe was introduced upwards between the coffin-bone and the hoof; the connection between the tendinous fibres upon the surface of the coffin-bone and the hoof, was destroyed at the fore-part or toe; the bone, losing part of its support, pressed down upon the horny sole, and produced that swelling or convexity of its surface, which is called a *high, round, or punice sole*. The hoof lost its former shape, growing narrow towards the toe, with a preternatural thickness of the horny substance of the crust, whilst the quarters or sides of the hoof were decayed, thin, and full of deep wrinkles, together with a hollowness upon the surface of the upper part of the hoof, the whole foot having a diseased appearance. When the horse had recovered so far as to be able to walk, in going forward he threw out his legs well before him, but drew them backwards before he set his foot to the ground; setting the heel down first with great caution upon which he rested most, the toe being turned a little upwards. From this symptom only, we may judge with certainty, even though at a distance, upon seeing a horse walk, whether he has ever been *foundered* or not.

This disease proves still more violent, and indeed sometimes fatal, if the horse has been allowed to stand in cold water when his feet are overheated. Thus, a saddle-horse, after being rode very hard, was turned loose into a stable-yard all over in a sweat; he went immediately into the water-pond, where he was suf-

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ferred to stand for a considerable time in very cold weather : a few hours afterwards, he was seized with a most violent fever, and a great pain in his fore-feet : he lay upon the litter for some days in the greatest agony; and at last both his hoofs dropt off, occasioned by a mortification brought upon the parts from the application of the cold water, which rendered him entirely useless.

From what has been said with respect to this disease, it is evident, that as the circulation is greatly increased, and the current of blood chiefly determined toward the fore-feet, attended with symptoms of the most violent pain, we may thence conclude, that there is an inflammation in these parts : therefore, the cure must first be attempted by diminishing the circulation of the blood, giving cooling salts internally, as N^o 5. glysters, an opening diet, and plenty of diluting liquor four or five times a day, together with emollient poultices applied warm all round the hoofs, in order to soften them, and keep up a free and equal perspiration; observing, that his shoes be easy upon his feet; but by no means to pare the sole or frog to that excess which is commonly done in cases of this kind, farther than cleaning away the hardened surface of the sole and frog, in order that the poultice may have the desired effect, by increasing the perspiration through the pores; and to avoid all manner of greasy or oily applications to the hoofs, for the reasons already mentioned.

In all violent inflammations, there is nothing which contributes more to give immediate relief, than plentiful bleeding timely performed; and which ought by no means to be neglected, or too long delayed: for, in cases of this nature, although the fever may be so far overcome by strength of constitution, or prevented by medicines from destroying the life of the animal; yet the effects of it will ever afterwards remain, and, of course, the horse will be lame for life. But, in order to judge properly when this operation may be necessary, the pulse must be attended to, the knowledge of which is of the utmost importance in the practice of farriery, and should be more generally studied, as it is the only criterion or rule by which we may be directed when bleeding is necessary, or when it ought to be avoided. But, when this operation is neglected, and the cure is first attempted by rowels, &c. it is a long time before they can come to a proper suppuration, on account of the violence of the fever. Hence, in place of suppurating, they sometimes turn into a gangrene, by which many horses lose their lives. But, at all events, before the rowels could have any effect, even allowing they were to suppurate in the common time, (which is about three days), the inflammation within the hoof will by that time have taken place, and its consequences will follow, to the ruin of the feet, and, of course, the soundness of the horse.

The manner in which a horse walks or stands upon his fore parts, when affected with this disorder, has induced many practitioners, &c. to conclude, that the shoulders are affected: hence they say a horse is foundered in the body; and that drains, such as rowels, are the only proper remedies. But granting there was a stiffness, &c. all over the body, which is frequently the case in the beginning of inflammatory fevers, bleed-

ing ought to be premised, as the first necessary step towards the cure.

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bound.

SECT. XLII. Hoof-Bound.

This complaint affects the hoofs differently, according to their natural shape, and the treatment they are exposed to, whether from injudicious shoeing, keeping the hoofs too hot and dry, or paring the sole and binders at every time they are shod. Some are affected with a circular contraction of the crust, compressing the whole foot. In others, the crust is contracted at the coronet only, compressing the annular ligament, &c. A third kind is, when either one or both heels are contracted; hence, therefore, in proportion to the degree of contraction, the internal parts of the foot are compressed, and the horse becomes more or less lame.

It has been already observed, sect. xxxix. that deperforated narrow hoofs, or what are commonly called *asses' hoofs*, are naturally disposed to this malady: when they become diseased, they are easily known from their appearance, as they are smaller in proportion than the legs, and frequently smaller at their basis than at the coronet; the crust of the heels is high, thick, and strong; the frog walled and rotten; the hoofs are almost perpendicular; the horse moves in pain, steps short and quick, and trips and stumbles frequently; it is not uncommon that one foot only is affected, which then appears considerably smaller than the other.

This disease is hastened and brought on by paring and hollowing out the sole and binders at every time the shoes are renewed, from a mistaken notion of widening the heels; hence they are thereby made so very thin, that the crust at the extremity of the heels may be forced almost close to one another even with one's fingers: and what greatly forwards the complaint, is the form of the shoes commonly used, which are made hollow; for this practice of hollowing the shoes so universally prevails, that, without any regard to the shape of the sole, whether it be flat or otherwise, the shoe is made concave or hollow upon that side which is placed next the foot. Hence the outer edges of the concave shoes force the crusts at the heels nearer to one another; which being there retained, the contraction of the hoof becomes general, and confirmed beyond the power of art or remedy.

In the second species of this complaint, the hoof acquires a particular shape, which Mr Gibson, in his Farriery, compares to that of a bell; that is, the hoof appears contracted and tight round the coronet and inset, but spreads wider downwards to its basis; the hoof in other respects looks well and sound. This is generally occasioned by keeping the horse standing for a long time together in the stable upon hot dry litter, without moistening and cooling the hoofs, allowing them at the same time to grow to a preternatural size both in length and breadth; hence, from the great strength, the rigidity and dryness of the under part of the hoof, a preternatural stricture or pressure is made by the hardened crust at the coronet, which compresses the annular ligament, and parts near it.

The third species of this malady is, when either one or both heels are contracted. This frequently happens even in all kinds of hoofs, but more especially in those that are flat, from the use of concave or hollow shoes, together with cutting out the sole and binders at every time

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time the horse is shoed. But it more frequently happens, that the inside heel only is contracted, from the natural weakness of that part of the hoof: hence the weight of the limb, &c. pressing upon the inside crust at the heel, it is inflected or bended inwards; by which, together with the concave form of the shoe, and loss of substance from paring, &c. the disorder is increased, the crust of the heels becomes contracted, and compresses that quarter of the foot, and of course occasions lameness.

With respect to any particular method of cure to be observed in removing this disease, all that can be said is, That, as it is one of that kind which comes on gradually and perceptibly, it may by proper care and management, when properly attended to, be prevented. But, when once it becomes confirmed, it never will admit of a thorough cure. Nevertheless, it may be so far palliated as to render a horse in some degree sounder, by keeping the hoofs cool and moist; as, in this case, they are naturally disposed to be very hot, dry, and hard, his shoes should be flat, narrow, and open heeled, the hoofs never greased nor oiled, the soles never pared. But, as the crusts of the heels in these hoofs are preternaturally high and strong, they should always be pared down till they are lower than the frog, that it, if possible, may rest upon the ground. This operation will tend to remove that stricture from the heels and frog, which will greatly relieve them. But many people, adhering too strictly to that general rule, which, from inattention, has crept into practice, *viz.* of paring down the toes, and keeping the heels entire, without reflecting upon the shape or natural formation of the particular hoofs, continue the same practice upon deep-crufted, high-heeled hoofs, which is only necessary to be observed in long-toed hoofs with low heels, and thereby this disorder is greatly increased; the weight of the body is likewise thrown forwards, by which the horse stands too much upon his toes; and hence the leg-bones, from the awkward habit of the horse's standing, become bent at the joints, and occasion what is called *knuckling* or *nuclcling*.

The second species of this complaint, is when the crust at the coronet becomes contracted; and, compressing the annular ligament, &c. occasions lameness, the hoof acquiring that shape formerly compared to that of a bell. Different methods have been tried and recommended for the cure. Mr Gibson proposes to make several lines or rases on the fore-part of the hoof with a drawing knife, almost to the quick, from the coronet down to its basis, and turning the horse out to graze: others, after this operation is performed, scrow the heels wide, by means of a scrowed shoe; a third method practised is, to draw the sole, and divide the fleshy substance of the frog with a knife, and keeping it separated by the scrowed shoe above mentioned: a fourth method in use, is to make the inner-rim of the shoe-heel very thick on the under side, (its upper surface being quite flat); and by making it rest upon the binders and sole at the extremity of the heels, by pressure from the weight of the body, the heels are forced to recede to a greater distance from one another. Either of these methods may indeed in a small degree widen or expand the horny substance of the crust, and may be of use in recent contractions. But, when once it has become confirmed, and is of some standing, no means what-

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ever can then restore the internal parts to their primitive state; for, as the contraction takes place, the tender parts within the hoof being compressed, lose their tone, and diminish in their size. The blood-vessels become impervious; hence a decay or wasting of the whole foot, and not unfrequently a concretion of the parts, and, of course, the impossibility of the horse ever becoming sound. But, as it has been observed, that the cause of this species of the complaint now under consideration proceeds from allowing the hoofs to grow to an extraordinary size, and keeping them too hot and dry, by which they acquire a rigidity and dryness occasioning a preternatural compression upon the coronet; to remove which, (as the case will only admit of palliation), the surface of the hoof at its basis must be pared down till the blood appears, the thick strong crust upon the outside towards the toe rasped in the same manner, and the horse turned out to graze in soft meadow-ground till the feet recover. But it must be observed, that, if both hoofs are alike affected, one of them at one time only should be treated in the manner directed, as a tenderness will remain for some days, which might prevent the horse from walking about in search of food.

The third species is a contraction of one, or sometimes of both heels, in flat feet, from the use of concave shoes, &c. Where it has not been of a very long standing, it may, by proper management, be greatly relieved, by laying aside the use of concave shoes, and refraining from paring the sole, &c. But to remove the stricture of the hoof more immediately, the whole contracted quarter of the crust near the heel must be rasped or pared to the quick, from the coronet to its basis, close to the frog, taking care to avoid drawing blood, putting on a barred shoe, causing the shoe-bar to press upon the frog, keeping the hoof cool and moist, or turning the horse out to graze. Hence the pressure from the contracted hoof being removed, and the frog at the same time resting upon the bar of the shoe, the contracted quarter is thereby dilated or expanded; the new hoof growing from the coronet downwards, acquires a round, full shape, and becomes of its original form.

From what has been said concerning this disorder in the feet of horses, it is evident, what little prospect there is of effecting a thorough cure by art, as the complaint is of such a nature as only to admit of some palliation, and, even then, in some very favourable cases only. Nevertheless, it is practicable to prevent contractions in the hoofs from taking place, even in those hoofs which are seemingly disposed that way from their shape, &c. by observing the rules already laid down, *viz.* by keeping the hoofs moist and cool, which is their natural state; using flat shoes, from which the hoofs can acquire no bad shape; allowing the sole and frog to continue in their full strength, the latter especially to rest upon the ground; and keeping the crust within due bounds, not suffering it to grow too long towards the toe, nor too high at the heels.

SECT. XLIII. Of Corns.

In the human body, corns in the feet are termed so with some propriety, from their horny substance; but, what are called *corns* in the feet of horses, are very improperly named, as they are quite of an opposite nature,

ture, rather resembling contusions or bruises, and not unlike those bruises which happen in the palms of the hands and fingers to working people, arising from violent pinching, bruising, &c. where the skin is thick, which appears of a blackish red colour, and exceedingly painful at first, containing blood; but, in the end, the serum or thinner parts being absorbed, the red particles appear, when the dead skin is removed, like red powder. In like manner corns, or rather bruises, appear red and *soxy* (as the phrase is). They are situate in the corner or sharp angle of the sole at the extremity of the heels, where the crust reflects inward and forward, forming the binders. But, they are more frequently to be met with in the inside heel, from the manner of the horse's standing, together with the pressure or weight of the body, which is greater upon the inside of the hoof than the outside. Bruises of this kind are exceedingly painful, inasmuch that the horse shrinks and stumbles when any thing touches or presses upon that quarter of the hoof; hence lameness.

This complaint arises from different causes, according to the shape or natural formation of the hoof, together with the treatment they are exposed to. But the following are the most frequent.

1st, In flat low heels, from too great a pressure of the shoe-heel upon the sole, whether from caulkers, a too great thickness of iron upon the heels of the shoe, or its being bended downwards upon the sole, or the shoe made too concave; either of these causes will produce the same effect: for, from the too great pressure upon the horny sole, the fleshy sole, which lies immediately underneath it, is compressed and bruised between the shoe-heel, the sole, and the extremities or outward points of the coffin-bone; and hence a contusion or bruise, attended with an extravasation of the blood, which afterwards gives that part of the sole a red appearance, and is the reason why the sole on that place never grows up so firm and solid as it was before, but remains soft and spongy, forming a lodgment for sand and gravel, which frequently insinuates itself into the quick, causing an inflammation, attended with a suppuration or discharge of matter, which, if not finding a passage below, will break out at the coronet.

2^d, This complaint is produced in wide open heels, when the hoofs are very thick and strong, from too great a luxuriance of the binder, which, being infected or bended downwards between the shoe and the sole, compresses the fleshy sole, as already mentioned; and hence lameness.

3^d, This malady, in deep narrow hoofs, proceeds from a contraction of the crust compressing the heels, &c. Hence, it not unfrequently happens in hoofs of this shape, that both heels are alike affected, from the stricture and pressure of the hardened crust upon the tendinous aponeurosis, &c. on the outside of the coffin-bone, which, in this case, is bruised between the bone and the crust; hence the redness may sometimes be traced upwards almost to the coronet. In this case, no radical cure can take place, as the cause which produces these bruises, &c. will exist while the horse lives, and at the same time the horse will be lame from the contraction of the hoof; but the remedy proposed in the preceding section, by way of palliation for hoof-bound feet, may be of use to render the horse in some measure more serviceable.

With respect to the two first causes, when the bruise proceeds from too great a pressure from the shoe-heels, &c. upon the sole, the shoe must be made so as to bear off the tender part, and likewise to some distance on both sides of it; for which purpose, a round or a barred shoe will be necessary. The red and bruised parts must be cut out to the quick, and the hoof kept soft with emollient poultices for some time. But the texture of the blood-vessels, and likewise that of the hoof at the bruised part, being destroyed, a sponginess remains afterwards, and, upon the least unequal pressure from the shoe, &c. are liable to a relapse, never admitting of a thorough cure, and of consequence subject to frequent lameness.

Corns or bruises in the feet of horses might, by taking proper care of them, be easily avoided: for in those countries where horses go mostly barefooted, this malady is not so much as known; neither are those horses that go constantly at cart and plough subject to them: hence, therefore, this complaint is most frequently to be met with in great towns, where horses go much upon hard caufeway, having their shoes turned up with high caulkers on the heels, and frequently renewed, at the same time their hoofs being kept too dry and hard, from standing too much upon hot dry litter; hence will appear the necessity of complying with what is most natural to the hoofs of horses, namely, coolness and moisture, together with using such a form of shoe as will press equally upon the circumference of the crust, and without giving it any bad unnatural shape. See *SHOEING OF HORSES*.

SECT. XLIV. Of Running Thrushes.

1. A *RUNNING THRUSH* (or *FRUSH*), is a discharge of a fetid, and sometimes ichorous, matter, from the cleft in the middle of the frog, affecting one, frequently both, and in some cases all the four feet. But, generally, the fore-feet are most subject to this disease. In most cases, it seldom admits of a radical cure; but is subject to frequent relapses, occasioning lameness, from the rawness and tenderness of the parts affected, on being exposed to sand, gravel, &c. or in rough grounds, from the heels treading on sharp stones, &c. and when the horse happens to be of a bad habit of body, they even degenerate into what is commonly called a *canker*.

Running thrushes, according to Mr Gibbon, "are sometimes profitable to horses of fleshy and foul constitutions; because (says he) they drain off a great many bad humours." But, however salutary or beneficial they may be in some particular constitutions, yet, upon the whole, they prove extremely troublesome, on account of the lameness and tenderness of the feet affected with them; and, where there occurs one case in which they may properly be said to become beneficial to the constitution, there are a far greater number in which they are hurtful, as they are brought on by the treatment the hoofs are exposed to, together with the injudicious method generally observed in shoeing them, particularly in those hoofs that are narrow-heeled, or disposed to be hoof-bound, running thrushes being always an attendant upon that complaint. But, to explain this more particularly, there is, in the middle of the frog, a cleft or opening, by which the heels in a natural state have a small degree of contraction and expansion, especially when the horse treads or presses

Running
Thrushes.Running
Thrushes.

his heel upon the ground, the frog then expands; when, therefore, a horse is shod with concave or hollow shoes, the heels are deprived of that power of expansion, being constantly confined in a contracted state by the resistance from the outer edges of the concave shoe, by which the frog is pressed or squeezed on both sides, by the crust of the heels being brought nearer to or almost into contact with one another. Hence pain, inflammation, an obstruction of the blood, &c. (in the fleshy substance of the frog), and of course that waiting and rottenness of its external covering, which, falling off in pieces, leaves the quick almost bare: the new frog, growing in detached pieces, never acquires the solidity of the former; and hence that rawness and tenderness which ever afterwards remain, and that extreme sensibility of pain when any hard substance touches that part of the foot, and of course subject the horse to frequent lameness. There are, no doubt, other causes which may be said to occasion this malady, even in those hoofs that are wide and open at the heels, where there is not the least appearance of a contraction at the heels: but these are generally owing to the treatment the hoofs are exposed to in the stable, by keeping them too hot and dry for a long tract of time together, during which the natural perspiration is greatly obstructed, by the constant application of grease or oil to the hardened hoofs, and stuffing them up with hot, resinous, and greasy mixtures, as tar, turpentine, &c. the horse being all the while kept at full feeding, and not having proper and necessary exercise to promote the circulation of the fluids, and to forward the ordinary secretions, &c.: the legs swell and inflame; at last a running in the frog appears; and hence this discharge is said to be beneficial to the constitution, when in fact it is but too frequently brought on by a slothful neglect, and kept up by bad management. Fresh air and regular exercise are essentially necessary towards preserving horses in an active healthy state; for running thrushes, like other diseases to which pampered horses are subject, are not known in those countries where horses run at large in the fields; neither are they so frequently to be met with in the country amongst labouring horses, whose exercise is regular, and whose hoofs are much exposed to coolness and moisture, the natural state of the feet of horses.

With respect to the cure of running thrushes, it has been hinted, that in most cases, especially where it has been of long standing, afflicting all the frogs more or less, it is impracticable to eradicate it by any assistance from art. For instance, when it proceeds from contracted narrow heels in those feet which are said to be hoof-bound, it is then an attendant only on that disease; and therefore cannot be cured without removing the first cause, tho' then it will only admit of some small degree of palliation*. But in those hoofs which are wide and open at the heels, where the complaint is recent, one or both the fore-feet only being affected, and where there is reason to suspect that it proceeds from the use of concave or hollow shoes, or keeping the hoofs too hot, dry, and hard, the cure then may be compleated with ease and safety, by laying aside the use of concave shoes, washing the frogs clean after exercise, and dressing them with Mel Egyptiacum, made as follows.

11. *Mel Egyptiacum.* Verdigris in fine powder,

two ounces; honey, six ounces; vinegar, four ounces; boil them over a gentle fire till they have acquired a reddish colour.

Or a solution of blue vitriol.

12. *Solution of vitriol.* Blue vitriol powdered, one ounce; water, one quart:

keeping the hoofs cool and moist. But, at the same time, recourse must be had to internal remedies by way of revulsion, as purging or diuretic medicines, bleeding being first premised: if the former is made choice of, twice or thrice will be sufficient, repeated at proper intervals; but if the latter, which seems preferable, they may be continued for some time with great safety, without losing one day's work of the horse.

In some cases, there is frequently not only a discharge of fetid matter from the clefts of the frogs; but, at the same time, a discharge of greasy like matter from the round protuberances of the heels, and the hollow of the pastern joints. It will be necessary, therefore, to make a distinction between the matter discharged in this case, which appears of a thick, white, clammy, or soapy consistence, and that running in the legs commonly termed a *grease*, which is of a quite opposite quality; the latter by good management will admit of a thorough cure, whilst the former baffles all the power of medicine.

2. In horses of a gross habit of body, especially the heavy draught-kind, running thrushes sometimes degenerate into what is commonly called a *canker*. In this case, the horny substance of the frog is soon thrown off; the fleshy parts grow to an immoderate size, the luxuriant substance or spongy flesh having a great number of papillæ or tubercles, which Mr Gibson compares not improperly to cauliflower, the colour only excepted, which is of a pale red, and sometimes variegated and tinged with blood; attended with a copious discharge of a thin ichorous fetid humour, having a most offensive smell. If its progress be not speedily stopped, the fleshy sole, from its vicinity, becomes likewise affected; the horny sole rots, decays, and falls off; the whole foot turns into a kind of quag or bog, (in warm weather full of maggots, which it is almost impossible to prevent; even with the most corrosive dressings); the tendons become likewise affected, the bones carious, the hoof falls off, and the horse is rendered useless. To prevent these and the like consequences, as soon as a running thrush begins to show the least malignant disposition, proper means must be used to correct the habit of body, and to divert this discharge to some other outlet, either by purging or diuretic remedies, continued for some time, bleeding being first premised. As to external applications, the first thing necessary to be done, is to pare down the crust till it is lower than the fungus, or growth of the canker, and to remove any hard pieces of the hoof or sole wherever it presses upon the tender parts; the circular part of the crust should be surrounded and kept soft with an emollient poultice. For dressings, the mildest escharotic powders may be first tried, as the following:

13. Take burnt alum powdered, two ounces; blue vitriol powdered, one ounce.

But, when it degenerates into the last species mentioned above affecting the fleshy sole, &c. the strongest corrosive applications will then be necessary, and sometimes hardly sufficient to keep down the luxury of the

* See
Sect. xliii.

the fungus. The caustic oils are found preferable, as ol. vitriol. aqua-fortis, butter of antimony: either of these may be applied once every day; otherwise, if neglected dressing too long, or to every other day, which is the common practice, the great humidity and moisture issuing from the fungus so weakens the force of the strongest oils, that they have little or no effect: when these sharp dressings seem to gain upon the cancer, it may be dressed with equal parts of red precipitate and burnt alum pounded and mixed together, till such time as the new sole begins to grow; the purging or diuretic medicines being given at proper intervals till the cure is completed.

SECT. XLV. Of False-quarter, and Sand-cracks.

1. WHAT is commonly called a *false-quarter* in the foot of an horse is a cleft or chink in the side or quarter of the hoof, running in a slanting direction with the horny fibres of the hoof, from the coronet to its basis, by which the horny substance of the crust is divided; one part of the hoof being in a manner detached from the other, and rendered unable to sustain its portion or share of the weight of the limb, &c. and hence the name of *false-quarter*: for, when the horse sets his foot on the ground, the chink widens; but, when it is lifted up, the hardened edges of the divided hoof take in between them the tender and soft parts, and squeeze it so as to occasion frequent bleeding at the chink, and is frequently attended with inflammation, a discharge of matter, and, of course, lameness.

This complaint, notwithstanding the different accounts commonly given as to the cause of it, is in fact the effect of a deep wound or bruise upon the coronet, by which the continuity of the parts has been entirely broke off; for we always find, that, when the horny fibres are divided at their roots, they never unite or grow up as before, but leave a blemish, more or less, in proportion to the size and deepness of such wounds, &c. We have many instances of this, even in the human body; for, when a wound happens at the roots of the nails, whether in the fingers or toes, it occasions a blemish, which continues to grow in the same manner afterwards. Hence, it will be evident that no radical cure can possibly take place; but we may so far palliate the complaint as to render the horse something useful, by using a shoe of such a construction as will support the weight of the limb, &c. without resting or pressing too much upon the weakened quarter; for which purpose, a round, or what is called a *barred shoe*, will be most proper. The surface of the hoof on and near the diseased part may be cut down lower than the surface of the crust upon which the shoe is to rest; or, if the hoof will not admit of being cut down, the shoe may be raised up from the weak quarter. Either of these means will remove the weight of the body from the diseased part, and the horse will go sounder.

But, as sand and gravel is easily admitted into the chink, or crack, where, being accumulated and pent up, it irritates and inflames the parts, whereby matter is formed underneath the hoof, which causes lameness, and which not unfrequently breaks out at the coronet, producing the most inveterate ulcers, which become extremely difficult to heal, on account of the sinus or fistula branching out in different directions underneath

the hoof. Therefore, horses with this defect should be carefully observed; and, when the thick hardened edges of the chinks or crack grow too high, by which it is so much the deeper, and, of course, lodges the greater quantity of sand, &c. these edges should be rasped, or pared with a crooked knife, till the seam disappears. But wherever there remains a blackness, or appearance of gravel, that part must be tracked farther; always observing, if possible, to avoid drawing blood. The chink or crack thus made smooth and equal, no sand or gravel can lodge in it; and, as the parts will be tender, it will be necessary to apply an emollient poultice for some days, till the tenderness wear off. If the inflammation has been great, and matter formed in the crack, or the parts wounded by the knife in cutting its hardened edges, proud flesh may rise and jet out. In this case, the hard parts of the hoof near it are to be removed, a digestive poultice applied, and, when the inflammation is abated, the proud flesh may be touched with the following corrosive powder:

TAKE blue vitriol burnt, two drams; corrosive sublimate, one dram; rubbed into powder.

2. A sand-crack is of much the same nature with a false-quarter; only they run more frequently in an horizontal direction than the latter, on the outside or surface of the crust: they are generally the effect of slight or superficial wounds upon the coronet, and grow gradually downwards towards the basis of the hoof, and at last are cut or rasped off in the shoeing; when they occasion lameness from lodging sand or gravel, they must be treated in the same manner as already mentioned for false-quarters.

SECT. XLVI. Of Horses cutting their Legs in Travelling.

HORSES frequently cut their legs both before and behind, by striking or knocking the hoof when trotting, &c. against the opposite leg, whereby a wound is made, which is attended with an inflammation, swelling, &c. and of course lameness. The parts commonly wounded from cutting in the fore-legs, are the prominent and back part of the fetlock joint; and under the knee joint on the inside of the leg. The former is most common: the latter only happens to those horses who raise their feet high in trotting; and, as such horses generally go fast, this last species of cutting is distinguished by the name of the *swift* or *speedy* cut.

In the hind-legs, horses cut themselves upon the prominent part of the fetlock-joint; and sometimes, especially those who move their legs too low, cut upon the coronet. But, whether they cut before or behind, it commonly proceeds from some of the following causes.

1st, Injudicious shoeing; under which may be included, the hoofs being suffered to grow too large and broad, the shoe projecting over the inside edge of the hoof, the clenches or rivets of the nails rising above the surface of the crust.

There are a great variety of shoes recommended for preventing this complaint, of different contractions; but the most common are those that are made thick up on the inside heel. Others have a border or margin turned up upon the inside of the shoe's rim, commonly called a *feather*, which raises the inside of the hoof

Cutting
Feet.

Cutting
Feet.

considerably higher from the ground than the outside. Either of these shoes may be of use to a dealer, in order to make a wry-footed horse appear to stand straight upon his limbs; but can have no effect upon a horse's manner of moving his legs, especially at the time when the foot is raised from the ground, and passing by the other leg, so as to prevent him from cutting. The reason why this method of shoeing seems to succeed, especially in the hind-feet, is this: when the shoe is made thick upon the inside heel, which part commonly strikes the opposite leg, the shoe-nails are removed to a considerable distance forward from the thick part of the shoe, which, at the same time, is kept much within the circle of the hoof; and, on that account, it becomes impossible that the shoe should touch the opposite leg. But, to show that this raising of the inside quarter or heel, by a thickness of iron in the shoe, is not necessary to prevent horses from cutting, the author has frequently caused the heel of the shoe to be made thinner than common; and, by keeping it within the hoof, it answered equally well with the former: he has likewise caused the shoe to be cut in the middle of the quarter, whereby the hoof at the heel was left quite bare; which answered the purpose so much the better, as the foot was the less loaded with the additional weight of superfluous iron.

2d, The great weight of the concave shoes commonly used, is likewise another cause why horses, that in other respects move well upon their legs, do frequently cut and wound themselves; and to this we may add, the great length of the hoof at the toe, especially in the fore-feet, which is allowed frequently to grow to an unnatural size. It has been already observed, that great load of iron is by no means necessary in a horse's shoe: on the contrary, it becomes a great disadvantage; for a flat one that is properly constructed, and well wrought, that is, well hammered, will wear as long as a concave or hollow shoe that is almost double the weight of the former. This, at first view, will perhaps appear a paradox; but, nevertheless, it is a fact: for, as the round or outward surface of a concave shoe is the only part that touches the ground, and is liable to be wore, it soon grows thin, and yields to the pressure from the weight of the body; and therefore must

be renewed before the other parts of it are hardly touched, and but little reduced in its original weight. But the surface of a flat shoe, resting equally upon the ground, will remain firm upon the hoof, and be sufficiently strong to support the weight of the body till it wears very thin.

When horses cut or wound themselves immediately under the knee-joint, this is called the *swift* or *speedy cut*; and is occasioned by raising the feet high in trotting, whereby the inside toe or quarter of the hoof strikes against the opposite leg. This is easily prevented, by making the shoe straight, and placing it considerably within the hoof at the part where the hoof strikes the other leg, observing that no nails are to be put in that part of the shoe which is kept so much within the hoof, otherwise they must immediately plunge into the quick.

3d, When cutting proceeds from a natural defect, that is, a wrong position of the foot upon the leg-bones, whereby the toes are turned too much outward, or too much inward; at the same time, if the horse crosses his legs much in trotting; in this case there is no preventing his cutting altogether, though it may be palliated. Such horses are by no means fit for journey-riding, being generally addicted both to cutting and stumbling.

In the *last* place, it may proceed from fatigue or weakness. This happens frequently, even to those horses that deal their legs well (as the phrase is), especially in young horses; but they soon leave it off when they acquire more strength, and are accustomed to their work: most people must have experienced this in themselves when boys, as they at that age are very ready to knock their ancles with the heel of the opposite shoe, which custom wears off as they grow strong. Upon the whole, the best general rule that can be laid down for preventing horses from cutting their legs, is to keep their hoofs round and short at the toe, and from growing too large and broad; to observe that the shoe does not project over the inside edge of the hoof; that the clenches or rivets of the nails on the outer surface of the crust are smooth; and above all, that the shoe be made light, well worked, and properly proportioned to the size of the foot. See *SHOEING of Horses*.

F A S

FASCES, in Roman antiquity, axes tied up together with rods, or staves, and borne before the Roman magistrates as a badge of their office and authority.

According to Florus, the use of the fasces was introduced by the elder Tarquin the fifth king of Rome; and were then the mark of the sovereign dignity. In after-times they were borne before the consuls, but by turns only, each his day; they had each of them 12, borne by as many lictors. These fasces consisted of branches of elm; having in the middle a securus or axe, the head of which stood out beyond the rest. Publicola took the axe out of the fasces, as Plutarch assures us, to remove from the people all occasion of terror. After the consuls, the pretors assumed the fasces. In the government of the decemvirs, it was the practice at first for only one of them to have the fasces. Afterwards each of them had twelve, after the manner of the kings.

FASCETS, in the art of making glass, are the

F A S

irons thrust into the mouths of bottles, in order to convey them to the annealing tower.

FASCIA, in architecture, signifies any flat member having a considerable breadth and but a small projection, as the band of an architrave, larmier, &c. In brick-buildings, the jutting outs of the bricks beyond the windows in the several stories except the highest are called *fascias*, or *fascie*.

FASCIÆ, in astronomy, the belts seen on the disk of the superior planets Mars, Jupiter, and Saturn †.

FASCIA *Lata*, in anatomy, a muscle of the leg, called also *semit-membranæsus*. See *ANATOMY, Table of the Muscles*.

FASCIALIS, in anatomy, one of the muscles of the thigh, called *farorius*. See *ANATOMY, Table of the Muscles*.

FASCINATION, (from the Greek βακχισμός, to fascinate or bewitch), a sort of witchcraft supposed to operate either by the eye or the tongue.

FAS.

† See *Astronomy*, vol. 2, p. 445.

Fascines
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Fast.

FASCINES, in fortification, faggots of small wood, of about a foot diameter, and six feet long, bound in the middle, and at both ends. They are used in raising batteries, making chandeliers, in filling up the moat to facilitate the passage to the wall, in binding the ramparts where the earth is bad, and in making parapets of trenches to screen the men. Some of them are dipped in melted pitch or tar; and, being set on fire, serve to burn the enemy's lodgments or other works.

In the corrupt Latin they use *fascennina*, *fascennia*, and *fascinata*, &c. to signify the pales, fascines, &c. used to inclose the ancient castles, &c.

FASHION-PIECES, in the sea-language, the aftmost or hindmost timbers of a ship, which terminate the breadth, and form the shape of the stern. They are united to the stern-post, and to the extremity of the wing-transom, by a rabbit, and a number of strong nails or spikes driven from without.

FAST, or **FASTING**, in general, denotes the abstinence from food; but is more particularly used for such abstinence on a religious account.

Religious fasting has been practised by most nations from the remotest antiquity. Some divines even pretend its origin in the earthly paradise, where our first parents were forbidden to eat of the tree of knowledge. But though this seems carrying the matter too far, it is certain, that the Jewish church has observed fasts ever since its first institution. Nor were the neighbouring heathens, *viz.* the Egyptians, Phœnicians, and Assyrians, without their fasts. The Egyptians, according to Herodotus, sacrificed a cow to Isis, after having prepared themselves by fasting and prayer: a custom which he likewise ascribes to the women of Cyrene. Porphyry affirms, that the Egyptians, before their stated sacrifices, always fasted a great many days, sometimes for six weeks; and that the least behoved to be for seven days: during all which time the priests and devotees not only abstained from flesh, fish, wine, and oil; but even from bread, and some kinds of pulse. These austerities were communicated by them to the Greeks, who observed their fasts much in the same manner. The Athenians had the eleusinian and thesmophorian fasts, the observance of which was very rigorous, especially among the women, who spent one whole day sitting on the ground in a mournful dress, without taking any nourishment. In the island of Crete, the priests of Jupiter were obliged to abstain all their lives from fish, flesh, and baked meats. Apuleius informs us, that whoever had a mind to be initiated in the mysteries of Cybele were obliged to prepare themselves by fasting ten days; and, in short, all the pagan deities, whether male or female, required this duty of those that desired to be initiated into their mysteries, of their priests and priestesses that gave the oracles, and of those that came to consult them.

Among the heathens fasting was also practised before some of their military enterprises. Aristotle informs us, that the Lacedæmonians having resolved to succour a city of the allies, ordained a fast throughout the whole extent of their dominions, without excepting even the domestic animals: and this they did for two ends; one to spare provisions in favour of the besieged; the other, to draw down the blessing of heaven upon their enterprise. The inhabitants of Tarentum, when besieged by the Romans, demanded succours from their

neighbours of Rhegium, who immediately commanded a fast throughout their whole territories. Their enterprise having had good success by their throwing a supply of provisions into the town, the Romans were obliged to raise the siege; and the Tarentines, in memory of this deliverance, instituted a perpetual fast.

Fasting has always been reckoned a particular duty among philosophers and religious people, some of whom have carried their abstinence to an incredible length. At Rome it was practised by kings and emperors themselves. Numa Pompilius, Julius Cæsar, Augustus, Vespasian, and others, we are told, had their stated fast-days: and Julian the apostate was so exact in this observance as to outdo the priests themselves, and even the most rigid philosophers. The Pythagoreans kept a continual lent; but with this difference, that they believed the use of fish to be equally unlawful with that of flesh. Besides their constant temperance, they also frequently fasted rigidly for a very long time. In this respect, however, they were all outdone by their master Pythagoras, who continued his fasts for no less than 40 days together. Even Apollonius Tyaneus, one of his most famous disciples, could never come up to him in the length of his fasts, though they greatly exceeded those of the ordinary Pythagoreans. The gymnosophists, or brachmans of the east, are also very remarkable for their severe fastings; and the Chinese, according to father le Comte, have also their stated fasts, with forms of prayer for preserving them from barrenness, inundations, earthquakes, &c. The Mahometans too, who possess so large a part of Asia, are very remarkable for the strict observance of their fasts; and the exactness of their services in this respect is extraordinary.

Fasting was often used by the heathens for superstitious purposes; sometimes to procure the interpretations of dreams; at others, to be an antidote against their pernicious consequences. A piece of superstition prevails to this day among the Jews; who, tho' expressly forbid to fast on Sabbath-days, think themselves at liberty to dispense with this duty when they happen to have frightful and unlucky dreams the night preceding, that threatened them with great misfortunes. On these occasions they observe a formal fast the whole day; and at night the patient, having invited three of his friends, addresses himself to them seven times in a very solemn manner, saying, "May the dream I have had prove a lucky one!" And his friends answer as many times, "Amen, may it be lucky, and God make it so!" After which, in order to encourage him, they conclude the ceremony with these words of Ecclesiastes, "Go eat thy bread with joy;" and then set themselves down to table. They have also added several fasts not commanded in the law of Moses, particularly three, in memory of sore distresses their nation has suffered at different times; and some among them have kept an anniversary fast in memory of the translation of the Septuagint, in order to expiate the base compliance of their doctors for a foreign prince, and the outrage offered to the dignity of their law, which in their opinion was only given to the Jewish nation. The abstinence of the ancient Jews commonly lasted 27 or 28 hours at a time; beginning before sunset, and not ending till some hours after sunset next day. On these days they were obliged to wear
white

Fasting.

Fasting.

white robes in token of grief and repentance; to cover themselves with sackcloth, or their worst cloaths; to lie on ashes; to sprinkle them on their head, &c. Some spent the whole night and day following in the temple or synagogue, in prayers and other devotions, barefooted, with a scourge in their hands, of which they sometimes made a good use in order to raise their zeal. Lastly, in order to complete their abstinence, at night they were to eat nothing but a little bread dipped in water with some salt for seasoning; except they chose to add to their repast some bitter herbs and pulse.

The ancients, both Jews and Pagans, had also their fasts for purifying the body, particularly the priests and such as were any way employed at the altars; for when nocturnal disorders happened to these, it was unlawful for them to approach all the next day, which they were bound to employ in purifying themselves. On this account, at great festivals, where their ministry could not be dispensed with, it was usual for them, on the eve thereof, not only to fast, but also to abstain from sleep, for the greater certainty. For this purpose the high-priest had under-officers to wake him, if overtaken with sleep; against which other preservatives were also made use of.

Many wonderful stories have been told of extraordinary fasts kept by religious people; great numbers of which, undoubtedly, must be false. Others, however, we have on very good authority, of which some are mentioned under the article ABSTINENCE. Another we have in the

FASTING Woman. Of the many instances of extraordinary fasting mentioned by different authors, this seems to be one of the best authenticated. A full account of this very uncommon case is given in the Phil. Transf. Vol. LXVII. Part I. the substance of which follows. The woman, whose name was *Janet M'Leod*, an inhabitant in the parish of Kincardine in Rosshire, continued healthy till she was 15 years of age, when she had a pretty severe epileptic fit; after this she had an interval of health for four years, and then another epileptic fit which continued a whole day and a night. A few days afterwards she was seized with a fever, which continued with violence several weeks, and from which she did not perfectly recover for some months. At this time she lost the use of her eyelids; so that she was under a necessity of keeping them open with the fingers of one hand, whenever she wanted to look about her. In other respects she continued in pretty good health; only she never had any appearance of menses, but periodically spit up blood in pretty large quantities, and at the same time it flowed from the nose. This discharge continued several years; but at last it ceased; and soon after she had a third epileptic fit, and after that a fever from which she recovered very slowly. Six weeks after the crisis, she stole out of the house unknown to her parents, who were busied in their harvest-work, and bound the sheaves of a ridge before she was observed. In the evening she took to her bed, complaining much of her heart, (most probably her stomach, according to the phraseology of that country) and her head. From that time she never rose for five years, but was occasionally lifted out of bed. She seldom spoke a word, and took so little food that it seemed scarce sufficient to support a sucking infant.

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Fasting.

Even this small quantity was taken by compulsion; and at last, about Whit Sunday 1763, she totally refused every kind of food or drink. Her jaw now became so fast locked, that it was with the greatest difficulty her father was able to open her teeth a little, in order to admit a small quantity of gruel or whey; but of this so much generally run out at the corners of her mouth, that they could not be sensible any had been swallowed. About this time they got some water from a noted medicinal spring in Brae-Mar, some of which they attempted to make her swallow, but without effect. They continued their trials, however, for three mornings; rubbing her throat with the water, which run out at the corners of her mouth. On the third morning during the operation, she cried out "Give me more water;" and swallowed with ease all that remained in the bottle. She spoke no more intelligibly for a year; though she continued to mutter some words which her parents only understood, for 14 days. She continued to reject all kinds of food and drink till July 1765. At this time her sister thought, by some signs she made, that she wanted her jaws opened; and this being done, not without violence, she called intelligibly for a drink, and drank with ease about an English pint of water. Her father then asked her why she would not make some signs when she wanted a drink; to which she answered, why should she, when she had no desire. It was now supposed that she had regained the faculty of speech; and her jaws were kept open for about three weeks, by means of a wedge. But in four or five days she became totally silent, and the wedge was removed because it made her lips sore. She still, however, continued sensible; and when her eyelids were opened, knew every body, as could be guessed from the signs she made.

By continuing their attempts to force open her jaws, two of the under foreteeth were driven out; and of this opening her parents endeavoured to avail themselves by putting some thin nourishing drink into her mouth; but without effect, as it always returned by the corners. Sometimes they thought of thrusting a little dough of oatmeal through this gap of the teeth, which she would retain a few seconds, and then return with something like a straining to vomit, without one particle going down. Nor were the family sensible of any thing like swallowing for four years, excepting the small draught of Brae-Mar water, and the English pint of common water. For the last three years she had not any evacuation by stool or urine, except that once or twice a-week she passed a few drops of urine, about as much, to use the expression of her parents, as would wet the surface of a halfpenny. In this situation she was visited by Dr Mackenzie, who communicated the account of her case to the royal society. He found her not at all emaciated; her knees were bent, and the hamstrings tight, so that her heels almost touched her buttocks. She slept much, and was very quiet; but when awake, kept a constant whimpering like a newborn weakly infant. She never could remain a moment on her back, but always fell to one side or another; and her chin was clapped close to her breast, nor could it by any force be moved backwards.

The doctor paid his first visit in the month of October; and five years afterwards, viz. in October 1772, was induced to pay her a second visit, by hearing that

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Fat.

she was recovering, and had begun to eat and drink. The account given him was most extraordinary. Her parents one day returning from their country-labours (having left their daughter fixed to her bed as usual), were greatly surprised to find her sitting upon her hams, on the side of the house opposite to her bed-place, spinning with her mother's distaff. All the food she took at that time was only to crumble a little oat or barley cake in the palm of her hand, as if to feed a chicken. She put little crumbs of this into the gap of her teeth; rolled them about for some time in her mouth; and then sucked out of the palm of her hand a little water, whey, or milk; and this only once or twice a-day, and even that by compulsion. She never attempted to speak; her jaws were fast locked, and her eyes shut. On opening her eye-lids, the balls were found to be turned up under the edge of the os frontis; her countenance was ghastly, her complexion pale, and her whole person emaciated. She seemed sensible and tractable in every thing except in taking food. This she did with the utmost reluctance, and even cried before she yielded; and at last only took a few crumbs as if to feed a bird, and sucked half a spoonful of milk from the palm of her hand. The great change of her looks, Doctor Mackenzie attributed to her spinning flax on the distaff, which exhausted too much of the saliva; and therefore he recommended to her parents to confine her totally to the spinning of wool.—In 1775 she was visited again, and found to be greatly improved in her looks, as well as strength; her food was also considerably increased in quantity, though even then she did not take more than would be sufficient to sustain an infant of two years of age.

FASTI, in Roman antiquity, the kalendar wherein were expressed the several days of the year, with their feasts, games, and other ceremonies.

There were two sorts of fasti, the greater and less; the former being distinguished by the appellation *fasti magistralis*, and the latter by that of *fasti calendares*.

The greater fasti contained the feasts, with every thing relating to religion and the magistrates.

The lesser were again distinguished into the city and country fasti, each adapted to the people for whom they were designed. In all these fasti, the court-days, or those whereon causes might be heard and determined, were marked with the letter F; these days were called *fasti*, from *fari*, to speak or pronounce; and the other days, not marked with this letter, were called *nefasti*.

FASTOLF (Sir John), a valiant and renowned English officer, a knight-banneret and of the garter, who served in France under Henry IV. V. and VI. was descended from an ancient family in Norfolk, and was born about the year 1377. He was as much distinguished for his virtue at home, as for his valour abroad; and became no less amiable in his private, than he had been admirable in his public character. He died in 1459, upwards of 80 years of age, as we learn from his noted cotemporary William Caxton the first English printer. By an unaccountable mistake it has been asserted, that Shakespeare's Falstaff was drawn to ridicule this great man; and this has made judicious biographers more studious to preserve his reputation.

FAT, in anatomy, an oily concrete substance depo-

sited in different parts of animal bodies*.

Strong exercise, preternatural heat, an acrimonious state of the juices, and other like causes, by which the oily parts of the blood are attenuated, resolved, or evacuated, prevent the generation of fat: labours of the mind also have this effect, as well as labour or intemperature of the body. Hence rest and plentiful food are sufficient to fatten brutes; but with men it is often otherwise. It is surprising how soon some birds grow fat; ortolans in 24 hours, and larks still sooner.

Fats may be divided, from their consistence, into three kinds: (1.) The soft and thin, which grow perfectly liquid in a very small heat. (2.) The thick and consistent, which liquify less readily; and, (3.) The hard and firm, which require a still stronger heat to melt them. The first is called *Pinguedo*; the second, *Auxungia*; and the third, *Adeps*, as taken from the animal; and *Sebum*, or *Secum*, when freed from the skins, &c. This use of the names, however, is not constant, some employing them differently.

A great number of fats have been kept in the shops, for making ointments, plasters, and other medicinal compositions; as hogs-lard, the fat of the boar, the fox, the hare, dog, wild cat, Alpine mouse, beaver; that of hens, ducks, geese, storks; of the whale, pike, serpents, viper, &c. as also human fat.—In regard to all these kind of substances, however, much depends upon the manner of purifying or trying, and of keeping them.

To obtain fat pure, it must be cut into pieces, and cleaned from the interposed membranes and vessels. It must then be cleaned from its gelatinous matter by washing with water, till the water comes from it colourless and insipid; it is afterwards to be melted with a moderate heat in a proper vessel with a little water; and it is to be kept thus melted till the water be entirely evaporated, which is known by the discontinuance of the boiling, which is caused by the water only, and which lasts till not a drop of it remains: it is afterwards to be put into an earthen pot, where it fixes; then it is exceedingly white, sufficiently pure for the purposes of pharmacy or chemical examination.

Fat thus purified has very little taste, and a weak, but peculiar, smell.

Mineral acids exhibit the same phenomena with fat, as they do with the fixed sweet oils of vegetables, which contain nothing gummy or resinous, and which do not dry. Such is the oil of ben, oil of olives, and all those which chemists call *fat oils*.

Alkalis dissolve fat, as they do these oils, and form a similar soap. Fat contains no principle so volatile as to be raised with the heat of boiling water. It does not inflame, but when heated in open air so as to rise in vapours. Lastly, by age it contracts an acrid and rancid quality.

When fat is distilled with a heat superior to that of boiling water, which must therefore be done in a retort and in a naked fire, first an acid phlegm arises, and a small portion of oil which remains fluid. As the distillation continues, the acid becomes stronger, and the oil thicker, and at last it congeals in the receiver. No other principle arises during this distillation: and, lastly, when the retort is red, nothing remains but a very small quantity of that kind of coal which cannot be burnt without very great difficulty. See **COAL**.

Fat.

* See *Anatom.*
temy, 1082.

Fat.

If the congealed oil which is found in the receiver be again distilled, more acid is obtained, and an oil which does not congeal; and thus, by repeating the distillations, the oil is more and more attenuated. While it is thus deprived of its acid, it acquires a more and more penetrating smell; and thus, by distillation alone, it may be rendered as volatile as essential oils, and capable of rising with the heat of boiling water.

Fat, and all other analogous oily matters, cannot be heated sufficiently to be raised into vapours, without suffering a considerable alteration, and even decomposition. The vapours which rise from it, when heated in open air, are the same as those which rise when distilled in close vessels. They consist of acid and attenuated oil. This acid is remarkably penetrating, acrid, and volatile; it irritates and inflames the eyes, the throat, and lungs; it makes the eyes shed tears, and excites a cough as much as volatile sulphureous acid does, although its nature be very different.

When fat is in its natural state, and has not yet suffered any alteration, its acid is so well combined with its oily part, that none of its properties can be perceived. Thus fat, in good condition, is very mild, and used successfully in medicine, particularly externally, for its lenient quality: but, notwithstanding its great mildness, before it has been heated sufficiently to decompose it, and while it is yet fresh, it becomes exceedingly acrid, irritating, and caustic, when its acid is partly disengaged by fire or by time.

When fat is become very rancid, not only its medicinal effects, but also many of its essential properties, are totally changed, particularly its property of resisting the action of spirit of wine: for this menstruum, which does not affect pure and unchanged fat, dissolves some portion of fat which has been strongly heated, or which has become rancid. This effect can certainly proceed from no other cause, than that the acid of the fat disengages itself in both these cases. Mr de Machy, an intelligent apothecary of Paris, and an able chemist and observer, has made a remark upon this subject which corresponds with this opinion; which is, that all the rancidity of fat may be taken from it by treating it with spirit of wine. Now, this evidently happens, because the spirit of wine dissolves all the portion of fat which is disengaged from its acid; that is, all the rancid part, while it does not touch that which is not changed. This practice may be advantageously employed for the preservation or recovery of some fats used in medicine, but which are rare, and not to be procured in their recent state.

One of the chief uses of fat probably is, to receive into its composition, to blunt and correct, a great part of the acids of the aliments, and which are more than are requisite to the composition of the nutritive juice, or which nature could not otherwise expel. This is certain, that the greater the quantity of aliments is taken by healthy animals above what is necessary for their nourishment and reproduction, the fatter they become. Hence animals which are castrated, which are not much exercised, or which are come to an age when the loss and production of the seminal fluid is less, and which at the same time consume much succulent aliment, generally become fatter, and sometimes exceedingly so.

Although fat be very different from truly animalized

substances, and appears not easily convertible into nutritive juices, it being generally difficult of digestion, and apt to become rancid, as butter does in the stomachs of many persons; yet in certain cases it serves to the nourishment and reparation of the body. Animals certainly become lean, and live upon their fat, when they have too little food, and when they have diseases which prevent digestion and the production of the nutritive juice; and in these cases the fatter animals hold out longer than the leaner. The fat appears to be then absorbed by the vessels designed for this use, and to be transformed into nutritive juice.

Fat, in the sea-language, signifies the same with broad. Thus a ship is said to have a fat quarter, if the trussing-in or tuck of her quarter be deep.

Fat is used also for several utensils; as, 1. A great wooden vessel, employed for the measuring of malt, and containing a quarter or eight bushels. 2. A large brewing vessel, used by brewers to run their wort in. 3. A leaden pan or vessel for the making of salt at Droitwich.

Fat likewise denotes an uncertain measure of capacity. Thus a fat of singglass contains from $3\frac{1}{2}$ hundred weight to 4 hundred weight; a fat of unbound books, half a maund or four bales; of wire, from 20 to 25 hundred weight; and of yarn, from 220 to 221 bundles.

FATE, *fatum*, denotes an inevitable necessity depending upon a superior cause. The word is formed a *sando*, from "speaking;" and primarily implies the same with *effatum*, viz. a word or decree pronounced by God; or a fixed sentence whereby the Deity has prescribed the order of things, and allotted to every person what shall befall him.

The Greeks called it *anagkai*, as it were a chain or necessary series of things indissolubly linked together. It is also used to express a certain unavoidable designation of things, by which all agents, both necessary and voluntary, are swayed and directed to their ends. See NECESSITY.

In this last sense, fate is distinguished into, 1. Astrological, arising from the influence and position of the heavenly bodies; which (it is supposed) give laws both to the elements and mixed bodies, and to the wills of men. 2. Stoical fate, defined by Cicero an order or series of causes, wherein, cause being linked to cause, each produces another, and thus all things flow from one prime cause. To this fate the Stoics subject even the gods.

Fate is divided by later authors into physical and divine. 1. Physical fate is an order and series of natural causes appropriated to their effects. By this fate it is that fire warms, bodies communicate motion to each other, &c. and the effects of it are all the events and phenomena of nature. See NATURE. 2. Divine fate is what is more usually called *Providence*. See PROVIDENCE.

FATES, in mythology. See PARCÆ.

FATHEMITES, FATEMITES, or FATHIMITES, the descendants of Mahomet by Fathema, or Fatima, his daughter. They never enjoyed the khalifat of Mecca or Bagdad, but reigned in Barbary and Egypt. See the history of these countries.

FATHER, a term of relation denoting a person who hath begot a child. See PARENT and CHILD.

Fat.
Father.

Father
Faunalia.

By the laws of Romulus, a father had an unlimited power over his children. Amongst the Lacedæmonians, as we learn from Aristotle's politics, the father of three children was excused from the duty of mounting guard for the security of the city; and a father of four children, was exempted from every public burden. The Poppæan law amongst the Romans, granted many valuable privileges to the fathers of three children; amongst which one was, that he should be excused from civil offices, and that the mother should have liberty, in her father's life-time, to make a will, and manage her estate without the authority of tutors.

Natural FATHER, is he who has illegitimate children. See *BASTARD*; and *LAW*, N° clxi. 33. clxxxii. 3, 4.

FATHER, in theology, is used in speaking of the First Person of the *TRINITY*.

FATHER, is also used in speaking of spiritual and moral things. Thus, Abraham is called the "*father of the faithful*."

FATHER, in church-history, is applied to ancient authors who have preserved in their writings the traditions of the church. Thus St Chrysostom, St Basil, &c. are called *Greek fathers*, and St Augustine and St Ambrose *Latin fathers*. No author who wrote later than the 12th century is dignified with the title of *Father*.

FATHER, is also a title of honour given to prelates and dignitaries of the church, to the superiors of convents, to congregations of ecclesiastics, and to persons venerable for their age or quality. Thus we say, the right reverend father in God, the father-general of the Benedicines, the fathers of the council of Nice, father of his country, &c.

FATHERLASHER, in ichthyology. See *CORPUS*.

FATHOM, a long measure containing six feet, used chiefly at sea for measuring the length of cables and cordage.

FATNESS. See *CORPULENCY*.—It is observed, that for one fat person in France or Spain, there are an hundred in England and Holland. This is supposed to be from the use of new malt liquors, more than from the difference of climates or degrees of perspiration. Indolence may cause fatness in some few constitutions; but, in general, those who are disposed to this habit will be fat in spite of every endeavour to the contrary, but that of destroying health.

FATUARI, in antiquity, were persons, who, appearing inspired, foretold things to come. The word is formed of *Fatua*, wife of the god Faunus, who was supposed to inspire women with the knowledge of futurity, as Faunus himself did the men.—*Fatua* had her name from *fari*, q. d. *vaticinari*, "to prophesy."

FATUUS IGNIS, in physiology, a meteor otherwise called *Will-with-a-wisp*. See that article.

FAVISSÆ, in antiquity, were, according to Festus and Gellius, cisterns to keep water in: but the faviæ in the Capitol at Rome were dry cisterns or subterraneous cellars, where they laid up the old statues, broken vessels, and other things used in the temple. There were much the same with what, in some of the modern churches, are called the *archives* and *treasury*.

FAUNALIA, in Roman antiquity, three annual

festivals in honour of the god Faunus; the first of which was observed on the ides of February, the second on the 16th of the calends of March, and the third on the nones of December. The principal sacrifices on this occasion were lambs and kids. Faunus was a deity of the Romans only, being wholly unknown to the Greeks.

FAUNS, a kind of rural deities, among the ancient Romans. See *FAUNUS*.

FAUNUS, in fabulous history, was king of the Aborigines, or country of the Latins, and succeeded his father Picus, about 1220 B. C. He is said to have instituted a great number of religious ceremonies, and to have kept himself almost always concealed, on which account he was confounded with the god Pan. His children called *Fauni*, or *Fauns*, were visionary beings, much like the satyrs, and were usually crowned with pine; but both Faunus and they were only worshipped in Italy, and were wholly unknown to the Greeks.

FAVORINUS, an ancient orator and philosopher of Gaul, who flourished under the emperor Adrian, and taught with high reputation both at Athens and Rome. Many works are attributed to him; among the rest, a Greek miscellaneous history often quoted by Diogenes Laertius.

FAUSTUS. See *FUST*.

FAWN, among sportsmen, a buck or doe of the first year; or the young one of the buck's breed in its first year.

FE, *fo*, or *Febi*, the name of the chief god of the Chinese, whom they adore as the sovereign of heaven. They represent him shining all in light, with his hands hid under his robes, to shew that his power does all things invisibly. He has at his right-hand the famous Confucius, and at his left Lanza or Lanza, chief of the second sect of their religion.

FEALTY, in law, an oath taken on the admittance of any tenant, to be true to the lord of whom he holds his land: by this oath the tenant holds in the freest manner, on account that all who have fee hold *per fidem et fiduciam*, that is, by fealty at the least.

This fealty, at the first creation of it, bound the tenant to fidelity, the breach of which was the loss of his fee. It has been divided into general and special: general, that which is to be performed by every subject to his prince; and special, required only of such as, in respect of their fee, are tied by oath to their lords. To all manner of tenures, except tenancy at will, and frank-almoign, fealty is incident, though it chiefly belongs to copyhold estates held in fee and for life. The form of this oath by stat. 17 Edw. II. is to run as follows. "I A. B. will be to you my lord D. true and faithful, and bear to you faith for the lands and tenements which I hold of you; and I will truly do and perform the customs and services that I ought to do to you. So help me God."

FEAR, one of the passions of the human mind. See *PASSION*.

FEAR (*Metus*, *Pavor*, or *Timor*), was deified by the Pagans. Tullus Hostilius brought the worship of this deity to Rome. The Ephori of Sparta erected a temple to Fear, near their tribunal, to strike an awe into those who approached it. Fear was likewise worshipped at Corinth. The poets did not forget this

Fauns
Fear.

Feast.
Feather.

imaginary deity. Virgil places her in the entrance of hell, in company with diseases, old age, &c. *Æn.* vi. 273.—Ovid places her in the retinue of Tisiphone one of the furies, *Mét.* iv. 483.

FEAST, or FESTIVAL, in a religious sense, is a day of feasting and thanksgiving.

Among the ancients, feasts were instituted upon various accounts, but especially in memory of some favourable interposition of Providence. Thus, the Jews had their feast of passover, pentecost, and tabernacles; the Greeks their cerialia, panathæna, &c. and the Romans their saturnalia, ambarvalia, &c. See PASSOVER, CEREALIA, &c.

In the ancient Christian church, besides the high festivals of Christmas, Easter, Pentecost, Annunciation, &c. there were others instituted in honour of the apostles and martyrs: all which are retained by the church of England. See the articles CHRISTMAS, EASTER, &c. In the church of Rome, there are double, half-double, and simple feasts almost without number. The name of *double feasts* is given to such whose service is fuller and more solemn than the rest, which likewise constitutes the difference between the others; the churches being embellished, and the altars adorned, according to the rank which each saint holds in his respective church. All high festivals have an octave, consisting of the feast itself, and the seven following days.

In Italy, certain festivals are celebrated solely by lovers. When a lover wants to give his mistress the highest testimony of his gallantry, he immediately makes her the idol of his devotion; procuring vespers, and even masses, to be said to her honour. For this purpose he makes choice of the festival of some saint whose name she bears; and though the saint has the same name, they manage matters so, that the devotion of the festival is plainly relative to the lover's mistress.

The four quarterly feasts, or stated times, whereon rent on leases is usually reserved to be paid, are Lady-day, or the annunciation of the blessed virgin Mary, or 25th of March; the nativity of St John the Baptist, held on the 24th of June; the feast of St Michael the arch-angel, on the 29th of September; and Christmas, or rather of St Thomas the apostle, on the 21st of December. See ANNUNCIATION, &c.

FEATHER, in physiology, a general name for the covering of birds; it being common to all the animals of this class to have their whole body, or at least the greatest part of it, covered with feathers or plumage.

Feathers make a considerable article of commerce. Those from Somersetshire are esteemed the best, and those from Ireland the worst.—Eider down is imported from Denmark, the ducks that supply it being inhabitants of Hudson's bay, Greenland, Ireland, and Norway. Our own Islands west of Scotland breed numbers of these birds, and might turn out a profitable branch of trade to the poor inhabitants. Hudson's bay also furnishes very fine feathers, supposed to be of the goose kind. The down of the swan is brought from Dantzic. The same place also sends us great quantities of the feathers of the cock and hen. The London poulterers sell a great quantity of the feathers of those birds, and of ducks and turkeys: those of

ducks being a weaker feather, are inferior to those of the goose; and turkeys feathers are the worst of any. The best method of curing feathers is to lay them in a room, in an exposure to the sun; and when dried, to put them in bags, and beat them well with poles to get the dirt off.

FEBRIFUGE, an appellation given to such medicines as mitigate or remove a fever.

FEBRUARY, in chronology, the second month of the year, reckoning from January, first added to the calendar of Romulus by Numa Pompilius.

February derives its name from *Februa*, a feast held by the Romans in this month, in behalf of the manes of the deceased; at which ceremony sacrifices were performed, and the last offices were paid to the shades of the deceased.

February, in a common year, consists only of 28 days; but in the bissextile year, it has 29, on account of the intercalary day added that year.

FECIALES, or FOECIALES, a college of priests instituted at Rome by Numa, consisting of 30 persons, selected out of the best families. Their business was to be arbitrators of all matters relating to war and peace, and to be the guardians of the public faith. It is probable that they were ranked among the officers of religion, to procure them the more deference and authority, and to render their persons more sacred among the people. If the commonwealth had received any injury from a foreign state, they immediately dispatched these officers to demand satisfaction, who, if they could not procure it, were to attest the gods against that people and country, and to denounce war: otherwise they confirmed the alliance, or contracted a new one, which they ratified by sacrificing a hog.

FECUNDITY, the same with FERTILITY.

FEE, in law, signifies a complete feudal property. Hence, where the bare liferent of any feudal subject is meant to be conveyed to A, and the absolute property to B, that meaning is expressed thus; "to A in liferent, and to B in fee." See LAW, N° lxxix. clxiv.

Fees are commonly divided into *absolute*, otherwise called fees-simple; and *limited*, one species of which we usually call fee-tail.

I. Tenant in fee-simple (or, as he is frequently styled, *tenant in fee*) is that he hath lands, tenements, or hereditaments, to hold to him and his heirs for ever; generally, absolutely, and simply; without mentioning what heirs, but referring that to his own pleasure, or to the disposition of the law. The true meaning of the word fee (*feodum*) is the same with that of *feud* or *fief*,* and in its original sense it is taken in contradistinction to *allodium*; which latter the writers on this subject define to be every man's own land, which he possesseth merely in his own right, without owing any rent or service to any superior. This is property in its highest degree; and the owner thereof hath *absolutum et directum dominium*, and therefore is said to be seised thereof absolutely in *dominio suo*, in his own demesne. But *feodum*, or *fee*, is that which is held of some superior, on condition of rendering him service: in which superior the ultimate property of the land resides. And therefore Sir Henry Spelman defines a feud or fee to be, The right which the vassal or tenant hath in lands to use the same, and take the profits thereof to him

Febrifuge
||
Fee.

Blackf.
Comment.

* See Feoda,
Syltem.

and his heirs, rendering to the lord his due services; the mere allodial property of the soil always remaining in the lord. This allodial property no subject in Britain has; it being a received and now undeniable principle in the law, that all the lands are holden mediately or immediately of the king. The king therefore only hath *absolutum et directum dominium*; but all subjects lands are in the nature of *feodum* or *fee*, whether derived to them by descent from their ancestors, or purchased for a valuable consideration: for they cannot come to any man by either of those ways, unless accompanied with those feudal clogs which were laid upon the first feudatory when it was originally granted. A subject therefore hath only the usufruct, and not the absolute property, of the soil; or, as Sir Edward Coke expresses it, he hath *dominium utile*, but not *dominium directum*. And hence it is that, in the most solemn acts of law, we express the strongest and highest estate that any subject can have, by these words, "he is seised thereof in his demesne, as of fee." It is a man's demesne, *dominium*, or property, since it belongs to him and his heirs for ever: yet this *dominium*, property, or demesne, is strictly not absolute or allodial, but qualified or feudal: it is in his demesne, *as of fee*; that is, it is not purely and simply his own, since it is held of a superior lord, in whom the ultimate property resides.

This is the primary sense and acceptation of the word *fee*. But (as Sir Martin Wright very justly observes) the doctrine, "that all lands are *holden*," having been for so many ages a fixed and undeniable axiom, the English lawyers do very rarely (of late years especially) use the word *fee* in its primary original sense, in contradistinction to *allodium* or absolute property, with which they have no concern; but generally use it to express the continuance or quantity of estate. A *fee* therefore, in general, signifies an estate of inheritance; being the highest and most extensive interest that a man can have in a feud: and, when the term is used simply, without any other adjunct, or has the adjunct of *simple* annexed to it, (as, a *fee*, or a *fee-simple*) it is used in contradistinction to a *fee conditional* at the common law, or a *fee-tail* by the statute; importing an absolute inheritance, clear of any condition, limitation, or restrictions to particular heirs, but descendible to the heirs-general, whether male or female, lineal or collateral. And in no other sense than this is the king said to be seised in *fee*, he being the feudatory of no man.

Taking therefore *fee* in its its secondary sense, as a state of inheritance, it is applicable to, and may be had in, any kind of hereditaments either corporeal or incorporeal. But there is this distinction between the two species of hereditaments; that, of a corporeal inheritance a man shall be said to be seised in his demesne, *as of fee*; of an incorporeal one he shall only be said to be seised *as of fee*, and not in his demesne. For, as incorporeal hereditaments are in their nature collateral to, and issue out of, lands and houses, their owner hath no property, *dominium*, or demesne, in the thing itself, but hath only something derived out of it; resembling the *servitudes*, or services, of the civil law. The *dominium*, or property, is frequently in one man, while the appendage or service is in another. Thus Gaius may be seised *as of fee*, of a way going over the land, of

which Titius is seised in his demesne *as of fee*.

The *fee-simple* or inheritance of lands and tenements is generally vested and resides in some person or other; though divers inferior estates may be carved out of it. As if one grants a lease for 21 years, or for one or two lives, the *fee-simple* remains vested in him and his heirs; and after the determination of those years or lives, the land reverts to the grantor or his heirs, who shall hold it again in *fee-simple*. Yet sometimes the *fee* may be in *abeyance*, that is (as the word signifies) in expectation, remembrance, and contemplation in law; there being no person *in esse*, in whom it can vest and abide: though the law considers it as always potentially existing, and ready to vest whenever a proper owner appears. Thus, in a grant to John for life, and afterwards to the heirs of Richard, the inheritance is plainly neither granted to John nor Richard, nor can it vest in the heirs of Richard till his death, *nam nemo est heres viventis*: it remains therefore in waiting, or *abeyance*, during the life of Richard. This is likewise always the case of a parson of a church, who hath only an estate therein for the term of his life; and the inheritance remains in *abeyance*. And not only the *fee*, but the freehold also, may be in *abeyance*; as, when a parson dies, the freehold of his glebe is in *abeyance* until a successor be named, and then it vests in the successor.

The word, *heirs*, is necessary in the grant or donation in order to make a *fee* or inheritance. For if land be given to a man for ever, or to him and his assigns for ever, this vests in him but an estate for life. This very great nicety about the insertion of the word *heirs* in all feoffments and grants, in order to vest a *fee*, is plainly a relic of the feudal strictness: by which it was required, that the form of the donation should be punctually pursued; or that, as Craig expresses it, in the words of Baldus, "*donationes sunt stricti juris*," "*ne quis plus donasse presumatur quam in donatione expresserit*." And therefore, as the personal abilities of the donee were originally supposed to be the only inducements to the gift, the donee's estate in the land extended only to his own person, and subsisted no longer than his life; unless the donor, by an express provision in the grant, gave it a longer continuance, and extended it also to his heirs. But this rule is now softened by many exceptions.

For, 1. It does not extend to devises by will; in which, as they were introduced at the time when the feudal rigour was apace wearing out, a more liberal construction is allowed: and therefore by a devise to a man for ever, or to one and his assigns for ever, or to one in *fee-simple*, the devisee hath an estate of inheritance; for the intention of the deviser is sufficiently plain from the words of perpetuity annexed, though he hath omitted the legal words of inheritance. But if the devise be to a man and his assigns, without annexing words of perpetuity, there the devisee shall take only an estate for life; for it does not appear that the deviser intended any more. 2. Neither does this rule extend to fines or recoveries, considered as a species of conveyance; for thereby an estate in *fee* passes by act and operation of law without the word *heirs*: as it does also, for particular reasons, by certain other methods of conveyance, which have relation to a former grant or estate, wherein the word *heirs* was expressed. 3. In crea-

FEE.

creations of nobility by writ, the peer so created hath an inheritance in his title, without expressing the word *heirs*; for they are implied in the creation, unless it be otherwise specially provided: but in creations by patent, which are *stricti juris*, the word *heirs* must be inserted, otherwise there is no inheritance: 4. In grants of lands to sole corporations and their successors, the word *successors* supplies the place of *heirs*; for as heirs take from the ancestor, so doth the successor from the predecessor. Nay, in a grant to a bishop, or other sole spiritual corporation, in *frankalmoin*; the word *frankalmoin* supplies the place of *successors* (as the word *successors* supplies the place of *heirs*) *ex vi termini*; and in all these cases a fee-simple vests in such sole corporation. But, in a grant of lands to a corporation aggregate, the word *successors* is not necessary, though usually inserted: for, albeit such simple grant be strictly only an estate for life, yet as that corporation never dies, such estate for life is perpetual, or equivalent to a fee-simple, and therefore the law allows it to be one. Lastly, in the case of the king, a fee-simple will vest in him, without the word *heirs* or *successors* in the grant; partly from prerogative royal, and partly from a reason similar to the last, because the king, in judgment of law, never dies. But the general rule is, that the word *heirs* is necessary to create an estate of inheritance.

II. We are next to consider limited fees, or such estates of inheritance as are clogged and confined with conditions or qualifications of any sort. And these we may divide into two sorts: 1. *Qualified, or base fees*; and, 2. *Fees conditional*, so called at the common law; and afterwards *fees-tail*, in consequence of the Statute *de donis*.

1. A *base*, or qualified, fee is such a one as has a qualification subjoined thereto, and which must be determined whenever the qualification annexed to it is at an end. As, in the case of a grant to A and his heirs, tenants in the manor of Dale; in this instance, whenever the heirs of A cease to be tenants of that manor, the grant is entirely defeated. So, when Henry VI. granted to John Talbot, lord of the manor of Kingston-Lisle in Berks, that he and his heirs, lords of the said manor, should be peers of the realm, by the title of *barons of Lisle*; here John Talbot had a base or qualified fee in that dignity; and the instant he or his heirs quitted the seignory of this manor, the dignity was at an end. This estate is a fee, because by possibility it may endure for ever in a man and his heirs; yet as that duration depends upon the concurrence of collateral circumstances, which qualify and debase the purity of the donation, it is therefore a qualified or base fee.

2. As to *fees-conditional*, or *fees-tail*, see the article *TAIL*.

FEE also signifies a certain allowance to physicians, barristers, attorneys, and other officers, as a reward for their pains and labour.

If a person refuse to pay an officer his due fees, the court will grant an attachment against him, to be committed till the fees are paid; and an attorney may bring an action of the case for his fees, against the client that retained him in his cause.

FEE also denotes a settle perquisite of public officers, payable by those who employ them.

Feetors

Feix.

The fees due to the officers of the custom-house, are expressly mentioned in a schedule, or table, which is hung up in public view in the said office, and in all other places where the said fees are to be paid or received. And, if any officer shall offend, by acting contrary to the regulations therein contained, he shall forfeit his office and place, and be for ever after incapable of any office in the custom-house.

The other public offices have likewise their settled fees, for the several branches of business transacted in them.

FEE-FARM, a kind of tenure without homage, fealty, or other service, except that mentioned in the feoffment; which is usually the full rent, or at least a fourth part of it.

The nature of this tenure is, that if the rent be behind, and unpaid for two years, then the feoffor and his heirs may have an action for the recovery of the lands.

FEELERS, in natural history, a name used by some for the horns of insects.

FEELING, one of the five external senses, by which we obtain the ideas of solid, hard, soft, rough, hot, cold, wet, dry, and other tangible qualities. See *ANATOMY*, n° 408.

FEET. See *Foot*.

FEET, in Poetry. See *POETRY*, n° 117, 175.

FEINT, in fencing, a shew of making a thrust at one part, in order to deceive the enemy, that you may really strike him in another.

A *simple feint* is a mere motion of the wrist, without stirring the foot.

FELAPTON, in logic, one of the six first modes of the third figure of syllogisms; whereof the first proposition is an universal negative, the second an universal affirmative, and the third a particular negative.

FELIÈN (Audre), was born at Chartres in 1619, and went secretary under the marquis de Fontenay-Mareuil ambassador to the court of Rome in 1647. On his return, M. Colbert procured him the places of historiographer to the king, superintendent of his buildings, and of the arts and manufactures in France. He became afterwards deputy comptroller-general of the bridges and dykes in that kingdom; and died in 1695. He wrote several pieces relating to the fine arts, the principal of which is his "Dialogues on the lives and works of the most eminent painters."

FELICITAS, (*FELICITY*, or *HAPPINESS*), was deified by the ancient Pagans. Lucullus built a temple to her. She had another erected by Lepidus. The Greeks paid divine worship to *Macaria*, daughter of Hercules, the same with *Felicitas*. This deity is often pictured upon medals, and generally with a Cornucopia in one hand and a Caduceus in the other. The inscriptions are, *Felicitas Temporum*, *Felicitas Augusti*, *Felicitas Publica*, &c.

FELIX, proconsul, and governor of Judæa in the first century, was brother to Pallas the freedman of the emperor Claudius. He arrived in Judæa about the year 53, when he conceived a violent passion for Drusilla the daughter of Agrippa and wife of Azizæ, and married her. For this reason St Paul, on his speaking before him, discoursed of chastity and the judgment to come with such energy, that Felix trembled. Some time after, Nero recalled him on account of his ill conduct, and sent Portius Festus to succeed him.

FELIX

Felis.

Felis.

FELIX (Minutius), a father of the primitive church, who flourished about the beginning of the third century. He was an African by birth, and a lawyer by profession; and has written a very elegant dialogue in defence of the Christian religion, intitled *Octavius*, from the name of the principal speaker. This work was long attributed to Arnobius; but was ascribed to the genuine author by Balduinus, a celebrated lawyer, in his edition of 1560 printed at Heidelberg. The best edition of it is that at Cambridge, in 1712, by Dr Davis.

FELIS, the CAT, a genus of quadrupeds belonging to the order of feræ, the characters of which are these: The fore-teeth are equal; the molares or grinders have three points; the tongue is furnished with rough sharp prickles, and pointing backwards; and the claws are sheathed, and retractile. This genus comprehends seven genera, viz.

1. The *Leo*, or LION. The largest lions are from eight to nine feet in length, and from four to six feet high: those of a smaller size are generally about 5½ feet long, and about 3½ high. His head is very thick, and his face is beset on all sides with long bushy yellowish hair; this shaggy hair extends from the top of the head to below the shoulders, and hangs down to his knees: the belly and breast are likewise covered with long hair. The rest of the body is covered with very short hair, excepting a bush at the point of the tail. The ears are roundish, short, and almost entirely concealed under the hair of his front. The shagginess of the fore-part of his body makes the hinder part have a naked appearance. The tail is long and very strong; the legs are thick and fleshy; and the feet are short; the length of the claws is about an inch and a quarter, are of a whitish colour, very crooked, and can be extended or retracted into the membranous sheath at pleasure: their points are seldom blunted, as they are never extended but when he seizes his prey.

The female, or lioness, has no mane, or long hair about her head or shoulders; in her we see distinctly the whole face, head, ears, neck, shoulders, breast, &c. all these parts being in some measure concealed under the long hair of the male, give the female a very different appearance: besides, she is considerably less than the male. The hair of both male and female is of a yellowish colour, and whitish on the sides and belly.

In warm countries, quadrupeds in general are larger and stronger than in the cold or temperate climates. They are likewise more fierce and hardy; all their natural qualities seem to correspond with the ardour of the climate. The lions nourished under the scorching sun of Africa or the Indies, are the most strong, fierce, and terrible. Those of mount Atlas, whose top is sometimes covered with snow, are neither so strong nor so ferocious as those of Biledulgerid or Zaara, whose plains are covered with burning sand. It is in these hot and barren deserts, that the lion is the dread of travellers, and the scourge of the neighbouring provinces. But it is a happy circumstance that the species is not very numerous: they even appear to diminish daily. The Romans, says Mr Shaw, brought many more lions out of Libya for their public shows, than are now to be found in that country. It is likewise remarked, that the lions in Turkey, Persia, and the Indies, are less numerous than formerly. As this formi-

dable and courageous animal makes a prey of most other animals, and is himself a prey to none, this diminution in the number of the species can be owing to nothing but an increase in the number of mankind: for it must be acknowledged, that the strength of this king of animals is not a match for the dexterity and address of a negro or Hottentot, who will often dare to attack him face to face, and with very slight weapons.

The ingenuity of mankind augments with their number; that of other animals continues always the same. All the noxious animals, as the lion, are reduced to a small number, not only because mankind are become more numerous, but likewise because they have become more ingenious, and have invented weapons which nothing can resist. This superiority in the numbers and industry of mankind, at the same time that it has broke the vigour of the lion, seems likewise to have enervated his courage. This quality, though natural, is exalted or lowered according to the good or bad success with which any animal has been accustomed to employ his force. In the vast deserts of Zaara; in those which seem to separate two very different races of men, the Negroes and Moors, between Senegal and the boundaries of Mauritania; in those uninhabited regions above the country of the Hottentots; and, in general, in all the meridional parts of Africa and Asia, where mankind have disdained to dwell, lions are still as numerous and as ferocious as ever. Accustomed to measure their strength by that of all other animals which they encounter, the habit of conquering renders them haughty and intrepid. Having never experienced the strength of man, or the power of his arms, instead of discovering any signs of fear, they disdain and set him at defiance. Wounds irritate, but do not terrify them: they are not even disconcerted at the sight of numbers. A single lion of the desert has been known to attack a whole caravan; and if, after a violent and obdurate engagement, he found himself weakened, he retreats fighting, always keeping his face to the enemy. On the other hand, the lions which live near the villages or huts of the Indians or Africans, being acquainted with man and the force of his arms, are so dauntless as to fly and leave their prey at the sight of women or children.

This softening in the temper and disposition of the lion, shows that he is capable of culture, and susceptible, at least to a certain degree, of the impressions that he receives: accordingly, history informs us of lions yoked in triumphal chariots, trained to war, or the chase; and that, faithful to their masters, they never employed their strength or courage but against their enemies. It is, however, certain, that a lion taken young, and brought up among domestic animals, will easily be accustomed to live and sport with them; that he is mild and caressing to his master, especially when he is young; and that, if his natural ferocity sometimes breaks out, it is rarely turned against those who have been kind to him. But, as his passions are impetuous and vehement, it is not to be expected that the impressions of education will at all times be sufficient to balance them: for this reason it is dangerous to let him suffer hunger long, or to vex him by ill-timed teazings: bad treatment not only irritates him, but he remembers it long, and meditates revenge. On the

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the other hand, he is exceedingly grateful, and seldom forgets benefits received. He has been often observed to disdain weak or insignificant enemies, to despise their insults, and to pardon their offensive liberties. When led into captivity, he will discover symptoms of uneasiness, without anger or peevishness: on the contrary, his natural temper softens, he obeys his master, caresses the hand that gives him food, and sometimes gives life to such animals as are thrown to him alive for prey: by this act of generosity he seems to consider himself as for ever bound to protect them; he lives peaceably with them; allows them a part, and sometimes the whole, of his food; and will rather submit to the pangs of hunger, than fill his stomach with the fruit of his beneficence. We may likewise observe, that the lion is not a cruel animal: he kills rather from necessity than choice, never destroying more than he eats; and whenever his appetite is satisfied, he is mild and peaceable.

The aspect of the lion does not detract from the noble and generous qualities of his mind. His figure is respectable; his looks are determined; his gate is stately; and his voice is tremendous. In a word, the body of the lion appears to be the best model of strength joined to agility. The force of his muscles is expressed by his prodigious leaps and bounds, often 20 feet at once; by the brisk motion of his tail, a single sweep of which is sufficient to throw a man to the ground; by the ease with which he moves the skin of his face, and particularly of his forehead; and, lastly, by the faculty of erecting and agitating the hair of his mane when irritated.

Lions are very ardent in their amours: when the female is in season, she is often followed by eight or ten males, who roar incessantly, and enter into furious engagements, till one of them completely overcomes the rest, takes peaceable possession of the female, and carries her off to some secret recess. The lioness brings forth her young in the spring, and produces but once every year.

All the passions of the lion, the soft passion of love not excepted, are excessive; the love of offspring is extreme: the lioness is naturally weaker, less bold, and more gentle than the lion; but she becomes perfectly rapacious and terrible when she has young. Then she exhibits more courage than the male; she regards no danger; she attacks indifferently men and all other animals, kills them, and carries them to her young ones, whom she thus early instructs to suck their blood and tear their flesh. She generally brings forth in the most secret and inaccessible places; and, when afraid of a discovery, she endeavours to conceal the traces of her feet, by returning frequently on her steps, or rather by effacing them with her tail; and, when the danger is great, she carries off her young, and conceals them somewhere else. But, when an actual attempt is made to deprive her of her young, she becomes perfectly furious, and defends them till she be torn to pieces.

The lion seldom goes abroad in the middle of the day; he goes round in the evening and night, in quest of prey. He is afraid of fire, and never approaches the artificial fires made by the shepherds for the protection of their flocks; he does not trace other animals by the scent, but is obliged to trust to his eyes. Many historians have even misrepresented him as incapable of find-

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ing on his prey; but that he is obliged to the jackal, an animal of exquisite scent, in order to provide for him, and that this animal either accompanies or goes before him for this purpose. The jackal is a native of Arabia, Libya, &c. and, like the lion, lives upon prey: perhaps sometimes he follows the lion, but it is with a view to pick up what he leaves behind, not to provide for him; for, being a small and feeble animal, he ought rather to fly from than to follow the lion.

The lion, when hungry, will attack any animal that presents itself: but he is so very formidable, that all endeavour to avoid his encounter; this circumstance often obliges him to conceal himself, and lie in wait till some animal chances to pass. He lies squat on his belly in a thicket; from which he springs with such force and velocity, that he often seizes them at the first bound. He endures hunger longer than thirst; he seldom passes water without drinking, which he does by lapping like a dog. For his ordinary subsistence, he requires about 15 pounds of raw flesh each day.

The roaring of the lion is so strong and loud, that it resembles the rumbling of distant thunder. His roaring is his ordinary voice; but when he is irritated, his cry is shorter, repeated more suddenly, and is still more terrible than the roaring: besides, he beats his sides with his tail, stamps with his feet, erects and agitates the hair of his head and mane, moves the skin of his face, shows his angry teeth, and lolls out his tongue.

The gait of the lion is stately, grave, and slow, though always in an oblique direction. His movements are not equal or measured, but consist of leaps and bounds; which prevents him from stopping suddenly, and makes him often overleap his mark. When he leaps upon his prey, he makes a bound of 12 or 15 feet, falls above it, seizes it with his fore-feet, tears the flesh with his claws, and then devours it with his teeth.

The lion, however terrible, is hunted by large dogs, well supported by men on horseback: they dislodge him, and oblige him to retire. But it is necessary that both the dogs and horses be trained before-hand; for almost every animal frets and flies as soon as he feels the very smell of a lion. His skin, although hard and firm, does not resist either a ball or a javelin: however, he is seldom killed by a single stroke; and is more frequently taken by address than force. They put a live animal above a deep pit covered with light substances, and thus decoy him into the snare.

II. The *Tigris*, or *TIGER*. The size of this animal, according to some authors, is larger, and, according to others, somewhat less, than the lion. M. de la Landemagon assures us, that he has seen a tiger in the East-Indies 15 feet long, including undoubtedly the length of the tail, which, supposing it to be four feet, makes the body of the tiger about 10 feet in length. The skeleton preserved in the cabinet of the French king, indicates that the animal was about seven feet long from the point of the muzzle to the origin of the tail; but then it must be considered that he was caught young, and lived all his days in confinement. The head of the tiger is large and roundish; and the ears are short, and at a great distance from each other. The form of the body has a great resemblance to that of the panther. The skin is of a darkish yellow colour, striped with long black streaks; the hair is short,

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excepting on the sides of the head, where it is about four inches long. The point of the tail is black, and the rest of it is interspersed with black rings. His legs and claws resemble those of the lion, only the legs are much shorter in proportion to the size of the animal.

The Tiger.

The tiger is more ferocious, cruel, and savage than the lion. Although gorged with carnage, his thirst for blood is not appeased; he feizes and tears in pieces a new prey with equal fury and rapacity, the very moment after devouring a former one; he lays waste the country he inhabits; he neither dreads the aspect nor the weapons of men; puts to death whole troops of domestic animals; and attacks young elephants, rhinoceros's, and sometimes even braves the lion himself. The tiger seems to have no other instinct but a constant thirst after blood, a blind fury which knows no bounds or distinction, and which often stimulates him to devour his own young, and to tear the mother in pieces for endeavouring to defend them. He lies in wait on the banks of rivers, &c. where the heat of the climate obliges other animals to repair for drink. Here he feizes his prey, or rather multiplies his massacres; for he no sooner kills one animal, than he flies with equal fury upon the next, with no other view but to plunge in his head into their bodies and drink their blood. However, when he kills a large animal, as a horse or a buffalo, he sometimes does not tear out the entrails on the spot; but, to prevent any interruption, he drags them off to the wood, which he performs with incredible swiftness. This is a sufficient specimen of the strength of this rapacious animal.

Neither force, restraint, or violence, can tame the tiger. He is equally irritated with good as with bad treatment: he tears the hand which nourishes him with equal fury as that which administers blows: he roars and is enraged at the sight of every living creature. Almost every natural historian agrees in this horrible character.

It is happy for other animals, that the species of the tiger is not numerous, and that they are confined to the warm climates. They are found in Malabar, Siam, Bengal, the interior parts of Africa, and, in general, in all the regions that are inhabited by the elephant and rhinoceros.

The tiger has always been a more rare animal than the lion; and yet brings forth an equal number of young, namely, four or five at a litter. The female is furious at all times; but, when her young are attempted to be taken from her, her rage is redoubled: she braves every danger; she pursues the ravishers, who are obliged, when hard pressed, to drop one of the young in order to retard her motion; she stops, takes it up, and carries it into some secret part of the forest; but she instantly returns and pursues the hunters into their villages or boats.

The tiger moves the skin of his face, grinds his teeth, and roars, like the lion; but the sound of his voice is different.

III. The *Pardus*, or PANTHER.—It is about the size of a large dog, and has a great resemblance to a domestic cat. The tongue is rough, and remarkably red; the teeth are strong and sharp; the skin is exceedingly beautiful, being of a yellow colour, variegated with roundish black spots, and the hair is short.

The panther inhabits Africa, from Barbary to the remotest parts of Guinea. It has a cruel and ferocious

aspect; his motions are brisk and lively; his cry resembles that of an enraged dog, but is more strong and rough. He is not so perfectly ungovernable as the tiger: but, notwithstanding all attempts to render him obedient and tractable, he may rather be said to be subdued than tamed; for he never entirely loses his natural ferocity. Accordingly, when kept with a view to the hunting of bucks, goats, or other animals, great care is necessary in training him, and still greater in conducting him. When leading out to the field, they put him in a cage and carry him on a cart. When the game is sprung, they open the door of the cage; he instantly springs towards the animal, often feizes him in a few bounds, throws him to the ground, and strangles him. But, if he happens to miss his aim, he becomes mad with rage, and sometimes falls upon his master, who, in order to prevent accidents of this kind, generally carries along with him pieces of flesh, or perhaps a lamb or a kid, which he throws to him in order to appease his fury.

The panther, according to Buffon, is no where to be found but in Africa, and the regions of the Indies.

The ancients were well acquainted with these animals. These, and the leopards, were the *Varia* and *Pardi* of the old writers: one should think that the Romans would have exhibited the desarts of Africa by the numbers they drew from thence for their public shows. Scaraus exhibited at one time 150 panthers; Pompey the Great, 410; Augustus, 420. Probably they thinned the coasts of Mauritania of these animals, but they still swarm in the southern parts of Guinea.—Oppian describes two species of panther, a large species and a small one; the first of which has a shorter tail than the lesser, and may possibly be this kind.—An animal of this species is found in Bucharia, called there *Babr*: it is seven feet long, very destructive to horses, and even camels: the skin is fine, and valued in Russia at 11. Sterling.—In China there is a most remarkable kind, called there *Louchu*, whose skins sell for 61. Sterling a-piece. It must here also be observed, that there are in the furriers shops in London, skins in most respects resembling those of the panther; which, they assure us, come from the Spanish settlements in the West Indies: These skins equal those of the old continent in beauty and size.

Though Mr Buffon denies the panther to be an inhabitant of America, yet Mr Pennant is of opinion that the same, or a variety at least, inhabits that country. 1. The figure of the species described by Faber, (*Hist. An. Nov. Hisp.* p. 498.) under the name of *Tigris Mexicana*, agrees exactly with that of the panther, as does also the description in general. 2. Every other animal of this genus, which has yet been discovered in America, is far inferior in size and strength to this; whose common height, Faber says, is four or five feet, and whose prey is wild cattle, horses, &c. *M. Condamine*, and *Le Pere Cojetan Cattaneo*, speak of the tigers (*i. e.* the panthers) of America, as equal and even superior in size to those of Africa, and the colour as bright as gold; and Ulloa describes them as big as little horses. 3. Notwithstanding the vendors of furs are not entirely to be relied on as to the countries their goods come from, yet the general opinion of the whole trade, that these skins were the product of Spanish America, is a further proof of their being common to both

The Panther.

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IV. The *Onca*, or *ONCE*, is less than the panther; the tail is longer; the hair is likewise longer, and of a whitish grey colour. The once is easily tamed; and is employed in hunting in several parts of Asia, where dogs are very scarce. He has not the delicate scent of a dog; does not trace other animals by the smell; neither can he run them down in a fair chase; but lies in wait for their approach, and then darts upon them unawares. He leaps so nimbly, that he easily clears a ditch or a wall several feet high; besides, he often climbs trees, waits till some animal passes, and instantly leaps upon them. This method of catching their prey, is practised by the panther and leopard, as well as by the once.—The once inhabits Barbary, Persia, Hyrcania, and China; from which last place the skins are brought into Russia, and sold for 20 s. a piece.

The Leopard. V. The *Pardalis*, or *LEOPARD*, differs from the panther and the once, in the beauty of his colour, which is a lively yellow, with smaller spots than those of the two latter, and disposed in groups. He is larger than the once, and less than the panther. The leopard inhabits the East Indies; one kept some years ago in the Tower, seemed a good-natured animal.—A variety called the *hunting leopard*, is about the size of a large greyhound; of a long make, narrow chest, legs very long. He inhabits India, where he is tamed and trained for the chase of antelopes: carried in a small kind of waggon, hood-winked and chained, till it approaches the herd: when first unchained, does not make its attempt, but winds along the ground, stopping and concealing itself, till it gets a proper advantage; then darts on the animals with surprising swiftness; overtakes them by the rapidity of its bounds; but if it does not succeed in its first efforts, consisting of five or six amazing leaps, misses its prey: losing its breath, and finding itself unequal in speed, it stands still, gives up the point for that time, and readily returns to its master.

The Lynx. VI. The *LYNX* is about 2½ feet long and 15 inches high. He has a great resemblance to the cat; but his ears are longer, and his tail is much shorter; his hair is streaked with yellow, white, and black colours. The lynx is an inhabitant of Muscovy, Poland, Canada, &c. His eyes are brilliant, his aspect is soft, and his air is gay and sprightly: like the cat, he covers his urine with earth; he howls something like the wolf, and is heard at a considerable distance; he does not run like the dog or wolf, but walks and leaps like a cat; he pursues his prey even to the tops of trees; neither wild cats nor squirrels can escape him; he lies in wait for stags, goats, hares, &c. and darts suddenly upon them; he seizes them by the throat and sucks their blood, then opens the head and eats the brain; after this, he frequently leaves them, and goes in quest of fresh prey. The colour of his skin changes according to the season or the climate: the winter-furs are more beautiful than those of summer. These furs are valuable for their softness and warmth: numbers are annually imported from North America, and the north of Europe and Asia; the farther north and east they are taken, the whiter they are, and the more distinct the spots. Of these the most elegant kind is called *irbyz*, whose skin sells on the spot for one pound Sterling. The ancients * celebrated the great quickness of the

lynx's sight; and feigned that its urine was converted into a precious stone.

VII. The *Catus*, or *CAT*, wild, and domestic.

1. The *wild cat* differs not specifically from the tame; the latter being originally of the same kind, but altered in colour, and in some other trifling accidents, as are common to animals reclaimed from the woods and domesticated.

The cat in its savage state is three or four times as large as the house-cat; the head larger, and the face flatter. The teeth and claws are tremendous: its muscles very strong, as being formed for rapine: the tail is of a moderate length, but very thick, marked with alternate bars of black and white, the end always black: the hips and hind part of the lower joints of the legs are always black: the fur is very soft and fine. The general colour of these animals is of a yellowish white, mixed with a deep grey: these colours, though they appear at first sight confusedly blended together, yet on a close inspection will be found to be disposed like the streaks on the skin of the tiger, pointing from the back downwards, rising from a black list that runs from the head along the middle of the back to the tail.

This animal may be called the *British tiger*; it is the fiercest and most destructive beast we have; making dreadful havoc among our poultry, lambs, and kids. It inhabits the most mountainous and woody parts of these islands, living mostly in trees, and feeding only by night. It multiplies as fast as our common cats; and often the females of the latter will quit their domestic mates, and return home pregnant by the former.

They are taken either in traps, or by shooting: in the latter case, it is very dangerous only to wound them; for they will attack the person who injured them, and have strength enough to be no despicable enemy. Wild cats were formerly reckoned among the beasts of chase; as appears by the charter of Richard II. to the abbot of Peterborough, giving him leave to hunt the hare, fox, and wild cat. The use of the fur was in lining of robes: but it was esteemed not of the most luxurious kind; for it was ordained, "that no abbess or nun should use more costly apparel than such as is made of lambs or cats skins." In much earlier times it was also the object of the sportsman's diversion.

2. The *tame or domestic cat* is so well known, that it requires no description. It is an useful, but deceitful domestic. Although when young they are playful and gay, they possess at the same time an innate malice and perverse disposition, which increases as they grow up, and which education learns them to conceal, but never to subdue. Constantly bent upon theft and rapine, though in a domestic state, they are full of cunning and dissimulation; they conceal all their designs; seize every opportunity of doing mischief, and then fly from punishment. They easily take on the habits of society, but never its manners; for they have only the appearance of friendship and attachment. This dissimulation of character is betrayed by the obliquity of their movements, and the ambiguity of their looks. In a word, the cat is totally destitute of friendship; he thinks and acts for himself alone. He loves ease, searches for the softest and warmest places to repose himself. The cat is likewise extremely amorous; and

* Plin. viii. 8. xxviii. 8.

Felis.
The Cat.

which is very singular, the female is more ardent than the male; she not only invites, but searches after and calls upon him to satisfy the fury of her desires; and, if the male disdains or flies from her, she pursues, bites, and in a manner compels him. This heat of passion in females lasts but nine or ten days, and happens twice in the year, namely, in the spring and autumn; however, in some it happens thrice or four times in the year. The female goes with young 55 or 58 days, and generally produces four or five at a litter. As the male has an inclination to destroy the young, the female takes care to conceal them from him; and, when she is apprehensive of a discovery, she takes them up in her mouth one by one, and hides them in holes or inaccessible places. When she has nursed a few weeks, she brings them mice, small birds, &c. in order to learn them to eat flesh. But it is worth notice, that these careful and tender mothers sometimes become unnaturally cruel, and devour their own offspring.

The cat is incapable of restraint, and consequently of being educated to any extent. However, we are told, that the Greeks in the island of Cyprus trained this animal to catch and devour serpents, with which that island was greatly infested. This, however, was not the effect of obedience, but of a general taste for slaughter; for he delights in watching, attacking, and destroying all kinds of weak animals indifferently. He has no delicacy of scent, like the dog; he hunts only by the eye: neither does he properly pursue; he only lies in wait, and attacks animals by surprise; and after he has caught them, he sports with and torments them a long time, and at last kills them (when his belly is full) purely to gratify his sanguinary appetite.

The eye of the cat differs greatly from that of most other animals. The pupil is capable of a great degree of contraction and dilatation; it is narrow and contracted like a line during the day, round and wide in the dark; it is from this conformation of the eye that the cat sees best in the night, which gives him a great advantage in discovering and seizing his prey.

Although cats live in our houses, they can hardly be called domestic animals; they may rather be said to enjoy full liberty; for they never act but according to their own inclination. Besides, the greatest part of them are half wild; they do not know their masters, and frequent only the barns, out-houses, &c. unless when pressed with hunger.

Cats have a natural antipathy at water, cold, and bad smells. They love to bask in the sun, and to lie in warm places. They likewise have an affection for certain aromatic smells; they are transported with the root of the valerian.

Cats take about 18 months before they come to their full growth; but they are capable of propagation in 12 months, and retain this faculty all their life, which generally extends to nine or ten years. They eat slowly, and are peculiarly fond of fish. They drink frequently; their sleep is light; and they often assume the appearance of sleeping, when in reality they are meditating mischief. They walk softly, and without making any noise. As their hair is always dry, it easily gives out an electrical fire, which becomes visible when rubbed a-crofs in the dark. Their eyes likewise sparkle in the dark like diamonds.—The cat, when pleased, purrs, and moves its tail: when angry, it spits, hisses,

and strikes with its foot. It drinks little: is fond of fish: it washes its face with its fore-foot, (Linnaeus says, at the approach of a storm:) it always lights on its feet: it is even proverbially tenacious of life.

Our ancestors seem to have had a high sense of the utility of this animal. That excellent prince *Hoeldda*, or *Howel the Good*, did not think it beneath him (among his laws relating to the prices, &c. of animals*), to include that of the cat; and to describe the qualities it ought to have. The price of a kitten before it could see was to be a penny; till it caught a mouse, two-pence; when it commenced mouser, four-pence. It was required besides, that it should be perfect in its senses of hearing and seeing, be a good mouser, have the claws whole, and be a good nurse: but if it failed in any of these qualities, the seller was to forfeit to the buyer the third part of its value. If any one stole or killed the cat that guarded the prince's granary, he was to forfeit a milch-ewe, its fleece and lamb; or as much wheat as, when poured on the cat suspended by its tail (the head touching the floor), would form a heap high enough to cover the tip of the former. This last quotation is not only curious, as being an evidence of the simplicity of ancient manners, but it almost proves to a demonstration, that cats are not aborigines of these islands, or known to the earliest inhabitants. The large prices set on them, (if we consider the high value of specie at that time†), and the great care taken of the improvement and breed of an animal that multiplies so fast, are almost certain proofs of their being little known at that period.

The cat is found in almost every country in the world; and all the varieties in their appearance may be reasonably enough attributed to the climates which produce them.

The Cat of *Angora*, is a variety with long hair, of a silvery whiteness, and silky texture; very long, especially about the neck, where it forms a fine ruff: the hair on the tail very long and spreading: it is a large variety, found about Angora, the same country which produces the fine-haired goat. It degenerates after the first generation in this climate.

See figures of the principal species of *felis*, on plates CV. CVI. CVII.

FELL (Dr John), a very learned English divine and bishop, entered a student at Christ-church, Oxford, 1636. In 1648, he was ejected by the parliamentary visitors, being then in holy orders: and from that time to the restoration lived at Oxford a retired and studious life. He was installed canon of Christ-church, July 1660; and the year following, dean of that church; in which places he did great services to the college, and reformed several abuses. He was consecrated bishop of Oxford in 1675; and had leave to hold his deanry in *commendam*, that he might continue his services to the college and university. He published several works, and died in 1686.

FELLING OF TIMBER.—Many circumstances are well known and constantly observed in the felling of timber for building, which, though to a hasty observer they might appear trifling, yet prove, on experience, to be of the utmost consequence. One thing observed by Mr De Buffon, which very greatly increases the solidity and strength of timber, is, that the trees intended to be felled for service should first be stripped

Fell,
Felling.

* *Leges Wallice*,
p. 247, 248.

† *Anno* 948.



Fig. 1. FALCO HALIENTUS
FISHING HAWK.



Nº 2.

Fig. 3. FROG-FISH of Surinam.



Fig. 2. FELIS DOMESTICUS
CAT of ANGORA

Fig. 4.
Vegetating FLY.
Nº 1.



A Bell & Co.



Fig. 1. FELIS LEO
or
LION



Fig. 2. FELIS TIGRIS
or
TIGER

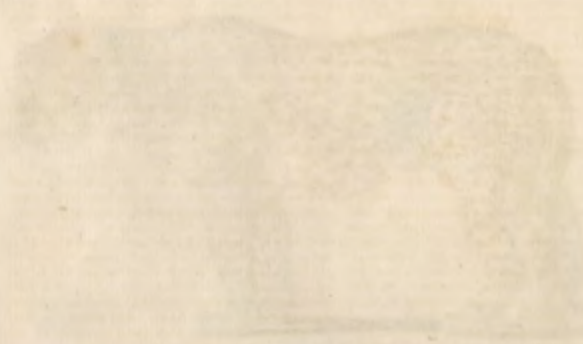


Fig. 1. FELIS PARDUS or
PANTHER



Fig. 2. FELIS LEOPARDUS or
LEOPARD





Fellowship of their bark, and suffered to stand and die upon the spot before the cutting. The sappy part or blea of the oak, becomes by this means as hard and firm as the heart; and the real strength and density of the wood has been proved, by many experiments, to be greatly increased by it: nor is this a practice of any detriment to the proprietor, since the remaining stumps of these trees send up their young shoots as vigorously as if they had been cut down in their natural condition.

When any tree is to be cut down for timber, the first thing to be taken care of is a skilful disbranching of such limbs as may endanger in its fall: many trees are utterly spoiled for want of a previous care of this kind. In arms of timber that are very great, it is always necessary to chop or sink in them close to the bole, and then, meeting it with down-right strokes, it will be severed from the tree without splitting. In felling the tree, take care always to cut it as close to the ground as possible, unless it is intended to be grubbed up: and the doing that is of advantage both to the timber, and to the wood; for timber is never so much valued, if it be known to grow out of old stocks.

FELLOWSHIP, COMPANY, or *Distributive-Portion*, in arithmetic. See ARITHMETIC, n° 15.

FELO DE SE, in law, a person that lays deliberately violent hands on himself, and is the occasion of his untimely death, whether by hanging, drowning, stabbing, shooting, or any other way.

FELON, in law, a person guilty of felony. See FELONY.

FELONY, in the general acceptance of the law, comprises every species of crime, which occasioned at common law the forfeiture of lands or goods. This most frequently happens in those crimes, for which a capital punishment either is or was to be inflicted: for those felonies that are called *clergyable*, or to which the benefit of clergy extends, were anciently punished with death in all lay, or unlearned, offenders; tho' now, by the statute-law, that punishment is for the first offence universally remitted. Trespass itself, says Sir Edward Coke, was anciently comprised under the name of *felony*: and in confirmation of this we may observe, that the statute of treasons, 25 Edw. III. c. 2. speaking of some dubious crimes, directs a reference to parliament; that it may be there adjudged, "whether they be treason or other felony." All treasons, therefore, strictly speaking, are felonies; tho' all felonies are not treason. And to this also we may add, that all offences, now capital, are in some degree or other felony: but this is likewise the case with some other offences, which are not punished with death; as suicide, where the party is already dead; homicide by chance-medley, or in self-defence; and petit-larceny, or pilfering; all which are, (strictly speaking) felonies, as they subject the committers of them to forfeitures. So that, upon the whole, the only adequate definition of felony seems to be that which is before laid down; viz. an offence which occasions a total forfeiture of either lands, or goods, or both, at the common law; and to which capital or other punishment may be superadded, according to the degree of guilt.

To explain this matter a little farther: The word *felony*, or *felonia*, is of undoubted feudal original, being frequently to be met with in the books of feuds, &c;

but the derivation of it has so much puzzled the juridical lexicographers, Præzeus, Calvinus, and the rest: some deriving it from the Greek, *φύλος*, "an impollitor or deceiver;" others from the Latin, *fallo*, *fallere*, to countenance which they would have it called *felonia*. Sir Edward Coke, as his manner is, has given us a still stranger etymology; that it is *crimen animo felleo perpetratum*, "with a bitter or gallish inclination." But all of them agree in the description, that it is such a crime as works a forfeiture of all the offender's lands or goods. And this gives great probability to Sir Henry Spelman's Teutonic or German derivation of it: in which language indeed, as the word is clearly of feudal original, we ought rather to look for its signification, than among the Greeks and Romans. *Fel-on* then, according to him, is derived from two northern words: *FEE*, which signifies (we well know) the fief, feud, or beneficiary estate; and *LOH*, which signifies price or value. Felony is therefore the same as *pretium feudi*, the consideration for which a man gives up his fief; as we say in common speech, such an act is as much as your life, or estate, is worth. In this sense it will clearly signify the feudal forfeiture, or act by which an estate is forfeited, or escheats, to the lord.

To confirm this, we may observe, that it is in this sense, of forfeiture to the lord, that the feudal writers constantly use it. For all those acts, whether of a criminal nature or not, which at this day are generally forfeitures of copyhold estates, are styled *felonia* in the feudal law: "scilicet, per quas feudum amittitur." As, "si domino deservire noluerit;—si per annum et diem cessaverit in petenda investitura;—si dominum ejuravit, i. e. negavit se a domino feudum habere;—si a domino, in jus eum vocante, ter citatus non comparuerit;"—all these, with many others, are still causes of forfeiture in our copyhold estates, and were denominated *felonies* by the feudal constitutions. So likewise injuries of a more substantial or criminal nature were denominated *felonies*, that is, forfeitures: as assaulting or beating the lord; vitiating his wife or daughter, "si dominum cucurbitaverit, i. e. cum uxore ejus concubuerit;" all these are esteemed felonies, and the latter is expressly so denominated, "si fecerit feloniam, dominum forte cucurbitando." And as these contempts, or smaller offences, were felonies or acts of forfeiture, of course greater crimes, as murder and robbery, fell under the same denomination. On the other hand, the lord might be guilty of felony, or forfeit his feignory to the vassal, by the same act as the vassal would have forfeited his feud to the lord. "Si dominus commisit feloniam, per quam vassallus amitteret feudum si eam commiserit in dominum, feudi proprietatem etiam dominus perdere debet." One instance given of this sort of felony in the law is beating the servant of his vassal, so as that he loses his service; which seems merely in the nature of a civil injury, so far as it respects the vassal. And all these felonies were to be determined, "per laudamentum suæ judicium parium suorum," in the lord's court; as with us forfeitures of copyhold lands are presentable by the homage in the court-baron.

Felony, and the act of forfeiture to the lord, being thus synonymous terms in the feudal law, we may easily trace the reason why, upon the introduction of that law into England, those crimes which induced such forfeiture or escheat of lands (and, by a small flexion from

Felony,
Female.

from the original sense, such as induced the forfeiture of goods also) were denominated *felonies*. Thus it was that suicide, robbery, and rape, were felonies; that is, the consequence of such crimes was forfeiture; till by long use we began to signify by the term of *felony* the actual crime committed, and not the penal consequence. And upon this system only can we account for the cause, why treason in ancient times was held to be a species of felony; viz. because it induced a forfeiture.

Hence it follows, that capital punishment does by no means enter into the true idea and definition of *felony*. Felony may be without inflicting capital punishment, as in the cases instanced of self-murder, excusable homicide, and petit larceny: and it is possible that capital punishments may be inflicted, and yet the offence be no felony; as in case of heresy by the common law, which, though capital, never worked any forfeiture of lands or goods, an inseparable incident to felony. And of the same nature was the punishment of standing mute, without pleading to an indictment; which at the common law was capital, but without any forfeitures, therefore such standing mute was no felony. In short, the true criterion of felony is forfeiture: for, as Sir Edward Coke justly observes, in all felonies which are punishable with death, the offender loses all his lands in fee-simple, and also his goods and chattels; in such as are not punishable, his goods and chattels only.

The idea of felony is indeed so generally connected with that of capital punishment, that we find it hard to separate them; and to this usage the interpretations of the law do now conform. And therefore, if a statute makes any new offence felony, the law implies that it shall be punished with death, viz. by hanging, as well as with forfeiture: unless the offender prays the benefit of clergy; which all felons are entitled once to have, unless the same is expressly taken away by statute.

Felonies by statute are very numerous; and as this work will not admit of a proper enumeration, we must refer to the Table of the quarto edition of the Statutes, where they are set forth in alphabetical order.

FELT, in commerce, a sort of stuff deriving all its consistence merely from being fulled, or wrought with lees and size, without either spinning or weaving.

Felt is made either of wool alone, or of wool and hair. Those of French make, $3\frac{1}{2}$ yards long, and $1\frac{1}{2}$ broad, for cloaks, pay each 2 l. 14 s. $1\frac{1}{2}$ s. d. on importation; and draw back 1 l. 12 s. 3 d. on exporting them again.

FELTRIA, (anc. geog.) a town on the borders of Rhetia towards Italy. Now *Feltri*, in the territory of Venice, on the Piava. E. Long. 12. 16. N. Lat. 46°.

FELUCCA, in sea-affairs, a little vessel armed with six oars, frequent in the Mediterranean; which has this peculiarity, that its helm may be applied either in the head or stern, as occasion requires.

FEMALE, (*FÆMINA*), a term peculiar to animals, signifying that sex which conceives and generates its young within itself. See SEX and GENERATION.

FEMALE is also applied, figuratively, to things without life, from the resemblance they bear to the females

of animals. Thus we say a

FEMALE-Screw. See SCREW.

FEMALE-Flower. See *Feminus* FLOS.

FEMALE-Plant. See *Feminea* PLANTA.

FEMME COVERT, in law, a married woman. See COVERTURE.

FEMME Sole, an unmarried woman, whose debts, contracted before marriage, become those of her husband after it.

A femme-sole merchant, is where a woman, in London, uses a trade alone, without her husband; on which account she shall be charged without him.

FEMININE, in grammar, one of the genders of nouns. See GENDER.

The feminine gender is that which denotes the noun or name to belong to a female. In the Latin, the feminine gender is formed of the masculine, by altering its termination; particularly by changing *us* into *a*. Thus, of the masculine *bonus equus*, "a good horse," is formed the feminine *bona equa*, "a good mare;" so, of *parvus homo*, "a little man," is formed *parva femina*, "a little woman," &c.

In French, the feminine gender is expressed, not by a different termination, but by a different article: thus, *le* is joined to a male, and *la* to a female.

In English, we are generally more strict, and express the difference of sex, not by different terminations, nor by different particles, but different words; as boar and sow, boy and girl, brother and sister, &c.—though sometimes the feminine is formed by varying the termination of the male into *ess*; as in abbot, abbess, &c.

FEMUR, or FEMORIS, in anatomy. See there, n° 57.

FEN, a place overflowed with water, or abounding with bogs. See Bog and DRAINING.

Fens are either made up of a congeries of bogs; or consist of a multitude of pools or lakes, with dry spots of land intermixed, like so many little islands.

Several statutes have been made for the draining of fens, chiefly in Kent, Cambridgeshire, Bedfordshire, and Lincolnshire; and by a late act, 11 Geo. II. commissioners shall be appointed for the effectually draining and preserving of the fens in the isle of Ely, who are authorized to make drains, dams, and proper works thereon; and they may charge the landholders therein with a yearly acre-tax, and, in default of payment, sell the defender's lands.

The wet grounds called *fens*, in Lincolnshire and elsewhere in England, bring many advantages to the inhabitants of those counties. Fowl and fish are very plentiful in them. The pike and eels are large and easily caught, but they are usually coarse. The duck, mallard, and teal, are in such plenty as is scarce to be conceived. They are taken in decoys by prodigious flocks at a time. They send these fowl from Lincolnshire to London, twice a week, on horseback, from Michelmass to Lady-day; and one decoy will furnish 20 dozen, or more, twice a week, for the whole season in this manner. The decoy-men contract with the people, who bring them to London at a certain rate, and they are obliged to take off their hands the whole number that is caught. Two teal are usually reckoned equal to one duck; and six ducks and 12 teal are accounted a dozen of wild-fowl; and the usual market-price is about

Femine
♀
Fem.

Fen,
Fence.

about 9s. for such a dozen. About midsummer, during the moulting season, a great number also are destroyed by the people in the neighbourhoods. The poor birds at this season are neither able to swim nor fly well; and the people going in with boats among the reeds where they lie, knock them down with long poles. A little before Michaelmas, vast flights of these birds arrive at the decoys from other places; they soon grow fat in them, and continue there a prey to the masters or owners, as long as the decoys are unfrozen; but, when they are iced over, they fly away again, and go to the neighbouring fens for food.

The fens also abound in a sort of herbage that is very nourishing to cattle. Sheep and horses always grow fat upon it. These fens are common, and the owners of cattle mark them that they may be known. It is remarkable, that, though all is open, the cattle used to one particular spot of ground seldom leave it, but the owner may always find them in or near the same place. The fens have many large and deep drains. In these the pike and eels grow to a vast size: and they are full of geese which feed on the grass; but these eat rank and muddy, and may even be smelt as soon as a person comes into the room where they are roasting. But the people have another very great advantage from these birds besides the eating of them, namely, their feathers and quills; and the produce of these is so great, that the customhouse-books in the town of Bolton shew, that there are frequently sent away in one year 300 bags of feathers, each containing a hundred and a half weight. Each pound of feathers brings in the owner twopence; and it may be thought strange by people unacquainted with these things, but it is a certain truth, that the owners pull them five or six times a-year for the feathers, and three times for the quills. Each pulling comes to about a pound, and many people have 1000 geese at a time, or more. They are kept at no charge, except in deep snowy weather, when they are obliged to feed them with corn.

Oats also grow very well in many of the fen countries, and in good seasons bring great increase and advantage to the owners. There is also another vegetable of great profit to them. This is the *rapum silvestre*; the seed of which they call *cole-feed*; and they make an oil from it of great use in trade. They grind the seed between two large stones, the one standing perpendicularly on the other. The stones are made of a sort of black marble, and are brought from Germany. They sometimes turn them by sails, and sometimes by the drains which carry off the water from the fen lands.

The fens lying low, and being of a vast extent, are very subject to be overflowed by waters from the neighbouring high countries; and though great care and expence is used to keep them dry, they are often like a sea; and the sheep are obliged to be carried off in boats, and the people to live in their upper rooms, and to be supplied with provisions all by boats.

FENCE, in gardening and husbandry, a hedge, wall, ditch, bank, or other inclosure, made round gardens, fields, woods, &c.

In hot climates, where they have not occasion for walls to ripen their fruit, their gardens lie open, where they can have a water-fence, and prospects; or else they bound their gardens with groves, in which are fountains, walks, &c. which are much more pleasing

to the sight than a dead wall: but, in colder countries, we are obliged to have walls to shelter and ripen our fruit, although they take away much from the pleasant prospect of the garden. Brick-walls are accounted the best and warmest for fruit: and these walls, being built panelwise, with pillars at equal distances, will save a great deal of charge, in that the walls may be built thinner than if they were made plain without these panels, for then it would be necessary to build them thicker every where; and, besides, these panels make the walls look the handsomer. Stone-walls, however, on account of their durability, are to be preferred to those of brick, especially those of square hewn stones. Those that are made of rough stones, though they are very dry and warm, yet, by reason of their unevenness, are inconvenient to nail up trees to, except pieces of timber be laid in them here and there for that purpose.

But, in large gardens, it is better to have the prospect open to the pleasure-garden; which should be surrounded with a fosse, that from the garden the adjacent country may be viewed. But this must depend on the situation of the place: for, if the prospect from the garden is not good, it had better be shut out from the sight than be open. As also, when a garden lies near a populous town, and the adjoining grounds are open to the inhabitants; if the garden is open, there will be no walking there in good weather, without being exposed to the view of all passers, which is very disagreeable.

Where the fosses are made round a garden which is situated in a park, they are extremely proper; because hereby the prospect of the park will be obtained in the garden, which renders those gardens much more agreeable than those that are confined.—In the making these fosses there have been many inventions; but, upon the whole, none seem preferable to those which have an upright wall next the garden, which (where the soil will admit of a deep trench) should be five or six feet high; and, from the foot of this wall, the ground on the outside should rise with a gradual easy slope, to the distance of 18 or 20 feet; and where it can be allowed, if it slopes much farther it will be easier, and less perceptible as a ditch, to the eye, when viewed at a distance: but, if the ground is naturally wet, so as not to admit a deep fosse, then, in order to make a fence against cattle, if the wall be four feet high, and slight posts of three feet high are placed just behind the wall, with a small chain carried on from post to post, no cattle or deer will ever attempt to jump against it; therefore it will be a secure fence against them; and if these are painted green, they will not be discerned at a distance, and at the same time the chain will secure persons walking in the garden from tumbling over.

In places where there are no good prospects to be obtained from a garden, it is common to make the inclosure of park-paleing; which, if well performed, will last many years, and has a much better appearance than a wall: and this pale may be hid from the sight within, by plantations of shrubs and evergreens; or there may be a quick-hedge planted within the pale, which may be trained up, so as to be an excellent fence by the time the pales begin to decay.

Fences round parks, are generally of paleing; which

Fence.

Miller's
Gardener's
Dictionary.

Fence.

if well made of winter-fallen oak, will last many years. But a principal thing to be observed, in making these pales, is not to make them too heavy; for, when they are so, their own weight will cause them to decay: therefore the pales should be cleft thin; and the rails should be cut triangular, to prevent the wet lodging upon them; and the posts should be good, and not placed too far asunder. If these things are observed, one of these pales will last, with a little care, upwards of 40 years very well. The common way of making these fences is, to have every other pale nine or ten inches above the intermediate ones; so that the fence may be six feet and a half high, which is enough for fallow deer; but, where there are red deer, the fence should be one foot higher, otherwise they will leap over.

Some inclose their parks with brick walls; and, in countries where stone is cheap, the walls are built with this material; some with, and others without, mortar.

A kitchen-garden, if rightly contrived, will contain walling enough to afford a supply of such fruits as require the assistance of walls, for any family; and this garden, being situated on one side, and quite out of sight of the house, may be surrounded with walls, which will screen the kitchen-garden from the sight of persons in the pleasure-garden; and, being locked up, the fruit will be much better preserved than it can be in the public garden; and the having too great a quantity of walling is often the occasion that so many ill-managed trees are frequently to be seen in large gardens.

The height of garden walls should be 12 feet, which is a moderate proportion; and, if the soil be good, it may in time be well furnished with bearing-wood in every part, especially that part planted with pears, notwithstanding of the branches being trained horizontally from the bottom of the walls.

With regard to the more common kinds of fences, Mr Anderson gives the following directions, in his *Essays on Agriculture*, &c. "The fences that are most universally employed, are either stone-dikes or hedges (A). Dikes, if well built, as effectually preserve a field from the intrusion of domestic animals, as any other kind of fence whatever; but they afford little warmth or shelter to the field: whereas hedges, if good, answer both these purposes equally well. But the most material distinction between dikes and hedges is, that dikes are in their highest degree of perfection as soon as they are reared, and from that moment begin to tend towards decay; so that the person who builds this kind of fence immediately receives the full benefit thereof; whereas hedges, being at first weak and tender, stand in need of attention and care, and do not become a fence for several years after they are planted; and, as they continue to increase in strength, and gradually acquire a higher and higher degree of perfection, it is long before they begin to fall towards decay; so that they are, in general, infinitely more durable than dikes, altho' they are longer of becoming of use to the person who

plants them. Which of these two kinds of fences may, upon the whole, be most eligible, must, in general, be determined by the circumstances and views of the possessor of the ground to be inclosed. If he is a tenant who has a short lease, without a prospect of getting it renewed; or, if he has immediate occasion for a complete fence; it will be, in general, most prudent in him to make choice of dikes, if the materials for rearing these are at hand: but, if there is any probability that his posterity may reap any advantage from these inclosures, it will be almost always more for his advantage to make choice of hedges.

"A dike built of freestone and lime will be almost as durable as a hedge; although, in general, it will neither be so cheap nor agreeable. But dry-stone dikes, unless built of the finest quarried stone, are of such a perishable nature, as to be hardly ever worth the expense of rearing; and never, excepting where the field that you would wish to inclose has plenty of stones upon its surface, which you are under a necessity of carrying away before the field can be improved. In this situation a man may, in some measure, be excused, if he should be tempted to put them into dikes; because the carriage of these stones may be said to cost him nothing; and he may, perhaps, be at some loss how to dispose of them in any other manner. But, in all other circumstances, it is very bad economy to rear fences of this kind, as seal (B) dikes can always be built at one fourth of the expense that these would cost—will answer all purposes equally well; and, if carefully built, will be kept in repair for any number of years at as small an expense as they could be.

"The want of durability generally complained of in these dikes is owing to their bad construction. The greatest part of them are made of a considerable thickness, with a ditch on each side; the heart of the dike being made up with the earth that is taken from these ditches; and only a thin wall, on each side, is built of solid seal from top to bottom: the consequence of which is, that as the loose earth that is thrown into the middle of the dike subsides much more than the seal on each side, the top of the dike sinks down; and, of course, the two side-walls are pressed too much upon the inside, so as to bilge (swell) out about the middle, and quickly crumble down to dust. To avoid this inconvenience, I have always chosen to build my dikes of this sort thinner than usual: they being only three feet and a half thick at the bottom; one foot, or a very little more, at top; and five feet high; taking care to have them built in such a manner, as that every sod (seal), from top to bottom binds the joinings of the others below it, with as much accuracy as the bricks in a well-built wall. The uppermost course of seal is cut a little longer than those that are immediately below it, and placed with the grassy side uppermost, so as to project a little on each side; which not only helps to throw the water a little off the dike, but also to prevent sheep or cattle from attempting to jump over it so readily.

(A) *Dike* is a term employed to denote any kind of wall reared for the purpose of inclosing a field and nothing else.

(B) *Seal* is a provincial word, which may perhaps have many synonyms. It here means any kind of sod dug by the spade from the surface of grass-ground, consisting of the upper mould rendered tough and coherent by the matted roots of the grass thickly interwoven with it. If only a very thin bit of the upper surface is pared off with a paring spade, the pieces are here called *divots*. These being of a firmer consistence, are more durable when built into dikes than seal, but much more expensive also.

Fence.

dily as they otherwise might do. At the foot of the dike, on each side, is dug a small ditch, about a foot and a half or two feet deep; leaving a ledge of a few inches broad, on each side, that the dike may not be undermined by the crumbling down of the loose earth into the ditch. These ditches not only help to give the dike an additional height, and keep its foundation dry; but are also of use to prevent cattle from coming close to it and rubbing upon it, or tearing it down with their horns, which they are very apt to do if this precaution be omitted. The earth that is taken out of the ditches may be thrown outwards into the place that was occupied by the seal that has been taken to build the dike; and, if the field is in grass, a few seeds may be sowed upon it, and it will soon be covered as well as the rest of the field.

"By having the joints bound in every direction, the fabric is rendered much firmer than it could be by any irregular manner of working, while it is at the same time more easily reared. If the ground is soft, and the seal rise well, I get a fence of this kind done for one penny halfpenny *per* yard; but, if it is not good to work, a little more than that must be allowed. As to the time that a fence of this kind may stand without needing any repair, I cannot speak with certainty, as it is not long since I fell into this method of building them. The oldest has just now stood ten years, and seems to be nearly as firm as when first built. I have seen some walls of poor cottages which have been built somewhat after this manner, that have been good after standing 40 or 50 years: but their durability depends greatly upon the nature of the seal of which they are formed. The best is that which is taken from poor ground of a spongy quality, which is generally covered with a strong sward of coarse bent grass. And, in situations where this can be had, I would have no hesitation in recommending this as the cheapest and best temporary fence that could be reared.

"The greatest inconvenience that attends this species of fence, is the danger it runs of being torn down by the horns, or wasted away by the rubbing, of cattle upon it; which they will sometimes do notwithstanding of the ditches. This may be effectually prevented by planting a row of sweet-briar (*oglantine*) plants between the first and second course of seal when the dike is built, which will not fail to grow with luxuriance, and in a short time defend the dike from every attack of this kind. But, if sheep are to be kept in the inclosures, this plant ought not, on any account, to be employed; for, as that animal naturally flies to the fences for shelter in stormy weather, the prickles of the straggling branches of the briar will catch hold of the wool, and tear it off in great quantities, to the great detriment of the flock and loss of the proprietor. In these cases, if the possessor of the ground is not afraid of the bad consequences that may be dreaded from the spreading of whins (*surze*), it would be much better to scatter a few of the seeds of this plant along the ledge at the foot of the dike, which would quickly become a preservative for it, and be otherwise of use as a green food for his sheep during the winter season. But, before he ventures to sow this plant, let him remember, that where it is once established, it will hardly fail to spread through the adjoining fields, and can hardly be ever afterwards thoroughly rooted out.

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"I have often imagined that this kind of fence might be greatly improved both in beauty and strength, by planting a row of ivy plants beneath the first course of seal in building the dike; which would, in a short time, climb up the sides of the dike and cover the whole with a close and beautiful network of woody fibres, covered with leaves of the most beautiful verdure; which would tend to preserve the dike from being eat away by frost, and other vicissitudes of weather. And when it is arrived at the top, it would there send out a number of strong woody branches, forming a sort of hedge, that would afford some shelter to the fields, and break the force of the wind considerably; but, as I never have yet had an opportunity of trying the experiment, I only here offer it as a probable conjecture. I have seen a garden-wall that had been built of stone and clay, ornamented and strengthened in this way. I have had the experience of ivy growing well upon a dry-stone dike: and have likewise seen it growing up the walls, and covering whole cottages built of seal; which have by this means been preserved entire, long after the walls that had been naked have fallen to decay. But, not having had plants of this kind at hand, I have not had an opportunity of trying it in the manner proposed; although, I think, there is the greatest reason to hope for success.

"Whins (*surze*) have been often employed as a fence when sowed upon the top of a bank. They are attended with the convenience of coming very quickly to their perfection, and of growing upon a soil on which few other plants could be made to thrive: but, in the way that they are commonly employed, they are neither a strong nor a lasting fence. The first of these defects may, in some measure, be removed, by making the bank upon which they are sowed (for they never should be transplanted) of a considerable breadth; in order that the largeness of the aggregate body, considered as one mass, may in some measure make up for the want of strength in each individual plant. With this view, a bank may be raised of five or six feet in breadth at the top, with a large ditch on each side of it; raising the bank as high as the earth taken from the ditches will permit; the surface of which should be sowed pretty thick with whin-seeds. These will come up very quickly; and in two or three years will form a barrier that few animals will attempt to break thro', and will continue in that state of perfection for some years. But the greatest objection to this plant as a fence is, that, as it advances in size, the old prickles always die away; there being never more of these alive at any time upon the plant, than those that have been the produce of the year immediately preceding: and these thus gradually falling away, leave the stems naked below as they advance in height; so that it very soon becomes an exceeding poor and unsightly fence; the stems being entirely bare, and so slender withal as not to be able to make a sufficient resistance to almost any animal whatever. To remedy this great defect, either of the two following methods may be adopted. The first is, to take care to keep the bank always stored with young plants; never allowing them to grow to such a height as to become bare below: and it was principally to admit of this, without losing at any time the use of the fence, that I have advised the bank to be made of such an unusual breadth. For, if one side

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* See Agriculture,
no 46.

fide of the hedge be cut quite close to the bank, when it is only two or three years old, the other half will remain as a fence till that side become strong again; and then the opposite side may be cut down in its turn; and so on alternately as long as you may incline: by which means the bank will always have a strong hedge upon it without ever becoming naked at the root. And as this plant, when bruised, is one of the most valuable kinds of winter-food yet known for all kinds of domestic animals*, the young tops may be carried home and employed for that purpose by the farmer; which will abundantly compensate for the trouble of cutting, and the waste of ground that is occasioned by the breadth of the bank.

“ The other method of preserving a hedge of whins from turning open below, can only be practised where sheep are kept; but may be there employed with great propriety. In this case it will be proper to sow the seeds upon a conical bank of earth, shovelled up from the surface of the ground on each side without any ditches. If this is preserved from the sheep for two or three years at first, they may then be allowed free access to it; and, as they can get up close to the foot of the bank upon each side, if they have been accustomed to this kind of food, they will eat up all the young shoots that are within their reach, which will occasion them to send out a great many lateral shoots; and these being continually browsed upon, soon become as close as could be desired, and are then in no sort of danger of becoming naked at the root, although the middle part should advance to a considerable height.

“ The fences hitherto mentioned are only intended to preserve fields from the intrusion of cattle; but, on some occasions, it is necessary to have a fence that would even resist the efforts of men to break through it: as around bleaching-fields, orchards, &c.; the want of which often subjects the proprietor of such fields to very disagreeable accidents. And, as such a fence might, on some occasions, be procured at no great expense or trouble, it were to be wished that the method of doing this were more generally known than it is at present.—To effectuate this, it is necessary to begin by trenching up or ploughing a large belt all around the field you mean to inclose, of 40 or 50 feet or more in breadth, if you find it convenient: the outer edge of which should be inclosed by a good dike, or a ditch and hedge. This belt should be kept in culture one year, and well manured, if your situation will admit of it; and laid up before winter in such a manner that no water may be allowed to lodge upon it; and planted in the winter-time all over with plants of eglantine so thick as not to be above two feet from one another; and between these put a good number of young birch plants not above two years old, interspersed with hazels, oak, ash, rown (wild service), and other trees that you think will thrive upon your soil; together with thorns, hollies, brambles, and wood-bine (honeysuckle); and having then fenced it from cattle, and kept down the weeds that may rise upon its surface by the hoe, as long as you can conveniently get access into it, leave it afterwards to nature. If this is done, and your soil be not extremely bad, the belt in a very few years will be entirely filled with a close bush of trees, so intermixed with the bending branches of the eglantine, and bound together by the trailing shoots of the

bramble and woodbine, that no animal above the size of a cat could penetrate; especially when it is of such a depth as I have recommended.

“ The first hint that I got for a fence of this kind was from a small thicket of brushwood that I had planted for ornament, pretty much in the manner above described; which in a short time became so much interwoven with the sweet-briar, that it was impossible to find any access into it. But as all kinds of trees and shrubs, if planted very close upon one another, become naked at the root when they arrive at any considerable size, care should be taken to prevent it from ever coming to that state, by cutting it down whenever it becomes in danger of being open at the root. And as it would be improper ever to leave the field entirely defenceless, it is a great advantage to have the belt as broad as it conveniently may be; so that the one half of it may be a sufficient fence; by which means, we will have it in our power to cut down the inside and the outside of the belt alternately, so as still to keep the thickest young, and never to want at any time a sufficient fence; and the brush-wood that this affords at each cutting would, in almost every situation, yield such a revenue as would do much more than indemnify the proprietor for the rent of the ground that was occupied by this fence. And if the field was in such a situation as required shelter, some trees might be allowed to grow to their full size about the middle, without any inconvenience, if the belt were of a sufficient breadth.

“ There is one other species of fencing as useful as any of those already mentioned, which is in general much less understood, and more difficult to execute properly, that deserves here to be taken notice of; viz. the method of securing the banks of rivers from being washed away by the violence of the stream, and of preventing the damages that may otherwise be occasioned by the swelling of the waters.

“ It frequently happens that, when a river runs in a bed of rich vegetable mould, the least accident that may chance to divert the stream towards any particular part of the bank, causes it to sweep away large tracts of fine ground, to the very great detriment of the proprietor, as well as the public; as this fine mould is usually carried to the sea, and the place that the water leaves to occupy the new bed that it thus forms for itself is generally of a much worse quality; consisting chiefly of stones, sand and gravel. In some cases, where the whole force of the current is quite close to the bank, and the materials necessary for fencing it are not to be found, it may perhaps be impossible or very difficult totally to prevent this evil; but, for the most part, it admits of a cure that can be obtained at a pretty moderate expence.

“ These ravages are always greatest where the bank rises perpendicularly to a pretty considerable height above the ordinary surface of the water, and never at those places where the banks slope down gradually towards the water's edge: for, when the river is swelled to a great height by rains, and runs with a force and rapidity greater than usual, it strikes violently against these perpendicular banks that directly oppose its course, which being composed of earth quite bare and uncovered, are easily softened by the water, and quickly washed away; so that the upper part of the bank being

Fence.

being thus undermined, falls by its own weight into the river, and is carried off in prodigious quantities: whereas, at those parts of the bank that shelve gradually downwards to the water's edge, when the river rises to any considerable height, it gently glides along its surface; which being defended by the matted roots of the grafs with which it is covered, scarcely sustains any damage at all; and is nearly the same after the water has retired within its banks as before the inundation. These facts, which no one who has bestowed the least attention to this subject can fail to have observed, clearly point out, that the first and most necessary step towards a cure, is to level down the edge of the bank that is next to the water, so as to make it slope gradually down towards the river. If the bank is very high, and you have no other particular use for the earth that must be taken from it, the easiest method of disposing of it, will be to throw it into the river: but, in whatever manner you may dispose of the earth, the slope of the bank must be continued until the inner edge of it is as low as the surface of the water at the driest time of the year, and be made to ascend gradually upwards from the water with an easy slope, till it comes to the level of the ground, or at least rises to such a height as that the water never exceeds. This operation ought to be performed as early in summer as possible, and should be either immediately covered with turf, pared from the surface of some field that has a very strong sward upon it; taking care to lay these in such a manner as to be in as little danger as possible of being washed away by any accidental flood that might happen before they had grown together; or, if the turf of this kind cannot be easily had, it should be sowed very thick with the seeds of some small matt-rooted grafs, that should be kept in readiness for this purpose (c).

"If the stream has not been extremely rapid at the foot of the bank, some of the earth that was thrown into the water will be allowed to subside to the bottom, and will there form a bank of loose soft earth, which will be of great use afterwards in preventing the face of the bank under water from being washed away; but, in order to secure this bulwark effectually for the future, the surface of this soft earth ought to be instantly stuck full of the roots of bog-reeds, flags, water-spiderwort, rushes, and other matt-rooted aquatic plants; which, if allowed to remain till they have once struck root, will afterwards form a barrier that nothing will ever be able to destroy. But, if the stream be too rapid to admit of this, and the bank of soft earth is much deeper than the surface of the water, it will be of use to fill up the breast of the bank with loose stones carelessly thrown in, till they rise near the surface of the water; which would most effectually secure it against any future encroachments, if the bank is sloped away above.

"If it should so happen that stones cannot be easily got for this purpose, the only resource which in this case remains, is to dig the bank so low, that, at the undermost edge, it may be always below the surface of the water, and carry it out in this way for a considerable distance, and then stick the whole surface that is below the water full of matt-rooted aquatic plants; which will in a great measure, if not entirely, defend it from

any future encroachments. This bank ought to continue to shelve downwards even where it was below water, and those aquatics that will grow in the greatest depth of water be planted on the innermost brink, and the others behind them. The water-spiderwort will grow in four feet depth of water, and the roots of the common yellow-flowered water-iris forms such a strong and compact covering upon the surface of the soil on which it grows, as would defend it from being affected by the water almost as well as if it were a rock: it is likewise an advantage attending this plant, that it grows upon a firm bottom, and chiefly delights in running water.

"If the stratum of soft earth is not so deep as to reach to the surface of the water, and lies upon a stratum of rock or hard gravel, there will be no occasion for throwing in stones of any kind. But, as it is difficult to unite the vegetable mould to any of these strata, there will always be some danger of its separating from these in violent inundations; and if the water once get an entry, it will not fail to grow larger and larger by every future inundation. To prevent this inconvenience, it will be necessary, after you have sloped the earth away till you reach the gravel or rock, to cover the place where the edge of the earth joins the inferior stratum, with a good many small stones, if they can be found; sowing between them the seeds of any kind of plants that you think are most likely to thrive, which have strong matted roots with small and flexible tops as possible. You will easily observe, that from the impossibility of ever making earth adhere firmly to stone of any kind, it must always be an improper practice to face the banks of a river to a certain height with stone, which is coped at top with earth."

For the most proper methods of raising hedges of different kinds, see HEDGE.

FENCE-Month, the month wherein deer begin to fawn, during which it is unlawful to hunt in the forest.

It commences 15 days before mid-summer, and ends 15 days, after it. This month, by ancient foresters, is called *defence-month*.

FENCING, the art of making a proper use of the sword, as well for attacking an enemy as for defending one's self.

This art is acquired by practising with foils, called in Latin *rudex*; whence fencing is also denominated *gladiatura rudiaria*.—It is one of the exercises learnt in the academies, (see EXERCISE and ACADEMY); and is an accomplishment both agreeable and useful:—Agreeable, as it affords gentlemen a noble and distinguished amusement:—Useful, as it forms their body; and furnishes them with the faculty of defence, whether it be of their honour or their life, when the one or the other is attacked by those turbulent and dangerous persons whose correction is of service to society in general.

Pyrard assures us, that the art of fencing is so highly esteemed in the East-Indies, that none but princes and noblemen are allowed to teach it. They wear a badge or cognizance on their right arms, called in their language *asaru*; which is put on with great ceremony, like the badges of our orders of knighthood, by the kings themselves.

Fence,
Fencing.

Fenelon

Fenton.

Fencing is divided into two parts, *simple* and *compound*.

Simple is that performed directly and nimbly, on the same line; and is either offensive or defensive.—The principal object of the first, is whatever may be attempted, in pushing or making passes, from this or that point, to the most uncovered part of the enemy. The second consists in parrying and repelling the thrusts aimed by the enemy.

The *compound* includes all the possible arts and inventions to deceive the enemy, and make him leave that part we have a design on bare and unguarded, upon finding we cannot come at it by force, nor by the agility of the simple play. The principal means hereof are, on the offensive side, feints, appeals, clashings, and entanglings of swords, half-thrusts, &c.; and, on the defensive, to push in parrying. Of all which a detail would be here useless, as they are only to be understood and acquired from personal instructions conjoined with practice.

FENELON (Francis de Salignac de la Motte), was of an ancient and illustrious family, and born at the castle of Fenelon in Perigord in 1651. In 1689, he was appointed tutor to the dukes of Burgundy and Anjou; and in 1695 was consecrated archbishop of Cambray. After this preferment, a storm rose against him, that obliged him to leave the court for ever, occasioned by his performance intitled, *An explication of the maxims of the saints concerning the interior life*; in which he was supposed to favour the extravagant notions of Madam Guyon, and the principles of Quietism. A controversy on this occasion was for some time carried on between him and M. Bossuet, bishop of Meux; which terminated in an appeal to the pope; when his holiness condemned the archbishop's book, by a brief dated March 12th, 1699. Some friends indeed pretend, that there was more of court-policy than religious zeal in this affair: but be this as it may, the archbishop submitted patiently to this determination; and, retiring to his diocese of Cambray, acquitted himself punctually in all the duties of his station, and led a most exemplary life. The work that gained him the greatest reputation, and which will render his memory immortal, is his *Adventures of Telemachus*; the style of which is natural, the fictions well contrived, the moral sublime, and the political maxims tending all to the happiness of mankind. Hence it is thought, as the printing of this work was stopped at Paris, that the prelate's heresy was in politics instead of religion; and though his disgrace was prior to this work, he had, while he was tutor to the young princes, taught them the same principles asserted and exemplified in *Telemachus*. Fenelon died in 1715; and a collection of all his religious works was afterwards printed at Rotterdam, under the care of the marquis de Fenelon his grand-nephew, when ambassador to the States-General.

FENNEL, in botany. See ANETHUM.

FENTON (Sir Geoffrey), privy-counsellor and secretary in Ireland during the reigns of queen Elizabeth and king James I. is well known for his translation of

Guicciardini's History of the Wars of Italy, dedicated to queen Elizabeth in 1579. He died at Dublin in 1608; after having married his daughter to Mr Boyle, afterward the great earl of Corke.

FENTON (Elijah), descended from an ancient family, was born at Shelton near Newcastle, but in what year is uncertain. He was the youngest of 12 children, and was intended for the ministry; but embracing principles contrary to the government, while at Cambridge, he became disqualified for entering into holy orders. After he quitted the university, he was secretary to the earl of Orrery; but seems to have spent the most of his life amongst his friends and relations, and used to pay an annual visit to his elder brother, who enjoyed an estate of 1000l. a-year. He was a man of great tenderness and humanity, enjoyed the fairest reputation, and was much esteemed by Mr Pope; who, when he died in 1730, paid him the tribute of a very elegant epitaph. He published a volume of poems in the year 1717; and, in 1723, was acted his tragedy of *Marianne*, built upon her story collected from Josephus in the third volume of the *Spectator*.

FENUGREEK. See TRIGONELLA.

FEOD, or FEUD, is defined to be a right which a vassal hath in lands or some immoveable thing of his lord's, to use the same, and take the profits thereof hereditarily, rendering unto the lord such feudal duties and services as belong to military tenure, &c. and the property of the soil always remaining to the lord.

FEODAL, or of belonging to a FEUD or FEE.

FEODAL System, the constitution of FIEFS or FEUDS.

This remarkable system, so universally received throughout Europe upwards of 12 centuries ago, that Sir Henry Spelman does not scruple to call it the law of nations in our western world, forms a subject that merits particular attention; as, without a general knowledge of the nature and doctrine of feuds, it is impossible to understand, with any degree of accuracy, either the civil constitution of this kingdom, or the laws which regulate its landed property.

The constitution of feuds had its original from ¹Origin of the military policy of the northern or Celtic nations, ²feuds.

the Goths, the Huns, the Franks, the Vandals, and the Lombards; who, all migrating from the same *officina gentium*, or "storehouse of nations," as it has been justly called, poured themselves in vast multitudes into all the regions of Europe at the declension of the Roman empire. It was brought by them from their own countries, and continued in their respective colonies as the most likely means to secure their new acquisitions: and, to that end, large districts or parcels of land were allotted by the conquering general to the superior officers of the army, and by them dealt out again in smaller parcels and allotments to the inferior officers and most deserving soldiers. These allotments were called *feoda*, "feuds," "fiefs," or "fees;" which appellation, in the northern languages, signifies a conditional stipend or reward (A). Rewards, or stipends, they evidently were: and the condition annexed to them was, that the possessors should do service faithfully,

(A) Pontoppidan, in his history of Norway (p. 290.) observes, that, in the northern languages, *o* signifies *proprietary*, and *all totum*. Hence he derives the *ODHAL* right in those countries; and hence too, perhaps, is derived the *odal* right in Finland. (See Macdowall's Inst. part 2.) Now, the transposition of these northern syllables, *ALLODH*, will give us the true etymology of the *allodium* or *absolute property* of the feudists; as, by a similar combination of the latter syllable with the word *FEE* (which signifies, as we have seen, a conditional reward or stipend), *FEEDOH*, or *feodum*, will denote *stipendiary property*.

Feodal System.

fully, both at home and in the wars, to him by whom they were given; for which purpose, he took the *juramentum fidelitatis*, or oath of fealty: (see the article *Feodal Tenure*): and in case of the breach of this condition and oath, by not performing the stipulated service, or by deserting the lord in battle, the lands were again to revert to him who granted them.

General nature of the feudal association.

Allotments, thus acquired, naturally engaged such as accepted them to defend them: and as they all sprang from the same right of conquest, no part could subsist independent of the whole; wherefore all givers as well as receivers were mutually bound to defend each other's possessions. But as that could not effectually be done in a tumultuous irregular way, government, and to that purpose subordination, was necessary. Every receiver of lands, or feudatory, was therefore bound, when called upon by his benefactor, or immediate lord of his feud or fee, to do all in his power to defend him. Such benefactor or lord was likewise subordinate to or under the command of his immediate benefactor or superior; and so upwards to the prince or general himself. And the several lords were also reciprocally bound in their respective gradations, to protect the possessions they had given. Thus the feudal connection was established; a proper military subjection was naturally introduced; and an army of feudatories were always ready enlisted, and mutually prepared to muller, not only in defence of each man's own several property, but also in defence of the whole and of every part of this their newly acquired country: the prudence of which constitution was soon sufficiently visible in the strength and spirit with which they maintained their conquests.

Of allodiality.

But while possessions were to flow in the range of feudality, and were to uphold a regular militia, there were also estates which were to be received and to be retained under more enlarged maxims. To these every person who was free had a title. He could lay claim to his lot or partition of territory, and could dispose of it at his pleasure (B). In contradistinction to the feudal grant, which, as we have seen, was burdened with service and confined by limitation, these lands were known by the name of *allodiality*; a term which denoted their entire freedom and exemption from superiority.

(B) The curious reader may see the remote sources of the feudal laws particularly traced in the manners of the Germanic tribes before they left their woods, by the learned and spirited author of *A view of Society in Europe*, Book I. chap. ii. sect. 1. The members of a German nation, according to Tacitus, cultivated, by turns, for its use, an extent of land corresponding to their number; which was then parcelled out to individuals in proportion to their dignity. When a German tribe obtained possession of a Roman province, they continued to be governed by their ancient principles in the distribution of their possessions. The king or sovereign, as the person of greatest dignity, had the most considerable portion; which came to constitute his *domain*. Each citizen and warrior had his lot or share; which gave rise to *allodiality*. That part of the territory which was not exhausted by partitions to individuals, was considered, agreeably to the ancient ideas, as belonging to the community; and was called, in the barbaric codes, the lands of the *frife*. The situation of a German state, which had acquired a settlement, produced the necessity of drawing closer the connection of the sovereign and the chiefs, and of the chiefs and the people. The lands of the *frife* were the medium which was employed in effecting this design. The sovereign took the direction of these: hence possessions flowed to the chiefs, under the burden of presenting themselves in arms at the call of the sovereign; hence the chiefs dealt out lands to their retainers, under the like injunction of continuing to them their aid; and thus a political system was founded, which was to act in society with infinite efficacy.

"Of this system (says Dr Stuart) the intention and the spirit were national defence and domestic independence. While it called out the inhabitant and the citizen to defend his property, and to secure his tranquillity, it opposed barriers to despotism. Growing out of liberty, it was to promote the freedom of the subject. The power of the sovereign was checked by the chiefs, who were to form a regular order of nobility; and the aristocracy, or the power of the chiefs, was repressed by the retainers and vassals, who, constituting their greatness, were to attract their attention. The chief who oppressed his retainers, was to destroy his own importance. It was their number, and their attachment, which made him formidable to his prince and to his equals."

We must not, however, imagine that these allodial proprietors had no share in the defence of their country, or that the former were its only guardians. In the feudal times, the great conditions of society were liberty and servitude. To be free, was to have a title to go to the wars, and to seek renown. To be a slave, was to be doomed to toil in the house, to sweat in the field, and to know neither ease nor glory. While the subordinations of men in the arrangements of feudality were the peculiar guardians of the kingdom, there was yet, in every person who was free, an inherent obligation to defend it against uncommon and urgent dangers. The necessities of the state gave the alarm to all the ranks of the citizens; and the brave made haste to repel the enemy, and to spill their blood.—There were thus the militia of fiefs, and the militia of the nation.

Of the free, it was a characteristic, that they might possess property; and while the train of the vassalage filled up the feudal army, the militia of the nation was necessarily to consist of the proprietors of *allodiality*. But though, in general, an allodial possession is to be applied to a property in land, it was likewise to denote an estate in moveables, or in money; and proprietors of the latter class, as well as those of the former, were, in the seasons of peril, to bear arms, and to range themselves in battle.

But there was this distinction between the feudatories and the allodial proprietors, with regard to the circumstance in question, that the latter could only be called out in foreign wars, and against the enemies of the state: as they held of no superior or lord, they had no concern in private quarrels, and made no part in the feudal association. A circumstance which, if judged by modern ideas, might appear advantageous. It was in fact, however, the reverse; and operated as a cause of the conversion of *allodium* into *tenure*.

In the imperfection of government, when the magistrate could not extend his power with equal force over all the orders of men in the society; while the weak were exposed to the insults and the passions of the strong; while nobles, haughty and independent, could legally prosecute their resentments with the sword,

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Stuart's *Observations concerning the law and constitution of Scotland*, p. 17, &c.

National militia.

Different situations of the feudatory and of the allodial proprietor.

Feudal
System.

Stuart's
View of So-
ciety in Eu-
rope, p. 41,
&c.

sword, revenge their wrongs, and gratify their avirice and cruelty, the holders of fiefs enjoyed a supreme advantage over allodial proprietors. A lord and his retainers, connected together in an intimate alliance, following the same standard, and adopting the same passions, could act with concert and efficacy. But allodial proprietors were altogether disqualified to defend themselves. Being distant and disengaged, they could form and support no continued or powerful confederacy; and the laws, in fact, did not permit them to enter into factions and hostilities. The violence of the times created an absurdity. It gave to gifts under service and reverible to the grantor, a value superior to lands which were held in full property and at the disposal of the proprietor. It made necessary the conversion of *propriety into tenure*.

Nor was this the only consideration which had weight with the possessors of property. In every monarchy, but in one more particularly that is governed by feudal ideas, rank and pre-eminence attract chiefly the attention, and excite the ambition of individuals. The king being the fountain of honour, and distinctions flowing from his favour, the ranks of men were nicely adjusted; and in proportion as they approached to his person, they exacted and received respect. From this principle it naturally proceeded, that allodial proprietors were treated with contempt. Holding by no tenure, and occupying no place in the feu-

dal arrangements, they could not draw observation. Their pride was alarmed, and they wished for the respect and security of vassals.

Princes, bent on the extension of fiefs, discouraged these proprietors. Their ambition, their abilities, and their prerogatives, furnished them with the greatest influence; and they employed it to give universality to a system, which was calculated to support the royal dignity and the national importance. Compositions for offences inferior to those which were allowed to a vassal, were deemed sufficient for the proprietors of allodality. In the courts of justice, they felt the disadvantages of their condition. Mortified with regal neglect; without sufficient protection from the laws; exposed to the capricious insolence, and the destructive ravages, of the great; disgusted with rancours, contempt, and indignity, they were driven into the circle of fiefs. They courted the privileges and protection which were enjoyed by vassals. They submitted their estates to tenure, selecting to themselves a superior the most agreeable, granting to him their lands, and receiving them back from him as a feudal donation.

In this direction of affairs, the extension of the feudal institutions was unavoidable. The landed property was every where changed into feudality. The empire of fiefs was universal (c).

While the greatness and simplicity of those maxims which

(c) It has puzzled the learned to discover the nation of the barbarians which first gave a beginning to fiefs. No inquiry, in Dr Stuart's opinion, could be more frivolous. In all of them they must have appeared about the same period. And they prevailed in all of them in consequence of the similarity of their situation on their conquests, and in consequence of their being governed by the same customs. It is not, therefore, to the principle of imitation that their universality is to be ascribed.

The annals of France make mention of fiefs in the age of Childebert. The Longobards at an early period introduced them into Italy; and the customs and laws which relate to them seem to have advanced rapidly among this people*.

In Spain, the introduction of feudal tenures preceded the devastations of the Saracens or Moors, which began in the year 710. Among the Goths, who established the monarchy of Spain, lands were granted for service and attachment; and the receiver was the retainer of the grantor. He was said to be *in patrocinio*; and if he refused his service, he forfeited his grant. It also appears, that the retainer, or vassal, swore fealty to his patron or lord. And it was on this scheme that their militia was regulated†.

In England, there is little doubt that the feudal law was known in the Saxon times, as we shall see above §.

In Scotland, the history of fiefs is still more obscure than in any other nation. This imperfection has been ascribed partly to the melancholy condition of the Scottish records, but chiefly to the want of able antiquaries of that nation. But, according to Dr Stuart, "the two great divisions of landed property, *feudality* and *allodial possession*, were coeval with its monarchy. And they must have sprung from the same peculiarity of manners, and of situation, which had given them existence in other nations. It has been conceived, indeed, that Malcom II. building upon some foreign model, introduced their customs into Scotland; and the great body of the Scottish historians and lawyers have subscribed to this notion. It has likewise been thought, that they were imported thither expressly from England; and the policy of Malcom III. has been highly extolled as the effective cause of their establishment. But it seems to Dr Stuart, that no reasons of any authority support these opinions.

"They bear either expressly, or by implication, that the feudal system was introduced into Scotland, in consequence of a principle of adoption or imitation. Now, the peculiarities of fiefs are so strong, and so contradictory to all the common maxims which govern men, that they could not possibly be carried, in any stage of their progression, from one people to another. To transplant the feudal usages, when the grants of land were precarious, or at the will of the prince, to a country where superiority and vassalage had been unknown; to alter the orders of men, from the sovereign to the peasant; and to produce the corresponding chain of customs, with respect to legislation, and the details of the higher and the lower jurisdiction, must have been an attempt infinitely wild, and altogether impracticable. To transplant fiefs in their condition of perpetuity, must have been a project, involving an equal, or rather a greater, number of absurdities.

"But, while it is to be imagined, that fiefs could not be transported with success, in any period of their progression, from one people to another; it is also obvious, that a nation so cultivated, as to have the knowledge and the practice of them in any degree, could not be inclined to make a conquest for the purpose of a settlement. The existence of fiefs implies an establishment and a fixed residence; and history has no notice of any tribe or people under this description, who ever wandered from home to fight for a tract of country which they might inhabit.

"Wherever feudality was to flourish, it was to grow from the root. The tree could not be carried to a foreign soil. Its native earth could alone preserve it in existence, and give the aliment that was to make it rise into height, and shoot into branches.

"Scotland was a feudal kingdom; and we can point pretty exactly to the time when fiefs were *hereditary* there. Now,

Feudal
System.

6
Conversion
of allodium
into tenure.

* Giannone
History of
Naples,
book iv.
sect. 3.
† LL. Wis-
goth, lib. v.
tit. 3. lib. iv.
tit. 7. l. xx.
§ Vid. also
Whitaker's
History of
Mancheſter.
† Observ.
on the law and
constitution
of Scotland.
p. 2, —12.

Feodal
System.Feodal
System.

which the conquerors of Rome brought with them from their woods continued to animate their posterity, the feudal association was noble in its principles, and useful in its practice. It was an exercise of bounty on the part of the lord, of gratitude on that of the vassal. On the foundation of their connection, and of that of the land or fief which the former bestowed on the latter, a train of incidents was to arise, the unequivocal expressions of friendship and habitude, the tender and affectionate fruits of an intercourse the most devoted and zealous.

The feudal
incidents.

While the grants of lands were precarious, or for life, the superior chose to educate, in his hall, the expectants of his fiefs. And, when they descended to heirs, he was careful, on the death of his vassal, to take the charge of his son and his estate. He protected his person, directed his education, and watched over his concerns. He felt a pride in observing his approaches to manhood, and delivered to him, on his majority, the lands of his ancestor, which he had been studious to improve. These cares were expressed in the incident of *wardship*.

The vassal, on entering to his fief, conscious of gratitude, and won with the attention of his lord, made him a present. This acknowledgment, so natural, and so commendable, produced the incident of *relief*.

Grateful for the past, and anxious for the future favour of his chief, the vassal did not incline to ally himself with a family which was hostile to him. The chief was ambitious to add to his power and splendor, by consulting the advantageous alliance of his vassal. They joined in finding out the lady whose charms and whose connections might accord with the passions of the one and the policy of the other. This attention gave establishment to the incident of *marriage*.

When the superior was reduced to distress and captivity in the course of public or of private wars, when he was in embarrassment from prodigality or waste, when he required an augmentation of means to support his grandeur, or to advance his schemes and ambition, the vassal was forward to relieve and assist him by the communication of his wealth. On this foundation there grew the incident of *aid*.

When the vassal gave way to violence or disorder, or when by cowardice, treachery, or any striking delinquency, he rendered himself unworthy of his fief, the sacred ties which bound him to his lord were infringed. It was necessary to deprive him of his land, and give it to a more honourable holder. This was the origin of the incident of *escheat*.

Amidst the contention of friendship and the mutuality of mind which informed the lord and his vassal, there was experienced a condition of activity, liberty, and happiness. The vassals attended to the retainers who were immediately below them. In their turn, they were courted by the lords, whose strength they constituted. And the lords gave importance to the sovereign. A subordination was known, which was

regular, compact, and powerful. The constituent parts interrelated in government as well as war, were attentive, in their several departments, to the purposes of order and justice; and, in national operations, they acted with an uniformity which made them formidable. Of this association public liberty was the result. And, while this fortunate state of things continued, the people, in every country of Europe, came in arms to their national assembly, or appeared in it by their representatives.

Such, in a more particular manner, was the condition of the Anglo-Saxon period of our history; and the people, happy alike in their individual and politic capacity, as men and as citizens, were to bear more reluctantly the oppressions of the Normans.

But the original manners which the conquerors of the Romans brought from their forests, were to spend their force. The high sentiments which had resulted from the limited ideas of property, were to decay. The generous maxims of the feudal association, and the disinterested wildness of chivalry, were to suffer with time. Property was unfolded in all its relations, and in all its uses. It became a distinction more powerful than merit, and was to alter the condition of society. By separating the interests of the lord and the vassal, it was to destroy for ever the principles of their association; and the incidents, which, in a better age, had fostered their friendship, were to feed their rage, and to prolong their animosity. As their confederacy had been attended with advantages and glory, their disaffection was marked with debasement and subjection. Out of the sweets of love, a fatal bitterness was engendered. Sufferance was to succeed to enjoyment; oppression to freedom. Society and government were to be tumultuous and disorderly; and diseases and infirmities were to threaten their decay.

In the prevalence of property and of mercenary views, the *ward* of the infant-vassal, which the superior once considered as a sacred care and an honourable trust, was to be regarded in no other light than as a lucrative emolument. The acquisitions of the vassal, which, in their state of agreement and cordiality, were a strength to the lord, seemed now to detract from his domains. He committed spoil on the estate which, of old, it was his pride to improve. He neglected the education of the heir. He gave repeated insults to his person. The relations of the vassal were often to buy from the superior the custody of his person and his lands. This right was more frequently to be let out to exercise the rapacity of strangers. The treasury of princes was to increase with this traffic; and superiors were to imitate, as well from necessity as from choice, the example of princes. The heir, on his joyless majority, received the lands of his ancestor; and, while he surveyed, with a melancholy eye, his castles, which bore the marks of neglect, and his fields, which were deformed with waste, new grievances were to

9
Its declension.

Ibid. p. 75.

† See Chivalry and Knight.

TO
The perversion of its incidents.

Now, in that form, they could not be imported by any of its princes; and, it is evident, that no conquering nation, advanced to the practice of fiefs in this degree, made a conquest and establishment in Scotland. In consequence, therefore, of a *natural* progress, fiefs must have grown to this condition of refinement. And, before fiefs were hereditary, they were for a series of years; before they were for a series of years, they were for life; and, before they were for life, they had been precarious or at pleasure.

“In every feudal country, the progress from the precarious grant, to the gift in perpetuity, was experienced. In Scotland, the same progress must have been known; and the consideration of it carries us back to a remote antiquity. For fiefs, in this kingdom, being *hereditary* about the days of Malcolm II. or Malcolm III. some centuries must have passed away in the production of the previous steps of feudality.”

Happiness
of the feo-
dal associa-
tion.

Feodal
System.

11
Oppressed
situation of
vassals.

to embitter his complaints, and to swell his passions.

The *relief*, which originally was no more than a present, at the pleasure of the vassal, on his entering into the fief, was consolidated into a right. An expression of gratitude was converted into a debt and a burden. The superior, before he invested the heir in his land, made an exaction from him, in which he had no rule but his rapacity. His demand was exorbitant and grievous. And, if the heir delayed too long to extinguish this sine of redemption, or was unable to pay it, the superior continued his possession of the estate. Rigours, so humiliating, and so frantic, produced clamour, discontent, and outrage. Mitigations were to be applied to them, and to prove ineffectual. Laws were to be made against them, and to be disregarded.

The *marriage* of the vassal, which could not be abused while their association was firm and their interest mutual, became a most ruinous perquisite, when their association was broken, and their interest discordant. The superior could give his vassal in marriage to whom he pleased. This right he exerted as a property. It might be purchased from him by the vassal himself, or by a stranger. The marriage of the vassal, without the consent of the superior, involved the forfeiture of the estate, or was punished with oppressive penalties. It was a rule, indeed, resulting out of their former habits, that the heir should not be married to his disparagement. But this rule was overlooked amidst the violence of the times. The superior had no check but from his humanity, the vassal no relief but in remembrance.

This right, so mortifying to the male heir, was a stretch of still wilder oppression, and more ferocious cruelty, when exercised on the *female ward*. Her hand might be tendered at the will of the superior. He might pay no attention to her affections. She was to submit, at his mandate, to indecent embraces, unfashioned with love. Her beauty was to lose its sweets, and her heart its enjoyments, to feed his avarice, and to gratify his whim. Her relations were often to buy from him a privilege so frightful; and the unfeeling tyrant was to paint the horrors of its exertion, to extort his demand.

The *aid* which, in happier times, the vassal bestowed out of benevolence to relieve the distress and to assist the grandeur of his lord, became a burden and a tax in the misery of their disaffection. It was arrogated as a duty and a tax. The lord called for an aid or contribution, when his eldest daughter was married, when his eldest son was made a knight, and when, having been taken in war, his own person was to be ransomed. These were esteemed the legal occasions when exactions could be made. But custom and practice authorised the requisition of aids on pretences the most frivolous. When the crown or the lord was disposed to be oppressive, they could find a reason for an *aid*; and wants, not his own, were to affect every moment the subsistence of the vassal.

While their confederacy was maintained, it was not on any slight foundation that the fief could be taken from the vassal. Cowardice, dishonour, treachery, or treason, were then the causes of *escheat*. The lord was not to be so offended with lesser delinquencies, as to take possession of the estate. In the times, however, of their disagreement, the causes of forfeiture were to multiply,

and he was to be active to enforce them. Trespases and trifles were to be sufficient grounds for the seizure of lands, of which the possessor was offensive. The vassal held a precarious and dangerous territory; and, with a mind disposed to be hostile to his chief, was to observe to him an attentive and punctilious demeanour. If he refused too long to attend the court of the superior, and to give his oath of fidelity; if he happened to commit the slightest infringement of his oath; if he foresaw any misfortune that was to befall his lord, and neglected to inform him of it; if, by any act, he was to affect the credit or the reputation of his superior; if he should chance to reveal any private circumstance concerning him; if he should grant an infestation in any other form than that in which he held his own; if he should make love to the wife or the daughter of his lord, or should carelessly his sister, while yet a virgin and unmarried; these, and reasons still more absurd, were to forfeit the estate to the superior, and to involve the ruin of the vassal and that of his family.

But though the cordiality of the lord and the vassal was decayed, the grant of land from the former to the latter continued its obligations. The vassal was held by a tie, which he could not renounce without forsaking his importance. His property and subsistence fastened him to an enemy. His passions and his duties were at variance. He might hate the person of his lord, but he was to bow to him as his superior. The grant of land he enjoyed, bound him to the performance of military service. With a cold heart, he was to buckle himself in his armour; and, with reluctant steps, he was to follow the march of his chief. Of old, it had been his fondest attention to carry all his strength against an enemy, that he might display his own greatness, and add to the magnificence of his superior. He now furnished unwillingly the least assistance in his power. The fervour of his former conduct was never more to advance the measures of ambition. And, in this state of things, the feudal militia was to obstruct and retard, rather than to forward, the operations of princes.

In the heart of a populous kingdom, and surrounded with subjects accustomed to arms, the feudal sovereign was thus to feel an unnatural weakness. A malady, so formidable, could not but produce an anxiety for its cure. And, what is no less certain than peculiar, in the different countries of Europe the same remedy was applied to it.

Fiefs, or the grants of land under military service, had advanced from being annual to be for life; and, from being donations for life, they were to proceed to be hereditary. It was before the establishment of this ultimate point in their progression, that the happiness of the feudal association was disturbed. And, it was the establishment of this point which was to afford the opportunity to princes of recovering, in some degree, their greatness. While the cordiality of the vassal was maintained, a general obligation of military service was sufficient to induce him to marshal all his force in the field. When this cordiality was destroyed, policy was to extort what his generosity and attachment had conferred. Lands were to be burdened with a *full* and exact proportion of soldiers. The giving them out in perpetuity was the season for annexing this burden. An expedient, natural, and not to be opposed, suggested

Feodal
System.

12
Consequent
degeneracy
of the feudal
militia.

13
Expedient
service was
for its recovery.

gested itself.

The tenure of knight-service was invented.

A portion of land, of which the grant, by the agreement of the giver and the receiver, entitled to the service of a soldier or a knight, was a *knight's fee*. An estate, of 200 fees, furnished, of consequence, 200 knights. Manours, baronies, and earldoms, were thus powerful, in proportion to their extensiveness. The grants from the sovereign to the nobles claimed the service of so many knights; and the sub-infeudations of the nobles enabled them to perform this service. The tenants of the crown who were not noble, had also their fees, and furnished proportionally their knights. Grants *in capite*, or from the sovereign, and the sub-infeudations of vassals, called out the force of the kingdom. The prince, the nobility, and the people, were in the capacities of a general, officers, and soldiers. A call to arms put the nation into motion. An army, numerous and powerful, could be assembled with expedition, exact in its arrangements, and in a state for defence and hostility.

Such, Dr Stuart conceives, was the origin and nature of *Knight-service*: A tenure which came to recover the feudal militia at a time when it was perishing in weakness. But though it bound more closely, in the connection of land, the superior and the vassal, by the fixedness of the service it enjoined, it could not bring back their ancient cordiality. It gave a strength and consistency to the military department of the feudal institutions; but it removed none of their civil inconveniences and burdens. These, on the contrary, were to increase during its prevalence. It was to brace, only, with a temporary vigour, a system which no prudence or art could accommodate to refining manners.

The incidents, which had grown with the progress of fiefs, still continued their operation. Every grant by the tenure of knight-service, was attended with homage and fealty, and was exposed to wardship and relief, to marriage, aid, and escheat. The superior had still his pretensions and his claims; the vassal was still to suffer and to complain. Promises of the relaxation of the feudal perquisites, were to be made by princes, and to be forgotten. Legal solemnities of restraint were to be held out, and, occasionally, to produce their Vol. IV.

(D) For the difference between the knights produced by this service and the more ancient knights or knights of honour, see the word *Knight*.

(E) Knight-service was established in Scotland before the time of Malcolm IV. anno 1153. Records of his reign instruct its existence, and do not mention it as a novelty. It even appears probable that this tenure was known in the times of David I. See *Dr Stuart's Observ. on the Law and Constit. Hist. of Scotland*, p. 16. and 156—160.

(F) The use of entails, which was not unknown in the Anglo-Saxon times, and the succession which obtained in allodial estates, must have contributed very much to the establishment of the perpetuity of the fief; *LL. Ælfredi*, ap. *Wilkins*. The general tendency of the fief to this ultimate step, and the immense power of many of the Anglo-Saxon nobles, seem also to confirm the idea, that the existence of its perpetuity might, in some cases, be known in the Anglo-Saxon times. But presumptive arguments, though of great weight, are not to be entirely relied upon in questions of this sort.

There is actual evidence that Ethelred possessed, as an hereditary fief and earldom, the territory which had constituted the kingdom of Mercland. He had this grant from king Alfred, when he married his daughter Ethelfleda; *Selden, Tit. Hon.* part 2. ch. 5. It is testified out of records, that the earldom of Leicester was an inheritance in the days of Ethelbald; and the regular succession of its earls, for a long period, is to be pointed out: *Camden's Britannia*, by *Gibson*, vol. I. p. 542. It is known from old historians of credit, that Deirland and Bernicia were Saxon earldoms, which were not only feudal, but inheritable; *Tit. Hon.* part 2. ch. 5.

The grant of Cumberland by king Edmund to Malcolm king of Scotland, was also feudal and inheritable; and this appears from the Saxon Chronicle, and from the following version of the terms employed in it. "Eadmundus Rex totam Cumberland prædavit et contrivit, et commendavit eam Malcolm Regi Scotie; hoc pacto quod in auxilio sibi fore terra et mari. *H. Huntingdon, ap. Prefat. Episc. Derrenf. ad LL. Anglo-Sax.* p. 7. The expression

effect. But, palliatives, feeble or forced, were not to controul the spirit of the system and the times. Fiefs, while they sustained, in the tenure of knight-service, the grandeur of the European states, were waiting with internal debilities. And the eye, in surveying their strength and magnificence, can trace the marks of an approaching weakness and decline.

Thus, in the history of the feudal institutions, there are two remarkable periods; the epoch which preceded the invention of knight-service (D), and the epoch during which it prevailed.

From the conquests of the barbarians till the ninth century, fiefs were in their state of fluctuation. It was about the year 877 that the perpetuity of the fief was established in France; and it was known in every country of Europe, in the commencement of the tenth.

The tenure of knight-service soon followed the perpetuity of the fief, and was connected with it. There is an instance of a knight-fee in the 880*. In the reign of Hugh Capet, who was raised to the throne in the year 987, this tenure extended itself over France; and after having appeared in other nations, it was introduced into England (E). But, in this last country, there are peculiarities, concerning the beginnings and the progress of fiefs, which have been the subject of much inquiry and conjecture. Many learned writers are positive that the Anglo-Saxons were strangers to fiefs, which they assert were introduced into England by William duke of Normandy. There are writers not less learned who affirm, that fiefs were not introduced into England by the duke of Normandy, but prevailed among the Anglo-Saxons in the condition in which they were known under William. Dr Stuart† observes, that it cannot be true, that the Saxons who settled in England should be strangers to fiefs.—The hereditary grant of land, as well as the grant in its preceding fluctuations, was known to our Saxon ancestors. Of this, the conformity of manners which must necessarily have prevailed between the Saxons and all the other tribes of the barbarians, is a most powerful and a satisfactory argument. Nor is it single and unsupported. History and law come in aid to analogy; and these things are proved by the spirit and text of the Anglo-Saxon laws, and by actual grants of hereditary estates under military service (F).

16 Doubts concerning the introduction of the feudal laws into England, &c.
† *View of Society*, p. 97.

16 F But

15 Two agrarian history of fiefs.

* *Ducange, voce Militia*.

Feodal
System.17
Solution of
them.19
Distinction
concerning
fiefs in the
Anglo-
Saxon and the Anglo-
Norman
times.† *Ibid.*
p. 102, &c.Feodal
System.19
Introduc-
tion of knight-
service into
England.

But although fiefs prevailed in the Anglo-Saxon times, yet their condition was different then, from what it afterwards became. Under the Anglo-Saxon princes, no mention is made of those feudal severities which shook the throne under William and his successors. The varying spirit of the feudal association, which Dr Stuart has been careful to remark, accounts for this difference. When the connection between the superior and vassal was warm and generous, the feudal incidents were acts of cordiality and affection. When the introduction of luxury, and an acquaintance with the use of riches, had given birth to those interested passions which set the superior and vassal at variance, the same incidents became acts of oppression and severity. This was more remarkably the case under William and his immediate successors; and until the time of king John, the people of England complained loudly of the feudal severities, and to their complaints always joined the request, that the laws of Edward the Confessor should be restored. "What these laws of Edward the Confessor were (says Mr Hume), which the English, every reign, during a century and a half, desired so passionately to have restored, is much disputed by antiquarians; and our ignorance of them seems one of the greatest defects of the ancient English history." The train of thinking into which Dr Stuart † has been led, points to an explanation of this mystery. By the laws or customs of the Confessor, that condition of felicity was expressed, which had been enjoyed during the fortunate state of the feudal association. The cordiality, equality, and independence, which then prevailed among all ranks in society, continued to be remembered in less prosperous times, and occasioned an ardent desire for the revival of those laws and usages which had been the sources of so much happiness (g).

But, while the times of duke William and his successors were discriminated from those of the Confessor and the Anglo-Saxon princes, by the different states they displayed of the feudal association, there is another circumstance in the progress of fiefs, by which they were to be distinguished more obviously.

Knight-service, which, in France, and in the other kingdoms of Europe, was introduced in the gentle gradation of manners, was about to be discovered in England, after the same manner, when the battle of Hastings facilitated the advancement of William the Nor-

man to the crown of the Confessor. The situation of the Anglo-Saxons in an island, and the Danish invasions, had obstructed their refinement. In the memorable year 1066, when they lost king Edward, and acquired duke William, they knew the perpetuity of the fief; but they were altogether strangers to knight-service and a knight's fee. The duchy of Normandy, when granted to Rollo by Charles the Simple, in the year 912, had yet experienced all the vicissitudes of fiefs. And William, being the sixth prince in the duchy, was familiar with the most extended ideas of the feudal system. These he brought with him into England, and they were to govern and direct his conduct.

The followers of Harold having forfeited their estates, they reverted to the crown. An immense number of lordships and manors being thus in the disposal of William, he naturally gave them out after the forms of Normandy. Each grant, whether to a baron or a gentleman, was computed at so many fees; and each fee gave the service of a knight. To the old beneficiary tenants, he was to renew their grants under this tenure. By degrees, all the military lands of the kingdom were to submit to it. And with a view, doubtless, to this extension, the book of DOMESDAY was undertaken, which was to contain an exact state of all the landed property in the kingdom. Instead, therefore, of bringing fiefs into England, this prince was only to introduce the last step of their progress, the invention of the knight's fee, or the tenure of knight-service.

In fact, it is to be seen by his laws, that he introduced knight-service, and not fiefs. Nor let it be fancied, that this improvement was made by his single authority and the power of the sword. His laws not only express its enactment in his reign, but mention that it was sanctioned with the consent of the common-council of the nation. It was an act of parliament, and not the will of a despot, that gave it validity and establishment (h).

The measure, it is to be conceived, was even highly acceptable to all orders of men. For, a few only of the benefices of the Anglo-Saxon princes being in perpetuity, the greatest proportion of the beneficiary or feudal tenants must have enjoyed their lands during life, or to a series of heirs. Now, the advancement of such grants into hereditary fiefs, under knight-service,

was

commendare, indeed, is said by Spelman not to mean a feudal homage; (*Feuds and Tenures*, p. 35.) But the original Saxon evinces this sense; and in fact the word *commendare*, notwithstanding the authority of this learned glossographer, is used with the utmost propriety to express a feudal homage. *Commendare se alicui*, was even the marked expression for *faire l'hommage à un seigneur*. See *Du Gange*, voc. *Commendare* et *Brüssel*, *Usage general des fiefs*, p. 35, 276.

(g) There are laws which bear the name of Edward; but it is acknowledged on every hand, that their authority is not to be fully trusted. And in the question treated, they are not of any use; unless it be, perhaps, that they illustrate the existence of fiefs among the Anglo-Saxons. This compilation, however, though posterior to the age of the Confessor, deserves to be examined with more attention than has hitherto been bestowed upon it. M. Honard, a foreign lawyer, whose acquaintance with the Norman customs is more intimate than with those of the Anglo-Saxons, is the latest writer who seems to have made a study of it.

(h) The following very curious law of William the Norman makes express mention of the knight's fee and knight-service. It does more. It alludes to a prior law which actually established this tenure, and which was the act of William and his parliament. It is, of consequence, a decisive proof of the introduction of the knight's fee, or of knight-service, by this prince, and of this only. "Statuimus etiam et finiter precipimus, ut omnes comites, et barones, et milites, et servientes, et universi liberi homines totius regni nostri predicti, habeant et teneant se femper bene in armis, et in equis, ut decet et oportet, et quod finit semper prompti et bene parati ad servitium suum integram nobis explendum, et peragendum, cum semper opus adjuverit, secundum quod nobis debent de feodis, et tenementis suis de jure facere, et sicut illis statuimus per commune consilium totius regni nostri predicti, et dedimus et concessimus in feodo jure hereditario." LL. Guill. c. 38.

Feodal
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was an important advantage and acquisition. While it operated to the convenience and the grandeur of the sovereign, it bettered the property, and secured the independence, of the subject.

When the feudal association was cordial, there existed no necessity for the knight's fee. The vassals of a chief gave with pleasure their assistance. When the association was discordant, different interests actuating the superior and the vassal, art and policy were to prescribe the exact service to be performed. Nothing was to be left to friendship and cordiality. A rule, certain and definite, pointed out the duties of the vassal. This rule was the tenure of knight-service.

A duchy, barony, or earldom, were the estates possessed by the nobles; and, being divided into fees, each of these was to supply its knight. A tenant of the crown, who was not created into nobility, but enjoyed a grant of land, furnished also his knights in proportion to his fees. The nobles and the gentry of a feudal kingdom were thus its defenders and guardians. And they granted out territory to persons inferior to them in the divisions of fees, and under the burden of knights. In proportion, therefore, to the extent of its lands, there was, in every feudal state, an army, or a body of militia, for its support and protection.

But while a force, numerous and sufficient, was in this manner created, a care was also bestowed to hold it in readiness to take the field. The knights, who were to appear in proportion to the fees of each estate, were bound to assemble at a call, in complete armour, and in a state for action. The feudal militia, of consequence, could be marched, with expedition, to defend the rights of its nation, to support its honour, or to spread its renown.

The usual arms of a knight were the shield and helmet, the coat of mail, the sword, or the lance. It was, also, his duty to have a horse. For, a growing luxury, and the passion for show, encouraged by tournaments, had brought discredit to the infantry, which had distinguished the barbarians in their original seats, and facilitated their victories over the Romans. The horsemen were called the *battle*, and the success of every engagement was supposed to depend upon them. No proprietor of a fee, no tenant by knight-service, fought on foot. The infantry consisted of men, furnished by the villages and the towns in the demesnes of the prince or the nobles. The bow and the sling were the arms of these; and tho', at first, of little consideration, they were to grow more formidable.

During the warmth of the feudal association, the military service of the vassal was every moment in the command of the superior. When their association was decayed, it was not to be depended on; and, when afforded, was without zeal, and without advantage. The invention of knight-service, which was to recover, in some degree, the vigour of this connection, while it ascertained the exact duty to be rendered, was to fix its duration. Each possessor of a fee was, at his own expense, to keep himself in the field during 40 days. To this obligation, the great vassals of the crown were bound, and inferior proprietors were to submit to it. When a single battle was commonly to decide the fate and the disputes of nations, this portion of time was considerable and important. And, if any expediency demanded a longer duty, the prince might retain his

troops, but under the condition of giving them pay for their extraordinary service.

Such was the military system, which, during a long period of time, was to uphold the power of the monarchies of Europe; a system, of which it was the admirable consequence, that those who were the proprietors of the land of a kingdom, were to defend it. They were the most interested in its welfare and tranquillity; and, while they were naturally disposed to act with union and firmness against a foreign enemy, they were induced not less strongly to guard against domestic tyranny. Their interest and happiness, their pleasure and convenience, urged them equally to oppose invasions from abroad, intestine commotions, and the stretches of prerogative. A strength, so natural, and which could never be exhausted; a strength, in which the prince was to have less authority than the nobles, and in which the power of both was checked by the numerous class of inferior proprietors; a strength, which had directly in view the preservation of civil liberty, seems, on a slight observation, the perfection of military discipline.

But, notwithstanding this advantage, the feudal militia was found incompatible with refining manners. It had been usual, from the earliest times, for the superior to levy a fine from the military tenant, who refused to take the field at his summons. As luxury increased, men became less willing to join the army. Hence the commutation of service for money, and the introduction of the tenure of *escuage*, which, instead of exacting the personal attendance of the knight, only obliged him to pay an annual sum to his superior. As the king was lord paramount of the whole kingdom, the money thus collected ultimately centered in him; and princes, instead of recruiting their armies, filled under their exchequers. In order to defend their dominions, they hired mercenaries, composed of the dregs of the people. These were disbanded at the end of every campaign; and the disturbances which such numbers of idle handitti occasioned all over Europe, shewed the necessity of standing armies. The use of mercenaries gave birth to taxations, which began to be levied in every kingdom of Europe at the will of the prince. This produced contentions between sovereigns and their subjects. In most countries of Europe the kings acquired the right of taxation, which, united to the command of the military force, forms the completion of despotism. In England, the prerogative of taxation, which the prince had assumed, was wrested from him by the great charter of liberties. He was to command his mercenaries; but he was to depend, for their support and their pay, on the generosity of his people.

FEOFFMENT, in law, is a gift or grant of any manors, messuages, lands, or tenements, to another in fee; that is, to him and his heirs for ever, by delivery of seisin, and possession of the estate granted. See **FEU**.

FERÆ, in zoology, an order of quadrupeds. See **ZOOLOGY**.

FERALIA, in antiquity, a festival observed among the Romans on February 21st, or, according to Ovid, on the 17th of that month, in honour of the manes of their deceased friends and relations. During the ceremony, which consisted in making presents at their

Its inefficacy and corruption.

See the particular consequences of this article KNIGHT-SERVICE.

Rise of standing armies, &c.

20
Idea of the
feodal militia.

116, p. 107,
6c.

For
Ferguson.

graves, marriages were forbidden, and the temples of the divinities shut up; because they fancied, that, during this festival, the ghosts suffered no pains in hell, but were permitted to wander about their graves, and feast upon the meats prepared for them.

FER DE FOURCHETTE, in heraldry, a cross having at each end a forked iron, like that formerly used by soldiers to rest their muskets on. It differs from the cross-fourché, the ends of which turn forked, whereas this has that sort of fork fixed upon the square end *.

* See Heraldry.

FER DE MULIN, *Milrinde*, *Inke de Moulin*, in heraldry, is a bearing supposed to represent the iron-ink, or ink of a mill, which sustains the moving mill-stone.

FERDINAND V. king of Spain, called the *Catholic*, which title was continued to his successors. He married Isabella of Castile, by which that kingdom was united to the Spanish crown. This illustrious couple, laid the foundation of the future glory and power of Spain. The conquest of Granada, and the discoveries of Christopher Columbus, make this reign a celebrated era in the history of Spain. He died in 1516, aged 63. See (*History of*) SPAIN.

FERENTARI, in Roman antiquity, were auxiliary troops, lightly armed; their weapons being a sword, bow, arrows, and a sling.

FERENTINUM, (anc. geog.), a town of the Hernici in Latium, which the Romans, after subduing that nation, allowed to be governed by its own laws. Now *Ferentino*, an episcopal city in the Campania of Rome. E. Long. 14. 5. N. Lat. 41. 45.

FERENTUM, or FORENTUM, (anc. geog.), a town of Apulia in Italy. Now *Forenza*, in the Basilicata of Naples.

FERETRUM, among the Romans, the bier used in carrying out the bodies of the dead, which duty was performed by the nearest male relations of the deceased; thus, sons carried out their parents, brothers their sisters, &c.

FERGUS, the name of three kings of Scotland. See (*History of*) SCOTLAND.

FERGUSON, (James), an eminent experimental philosopher and mechanic, was born in Scotland, of very poor parents. At the earliest age his extraordinary genius began to exert itself. He first learned to read, by overhearing his father teach his elder brother; and he had made this acquisition before any one suspected it. He soon discovered a peculiar taste for mechanics, which first arose on seeing his father use a lever. He pursued this study a considerable length, even whilst very young; and made a watch in wood-work, from having once seen one. As he had no instructor, nor any help from books, every thing he learned had all the merit of an original discovery; and such, with infinite joy, he believed it to be. As soon as his age would permit, he went to service; in which he met with hardships, which rendered his constitution feeble through life. Whilst he was servant to a farmer, (whose goodness he acknowledges in the modest and humble account of himself which he prefixed to his last publication), he frequently contemplated the stars; and began the study of astronomy; by laying down, from his own observations only, a celestial globe. His kind master, observing these marks of his ingenuity, procured him the countenance and assistance of his superiors. By their help and instructions, he went on gaining farther

knowledge, and was sent to Edinburgh. There he began to take portraits; an employment by which he supported himself and family for several years, both in Scotland and England, whilst he was pursuing more serious studies. In London he first published some curious astronomical tables and calculations; and afterwards gave public lectures in experimental philosophy, which he repeated (by subscription) in most of the principal towns in England, with the highest marks of general approbation. He was elected a Fellow of the Royal Society, without paying for admission (an honour scarcely ever conferred on a native); and had a pension of 50l. per ann. given him, unsolicited, by our gracious king, at his accession, who had heard lectures from him, and frequently sent for and conversed with him on curious topics. He also received several presents from his majesty, the patron of real merit. To what a degree of consideration Mr Ferguson mounted by the strength of his natural genius, almost every one knows. He was universally considered as at the head of astronomy and mechanics in this nation of philosophers. And he might justly be styled self-taught; or rather heaven-taught; for in his whole life he had not above half a year's instruction at school. He was a man of the clearest judgment, and the most unwearied application to study; benevolent, meek, and innocent in his manners as a child: humble, courteous, and communicative; instead of pedantry, philosophy seemed to produce in him only diffidence and urbanity,—a love for mankind and for his Maker. His whole life was an example of resignation and Christian piety. He might be said to be an enthusiast in his love of God, if religion, founded on such substantial and enlightened grounds as his was, could be styled enthusiasm. He died in 1776.

FERIÆ, in Roman antiquity, holidays, or days upon which they obtained from work.

The Romans had two kinds of feriæ: 1. the public, common to all the people in general; 2. The private, which were only kept by some private families.

The public feriæ were fourfold: 1. *Stativæ feriæ*, holidays which always fell out upon the same day of the month, and were marked in the calendar; of these the chief were the ægonalia, carnentia, and lupercalia. 2. *Comparitivæ feriæ*, holidays appointed every year upon certain or uncertain days by the magistrates or the pontiff; such were the latine, paganalia, compitalia, &c. 3. *Imperativæ feriæ*, holidays commanded or appointed by the authority of the consuls or prætors; of this kind we may reckon the ludiisæminni. 4. *Nundinæ*, the days for fairs. See NUNDINÆ, &c.

FERIÆ Latine, were instituted by Tarquinius Superbus; who, having overcome the Tuscans, made a league with the Latins, and proposed to them to build a temple in common to Jupiter Latiæ, in which both nations might meet, and offer sacrifice for their common safety. At this festival a white bull was sacrificed; and each town, both of the Latins and Romans, provided a certain quantity of meat, wine, and fruits. At first the solemnity continued but one day; after the expulsion of the kings, the senate added a third, a fourth, and so on to ten days.

FERIA, in the Romish breviary, is applied to the several days of the week; thus Monday is the *feria secunda*,

Feria,
Feria.

Fermanagh
Fermentation.

cunda, Tuesday the *feria tertia*; though these days are not working days, but holidays. The occasion of this was, that the first Christians were used to keep the easter-week holy, calling Sunday the *prima feria*, &c. whence the term *feria* was given to the days of every week. But besides these, they have extraordinary ferie, viz. the three last days of passion-week, the two following easter-day, and the second ferie of rogation.

FERMANAGH, a county of Ireland, in the province of Ulster; bounded by Cavan on the south, Tiroen on the north and north-east, by Tyrconnel on the north-west, Leitrim on the south-west, and Monaghan on the east. It is 38 miles long and 24 broad. A great part of it is taken up with bogs, and the great lake called *Lough Erne*, which is near 20 miles in length, and in some places 14 in breadth, diversified with upwards of 300 islands, most of them well wooded, inhabited, and covered with cattle. It abounds also with great variety of fish, such as huge-pike, large bream, roach, eels, trout, and salmon. The water of the lake in some places is said to have a particular softness and liminess, that bleaches linen much sooner than could be done by other water. The lake is divided into the Upper and Lower, between which it contracts itself for five or six miles to the breadth of an ordinary river. In one part of the county are marble rocks 50 or 60 feet high. This county sends four members to parliament, viz. two for the shire, and two for Inniskillen the capital. Fermanagh gives the title of viscount to earl Verney.

FERMENT, (*subst.*) any body which, being applied to another, produces fermentation.

Ferments are either matters already in the act of fermentation, or that soon run into this act. Of the first kind are the flowers of wine, yeast, fermenting beer, or fermenting wine, &c. and of the second are the new expressed vegetable juices of summer-fruit.

Among distillers, ferments are all those bodies which, when added to the liquor, only correct some fault therein, and, by removing some obstacle to fermentation, forward it by secondary means: as also such as, being added in time of fermentation, make the liquor yield a larger proportion of spirit, and give it a finer flavour.

FERMENTATION, may be defined a sensible internal motion of the constituent particles of a moist, fluid, mixed, or compound body: by the continuance of which motion, these particles are gradually removed from their former situation or combination; and again, after some visible separation is made, joined together in a different order and arrangement, so that a new compound is formed, having qualities very sensibly different from those of the original fluid.

Fermentation, properly so called, is confined to the vegetable and animal kingdoms; for the differences between acids and alkalies, however much they may resemble the fermentation of vinous liquors, are nevertheless exceedingly different. It is divided into three kinds; or rather, there are three different stages of it, viz. the vinous, the acetous, and the putrefactive. Of the first, vegetables alone are susceptible; the flesh of young animals is in some slight degree susceptible of the second; but animal substances are particularly susceptible of the third, which vegetable do

not so easily fall into without previously undergoing the first and second. The produce of the first stage is wine, or some other vinous liquor; of the second, vinegar; and of the third, volatile alkali. See BREWING, VINEGAR, &c.

Fermentation is one of the most obscure processes in nature, and no attempt has been made to solve it with any degree of probability. All that we know with regard to it is, that the liquor, however clear and transparent at first, no sooner begins to ferment, than it becomes turbid, deposits a sediment, emits a great quantity of fixed air, and throws up a scum to the top, acquiring at the same time some degree of heat. The heat of the vinous stage, however, is but moderate, seldom or never exceeding that of the human body. The heat of the acetous is considerably greater; and that of the putrefactive is the greatest of all, inasmuch that putrefying substances, when heaped together in great quantities, will sometimes break forth into actual flame.

From these phenomena, fermentation would seem to be a process ultimately tending to the entire dissolution of the fermenting substance, and depending upon the action of the internal heat, ethereal fluid, or whatever else we please to call it, which pervades, and makes an essential ingredient in, the composition of all bodies. From such experiments as have been made upon this subject, it appears, that whether fixed air is the bond of connection between the particles of terrestrial bodies or not; yet the emission of it from any substance is always attended with a dissolution of that substance. We cannot, however, in the present case, say that the emission of the fixed air is the cause of the fermentation. It is in fact otherwise. Fixed air hath no tendency to fly off from terrestrial substances with which it is united; on the contrary, it will very readily leave the atmosphere, after it hath been united with it, to join itself to such terrestrial substances as are capable of absorbing it. The emission of it, therefore, must depend upon the action of some other fluid; most probably the fire or heat, which is dispersed thro' all substances in a latent state, and in the present case begins sensibly to manifest itself. But from what cause the heat originally begins to operate in this manner, seems to be entirely unknown and inexplicable, except that it appears some how or other to depend on the air; for, if that is totally excluded, fermentation will not go on.

FERN, *FILIX*, in botany. See FILICES.

Fern is very common in dry and barren places. It is one of the worst weeds for lands, and very hard to destroy where it has any thing of a deep soil to root in. In some grounds, the roots of it are found to the depth of eight feet. One of the most effectual ways to destroy it is, often mowing the grass; and, if the field is ploughed up, plentiful dunging thereof is very good; but the most certain remedy for it is urine. However, fern, cut while the sap is in it, and left to rot upon the ground, is a very great improver of land.

In some places of the north, the inhabitants mow it green; and, burning it to ashes, make those ashes up into balls with a little water. They then dry them in the sun, and make use of them to clean their linen with; looking upon it to be near as good as soap for that purpose. In some parts of the north, that the frequent treading them down.

Fermentation,
Fern.

Fern
Fernelius.

down by sheep, while that sort of cattle feed upon them, is an infallible method of killing them.

The ancients used the root of the fern and the whole plant, in decoctions and diet-drinks, in chronic disorders of all kinds arising from obstructions of the viscera, particularly in hypochondriac cases, and in obstructions of the spleen and pancreas. There are not wanting modern authors who give it as high a character in these cases as the ancients have done; but it is an ill-tasted medicine, and in no great use in the shops. The country-people esteem it as a sovereign remedy for that troublesome distemper the rickets in children; and they give it also as a powder, after drying it in an oven, to destroy worms. As aperients and anthelmintics, the roots have been in high estimation with some; and Simon Pauli tells us, that they have been the grand secret of some empirics against the broad worm, called *tania*. In the Medical Commentaries, vol. vi. p. 307. are given some instances of the success of this remedy, by Dr Duncan of Edinburgh.

Female FERN. See PTERIS.

FERNANDO, or FERNANDES, an island in the Pacific Ocean. See *JUAN Fernandez*.

FERNELIUS (John), physician to Henry II. king of France, was born in Picardy, in the latter end of the 15th or the beginning of the 16th century. Being sent to Paris to study rhetoric and philosophy, he applied himself in a most intense manner. All other pleasure was insipid to him. He cared neither for play nor for walking, nor for entertainments, nor even for conversation. He read Cicero, Plato, and Aristotle. The reading of Cicero procured him this advantage, that the lectures he read on philosophical subjects were as eloquent, as those of the other masters were barbarous at that time. He also applied himself very earnestly to the mathematics.

This continual study drew upon him a long fit of sickness, which obliged him to leave Paris. On his recovery, he returned thither with a design to study physic; but before he applied himself entirely to it, he taught philosophy in the college of St Barbara. After this he spent four years in the study of physic; and, taking a doctor's degree, confined himself to his closet, in order to read the best authors, and to improve himself in the mathematics; that is, as far as the business of his profession would suffer him. Never was a man more diligent than Fernel. He used to rise at four o'clock in the morning, and studied till it was time either to read lectures or to visit patients. He then examined the urine that was brought him; for this was the method of those times, with regard to the poor people, who did not send for the physician. Coming home to dine, he shut himself up among his books, till they called him down to table. Rising from table, he returned to his study, which he did not leave without necessary occasions. Coming home at night, he did just as at noon: he staid among his books, till they called him to supper; returned to them the moment he had supped; and did not leave them till eleven o'clock, when he went to bed.

In the course of these studies, he contrived mathematical instruments, and was at great charges in making them. But his wife murmuring at the expence, he dismissed his instrument-makers, and applied himself in good earnest to practise physic. But as visiting

patients did not employ his whole time, he read public lectures upon Hippocrates and Galen. This soon gained him a great reputation through France, and in foreign countries. His business increasing, he left off reading lectures; but as nothing could make him cease to study in private, he spent all the hours he could spare in composing a work of physic, intitled *Physiologia*, which was soon after published. He was prevailed with to read lectures upon this new work, which he did for three years; and undertaking another work, which he published, *De vena sectione*, he laid himself under a necessity of reading lectures some years longer, in order to explain this new book to the youth.

While he was thus employed, he was sent for to court, in order to try whether he could cure a lady, whose recovery was despaired of. He was so happy as to cure her; which was the first cause of that esteem which Henry II. who was then but dauphin, and was in love with that lady, conceived for him. This prince offered him, even then, the place of first physician to him; but Fernel, who infinitely preferred his studies to the hurry of a court, would not accept the employment. When Henry came to the throne, he renewed his intreaties: but Fernel represented, that the honour which was offered to him was due, for several reasons, and as an hereditary right, to the late king's physician; and that, as for himself, he wanted more time to make experiments concerning several discoveries he had made relating to physic. The king admitted this: but as soon as Francis I.'s physician died, Fernel was obliged to go and fill his place at Henry II.'s court. And here just the contrary to what he dreaded came to pass: for he enjoyed more rest and more leisure at court, than he had done at Paris; and he might have considered the court as an agreeable retirement, had it not been for the journey which the new civil war obliged the king to take. He died in 1558, leaving behind him a great many works, besides what have been mentioned; as, *De abditis rerum causis*, seven books of Pathology, a book on Remedies, &c. They have been printed several times; with his life prefixed, written by William Plantius his disciple.

FERONIA, the pagan goddess of woods and orchards. The deity took her name from the town Feronia, situated at the foot of mount Sarcote in Italy, where was a wood and temple consecrated to her. This town and wood are mentioned by Virgil, in the catalogue of Turnus's forces. Strabo relates, that those, who sacrificed to this goddess, walked barefoot upon burning coals, without being hurt. She was the guardian deity of freed-men, who received their cap of liberty in her temple.

FERRARS (George), a lawyer, poet, historian, and accomplished gentleman, was descended from an ancient family in Hertfordshire, and born about the year 1510, in a village near St Alban's. He was educated at Oxford, and thence removed to Lincoln's inn; where applying with uncommon diligence to the study of the law, he was soon distinguished for his elocution at the bar. Cromwell earl of Essex, the great minister of Henry VIII. introduced him to the king, who employed him as his menial servant, and, in 1535, gave him a grant of the manor of Flamstead in his native county. This is supposed to have been a profitable estate; nevertheless, Mr Ferrars being a gay courtier, and

Feronia,
Ferrars.

Ferrars,
Ferrara.

and probably an expensive man, about seven years after, was taken to execution by a sheriff's officer for a debt of 200 marks, and lodged in the compter. Being at this time member for Plymouth, the house of commons immediately interfered, and he soon obtained his liberty. He continued in favour with the king to the end of his reign, and in that of Edward VI. he attended the lord protector Somerset as a commissioner of the army in his expedition to Scotland in 1548. In the same reign, the young king being then at Greenwich, Mr Ferrars was proclaimed *lord of misrule*, that is, prince of sports and pastimes; which office he discharged during 12 days, in Christmas holidays, to the entire satisfaction of the court. This is all we know of Mr Ferrars; except that he died in 1579, at Flamstead in Hertfordshire, and was buried in the parish-church. He is not less celebrated for his valour in the field, than for his other accomplishments, as a gentleman and a scholar. He wrote, 1. History of the Reign of queen Mary; published in Grafton's chronicle, 1569, fol. 2. Six Tragedies, or dramatic poems; published in a book called the *Mirror for magistrates*, first printed in 1559, afterwards in 1587, and again in 1610.

FERRARS (Henry), a Warwickshire gentleman of a good family, was eminent in antiquities, genealogies, and heraldry. Mr Wood says, that out of the collections of this gentleman, Sir William Dugdale laid part of the foundation of his celebrated *Antiquities of Warwickshire*. Camden also makes honourable mention of his assistance in relation to Coventry. Some scattered poems of his were published among others in the reign of queen Elizabeth; and he died in 1633.

FERRARA, a city of Italy, in the territory of the pope, capital of a duchy of the same name. It is seated in an agreeable and fertile plain; watered by the river Po, which is a defence on one side; and on the other is encompassed by a strong wall, and deep broad ditches full of water, as well as by a good citadel, finished by pope Paul. In the middle of the city is a magnificent castle, which was formerly the palace of the dukes, and is not now the least ornament of Ferrara. It is quite surrounded with water; and the arsenal, which is near it, deserves the observation of travellers. Over-against the palace is the duke's garden; with a park, called *Belvedere* on account of its beauty. Behind the garden there is a palace, built with white marble, called the *palace of diamonds*, because all the stones are cut diamond fashion.

Ferrara had formerly a considerable trade; but it is now almost deserted, being very poor, inasmuch that there is hardly a person to be seen in the streets. This is owing to the exactions of the popes. The fortifications are now neglected, and the ancient university is dwindled into a wretched college of the Jesuits. However, in 1735, it was advanced to an archbishopric by pope Clement XII. The country about it is so marshy, that a shower or two of rain renders the roads almost impassable. It is 24 miles north-east of Bologna, 38 north-west of Ravenna, 70 north-by-west of Florence, and 190 north of Rome. E. Long. 12. 14. N. Lat. 44. 36.

FERRARA, the duchy of a province in the pope's territory, bounded on the north by the state of Venice; on the west, by the duchies of Mantua and Mirandola;

on the south, by the Boulogne, and by Romania, of which it was formerly a part; and on the east, by the Gulph of Venice. It is 50 miles in length, and 43 in breadth along the coast; but grows narrower and narrower towards the Mantuan. This country is almost surrounded by the branches of the Po, which often overflow the country, and form the great morasses of Comacchio, which has a bad effect on the air. It is thin of people, and indifferently cultivated, though fit for corn, pulse, and hemp. The Po and the lake of Comacchio yield a large quantity of fish. Ferrara is the capital town; besides which, there are Arano, Comacchio, Magnavacca, Belriguardo, Cento, Buendeno, and Ficherola. This duchy was formerly possessed by the house of Este. But the pope took possession of it in 1598, after the death of Alphonso II. duke of Ferrara, it being a fief of the church.

FERRET, in zoology. See MUSTELA.

FERRETS, among glass-makers, the iron with which the workmen try the melted metal, to see if it be fit to work.—It is also used for those irons which make the rings at the mouth of the bottles.

FERRETTO, in glass-making, a substance which serves to colour glass.

This is made by a simple calcination of copper, but it serves for several colours: there are two ways of making it. The first is this. Take thin plates of copper, and lay them on a layer of powdered brimstone, in the bottom of a crucible; over these lay more brimstone, and over that another layer of the plates, and so on alternately till the pot is full. Cover the pot, lute it well, place it in a wind-furnace, and make a strong fire about it for two hours. When it is taken out and cooled, the copper will be found so calcined, that it may be crumbled to pieces between the fingers, like a friable earth. It will be of a reddish, and, in some parts, of a blackish colour. This must be powdered and sifted fine for use.

FERRI (Cibo), a skilful painter born of a good family at Rome, in 1634. He was bred under Peter Cortona; and the works of the scholar are often mistaken for those of the master. The great duke of Tuscany nominated him chief of the Florentine school; and he was as good an architect as a painter. He died in 1689.

FERRO, (W. Long. 19°. N. Lat. 28°,) the most westerly of the Canary islands, near the African coast, where the first meridian was lately fixed in most maps; but now, the geographers of almost every kingdom make their respective capitals the first meridian, as we do London. It is a dry and barren spot, affording no water except what is supplied in a very surprising manner by a tree which grows in these islands. See FOUNTAIN-Tree.

FERRO, or *Faro, Islands*; a cluster of little islands lying in the Northern ocean, between 61° and 63° N. Lat. and between 5° and 8° W. Long. They belong to Denmark, and have about 3000 or 4000 inhabitants.

FERROL, a sea-port town of Spain, in the province of Galicia, seated on a bay of the Atlantic ocean. It has a good harbour, and is frequented by the Spanish fleet in time of war. W. Long. 8. 46. N. Lat. 43. 26.

FERRUGINOUS, any thing partaking of iron, or which contains particles of that metal.

Ferret
Ferrug-
inous.

Ferrugo

FERRUGO, RUST. See RUST.

Fest.

FERRUM, IRON. See IRON.

FERRY, a liberty by prescription, or by the king's grant, to have a boat for passage, on a frith or river, for carrying passengers, horses, &c. over the same for a reasonable toll.

FERTILITY, that quality which denominates a thing fruitful or prolific.

Nothing can produce fertility in either sex, but what promotes perfect health: nothing but good blood, spirits, and perfect animal functions, that is, high health, can beget perfect fecundity; and therefore, all means and medicines, all nostrums and specifics, to procure fertility, different from those which procure good blood and spirits, are arrant quackery. Dr Cheyne says, that water-drinking males are very rarely infertile; and that if any thing in nature can prevent infertility, and bring fine children, it is a milk and feed diet persevered in by both parents.

To increase the fertility of vegetables, says lord Bacon, we must not only increase the vigour of the earth and of the plant, but also preserve what would otherwise be lost: whence he infers, that there is much saved by setting, in comparison of sowing. It is reported, continues he, that if nitre be mixed with water to the thickness of honey, and after a vine is cut, the bud be anointed therewith, it will sprout within eight days. If the experiment be true, the cause may be in the opening of the bud, and contiguous parts, by the spirit of the nitre; for nitre is the life of vegetables.

How far this may be true, is not perhaps sufficiently shewn, notwithstanding the experiments of Sir Kenelm Digby and M. Homberg. Consult Mr Evelyn's Sylva, the Philosophical Transactions, the French Memoirs, and Dr Stahl's Philosophical Principles of Chemistry; but a proper set of accurate experiments seems still wanting in this view.

FERULA, FENNEL GIANT; a genus of the digynia order, belonging to the pentandria class of plants. There are nine species; all of them herbaceous perennials, rising from three to ten or twelve feet high, with yellow flowers. They are propagated by seeds, which should be sown in autumn; and, when planted out, ought to be four or five feet distant from each other, or from any other plants; for no other will thrive under their shade.

FESSE, in heraldry, one of the nine honourable ordinaries. See HERALDRY.

FESSE-POINT, is the exact centre of the escutcheon. See POINT.

FESSE-WAYS, or in FESSE, denotes any thing borne after the manner of a fesse; that is, in a rank across the middle of the shield.

Party per FESSE, implies a parting across the middle of the shield, from side to side, through the fesse point.

FESTI DIES, in Roman antiquity, certain days in the year, devoted to the honour of the gods.

Numa, when he distributed the year into 12 months, divided the same into the *dies festi*, *dies profesti*, and *dies interfesti*.

The *festi* were again divided into days of sacrifices, banquets, games, and feriae. See SACRIFICE, EPULÆ, LUDI, and FERIE.

The *profesti* were those days allowed to men for the administration of their affairs, whether of a public or

private nature: these were divided into *fasti*, *comitalia*, &c. See FASTI, COMITIALES, &c.

The *interfesti* were days common both to gods and men, some parts of which were allotted to the service of the one, and some to that of the other.

FESTINO, in logic, the third mood of the second figure of the syllogism, the first proposition whereof is an universal negative, the second a particular affirmative, and the third a particular negative; as in the following example:

FES No bad man can be happy,

TI Some rich men are bad men.

NO Ergo, some rich men are not happy.

FESTIVAL, the same with feast. See FEAST.

FESTOON, in architecture and sculpture, &c. an ornament in form of a garland of flowers, fruits, and leaves, intermixed or twisted together.

It is in the form of a string or collar, somewhat biggest in the middle, where it falls down in an arch; being extended by the two ends, the extremities of which hang down perpendicularly.

Festoons are now chiefly used in friezes, and other vacant places which want to be filled up and adorned; being done in imitation of the long clusters of flowers, which the ancients placed on the doors of their temples and houses on festival occasions.

FESTUCA, PESCUE; a genus of grasses of the digynia order, belonging to the triandria class of plants.

—There are 16 species; two of which, as being the most remarkably useful, are described under the article AGRICULTURE, n° 51—56. Another species, called the *fluitans*, or *floating*, from its growing in wet ditches and ponds, is remarkable for the uses that are made of its seeds. These seeds are small, but very sweet and nourishing. They are collected in several parts of Germany and Poland, under the name of *manna seeds*; and are used at the tables of the great, in soups and gruels, on account of their nutritious quality and grateful flavour. When ground to meal, they make bread very little inferior to that in common use. The bran, separated in preparing the meal, is given to horses that have worms; but they must be kept from water for some hours afterwards. Geese are also very fond of these seeds.—Mr Lightfoot recommends this as a proper grass to be sown in wet meadows.

FESTUS (Pompeius), a celebrated grammarian of antiquity, who abridged a work of Verrius Flaccus, *De Significatione Verborum*; but took such liberties in castration and criticising, as, Gerard Vossius observes, are not favourable to the reputation of his author. A complete edition of his fragments was published by M. Dacier in 1681, for the use of the Dauphin. Scaliger says, that Festus is an author of great use to those who would attain the Latin tongue with accuracy.

FETLOCK, in the manege, a tuft of hair growing behind the palken joint of many horses; for those of a low size have scarce any such tuft.

FETTI (Domenico), an eminent painter in the style of Julio Romano, was born at Rome in 1589, and educated under Ludovico Civali of Florence. He painted but little for churches, but excelled in history; his pictures are much sought after, and are scarce. He abandoned himself to disorderly courses; and put an end to his life, by excesses, in the 35th year of his age.

FEUD (*Feida*), signifies, in the German tongue, *guerram*,

Festivo

Feud.

Feud
||
Fevre

guerram, Lat. *bellum*; and, according to Lambard, *capitales inimicitias*; and *feud* used in Scotland is a combination of kindred to revenge the death of any of their blood against the kiler, and all his race, or any other great enemy.

FEUD (*Feoda*), *Food*, *Fief*, or *Fec*. See FEODAL System.

Feuds are called by various names, according to their respective natures; as, FEUDUM *Antiquum*, a feud descending to a son, &c. from his ancestors. FEUDUM *Apertum*, a feud resulting back again to the lord of the fee; where the blood of the person last seized in fee-simple is utterly extinct and gone. FEUDUM *Honorarium*, (and *Feudum individuum*), an honorary feud, or title of nobility, of an indivisible nature, and descendible to the eldest son in exclusion of all the rest. FEUDUM *Improprium*, an improper or derivative feud; and *feoda impropria*, are all such feuds as do not fall within the description of *feoda propria*. FEUDUM *Maternum*, a feud descending to the son from the mother. FEUDUM *Novum*, a feud newly acquired by the son; to which, in ancient times, only the descendants from his body could succeed, by the known maxims of the early feudal constitutions. FEUDUM *Novum*, held *ad antiquum*; descendible in the same manner as a *feudum novum*. FEUDUM *Paternum*, a feud descendible from father to son. FEUDUM *Proprium*, a proper feud distinguished from an *improper*, which are the two grand divisions.

FEUDAL, or FEODAL. See FEODAL.

FEUDATORY, or FEODATORY, a tenant who *See Feodal formerly held his estate by feudal service*. TENURE.

FEU-DUTY, in Scots law, is the annual rent or duty which a vassal, by the tenor of his right, becomes bound to pay to his superior.

FEU-Holding, in Scots law, is that particular tenure by which a vassal is taken bound to pay an annual rent or feu-duty to his superior.

FEVER. See (Index subjoined to) MEDICINE.

The ancients divided the diseases as well as the passions and affections of men. Virgil places them in the entrance into hell, *Æn. vi. 273*. Among these, *Fever* had a temple on mount Palatine, and two other parts of ancient Rome; and there is still extant an inscription to this goddess. FEBRI. DIVÆ. FEBRI. SANCTÆ. FEBRI. MAGNÆ. CAMILLA. A. MATA. PRO. FILIO. MALE. AFFECTO.

FEVER, in fariery. See there, § iv.

FEVERFEW, in botany. See MATRICARIA.

FEVERSHAM, a town of the county of Kent in England, situated on a branch of the river Thames, which is navigable for boats. It is a member of the cinque-port of Dover. Oysters, and many other articles, are sent from hence to the London market. E. Long. o. 38. N. Lat. 51. 20.

FEVRE (Tanegui le), of Caen, in Normandy, born 1615, an excellent scholar in the Greek and Roman learning. Cardinal de Richelieu gave him a pension of 2000 livres to inspect all the works published at the Louvre, and designed to have made him principal of a college he was about to erect at Richelieu. But the cardinal's death cut off his hopes; and cardinal Mazarine having no great relish for learning, his pension was ill-paid. Some time after, the Marquis de Franciere, governor of Langres, took him along with him to his Vol. IV.

government, and there he embraced the Protestant religion; after which he was invited to Saumur, where he was chosen Greek professor. He there taught with extraordinary reputation. Young men were sent to him from all the provinces in the kingdom, and even from foreign countries, while divines and professors themselves gloried in attending his lectures. He was preparing to go to Heidelberg, whither he was invited by the prince Palatine, when he died, aged 57. He wrote, 1. Notes on Anacreon, Lucretius, Longinus, Phædrus, Justin, Terence, Virgil, Horace, &c. 2. A short account of the lives of the Greek poets. 3. Two volumes of letters; and many other works.

FEVRE (Claude le), an eminent French painter, was born at Fountainbleau in 1633, and studied in the palace there, and then at Paris under Le Sueur and Le Brun; the latter of whom advised him to adhere to portraits, for which he had a particular talent, and in his style equalled the best masters of that country. He died in England in 1675, aged 42.

FEZ, the capital of a kingdom of the same name in Barbary, in Africa. It is a very large place, surrounded with high walls, within which there are hills and valleys, only the middle being level and flat. The river, which runs through the city, is divided into two streams, from which canals are cut into every part of the town; so that the mosques, colleges, palaces, and the houses of great men, are amply supplied with water. They have generally square marble basins in the middle of the court of their houses, which are supplied with water by marble pipes that pass through the walls: they constantly run over, and the stream returns back into the street, and so into the river. The houses are built with brick or stone; and are adorned on the outside with fine mosaic work, or tiles like those of Holland. The wood-work and ceilings are carved, painted, and gilt. The roofs are flat; for they sleep on the tops of the houses in summer. Most of the houses are two stories high, and some three. There are piazzas and galleries running all round the court on the inside, so that you may go under cover from one apartment to another. The pillars are of brick, covered with glazed tiles, or of marble, with arches between. The timber-work is carved and painted with gay colours, and most of the rooms have marble cisterns of water. Some of the great men build towers over their houses several stories high, and spare no expence to render them beautiful; from hence they have a fine prospect all over the city.

There are in this city 700 mosques, great and small; 50 of which are magnificent, and supported with marble pillars, and other ornaments. The floors are covered with mats, as well as the walls to the height of a man. Every mosque has a tower or minaret, like those in Turkey, with a gallery on the top, from whence they call the people to prayers. The principal mosque is near a mile and a half in circumference. The middle building is 150 yards in length, and 80 in breadth, with a tower proportionably high. Round this to the east, west, and north, there are great colonades 30 or 40 yards long. There are 900 lamps lighted every night; and in the middle of the mosque are large branches, which are capable of holding 500 lamps each. Along the walls are seven pulpits, from which the doctors of the law teach the people. The business

Fevre,
Fet.

Fewel
Ficus.

of the priest is only to read prayers, and distribute alms to the people; to support which, there are large revenues.

Besides the mosques, there are two colleges built in the Moorish manner, and adorned with marble and paintings. In one of them there are 100 rooms, besides a magnificent hall. In this there is a great marble vase full of water, adorned with marble pillars of various colours, and finely polished. The capitals are gilt, and the roof shines with gold, azure, and purple. The walls are adorned with Arabic verses in gold characters. The other colleges are not near so beautiful, or rather all are gone to ruin since the neglect of learning.

There are hospitals in the city, where formerly all strangers were maintained three days *gratis*. But the estates belonging to them are confiscated for the emperor's use. There are above 100 public baths, many of which are stately buildings. People of the same trade or business live in streets by themselves.

Though the country about Fez is pleasant and fertile, and in many places abounding with corn and cattle, yet a great part of it lies waste and uncultivated, not so much for want of inhabitants, as from the oppression of the governors; which makes the people choose to live at some distance from the high roads, where they cultivate just as much land as is necessary for their own subsistence.

Round the city there are fine marble tombs, monuments, and gardens full of all manner of fruit-trees.

Fez is situated on the river Cebu, W. Long. 4. 25. N. Lat. 33. 58.

FEWEL. See FUEL.

FIASCOE, a town of Italy in the territories of the pope, remarkable for its good wine. E. Long. 13. 12. N. Lat. 42. 20.

FIAT, in law, a short order or warrant signed by a judge, for making out and allowing certain processes.

FIBRARIÆ, a class of fossils, naturally and essentially simple, not inflammable nor soluble in water; and composed of parallel fibres, some shorter, others longer; their external appearance being bright, and in some degree transparent: add to this, that they never give fire with steel, nor ferment with or are soluble in acid menstrua.

FIBRE, in anatomy, a perfectly simple body, or at least as simple as any thing in the human structure; being fine and slender like a thread, and serving to form other parts. Hence some fibres are hard, as the bony ones; and others soft, as those destined for the formation of all the other parts.

The fibres are divided also, according to their situation, into such as are straight, oblique, transverse, annular, and spiral; being found arranged in all these directions in different parts of the body.

FIBRE is also used to denote the slender FILAMENTS which compose other bodies, whether animal, vegetable, or mineral; but more especially, the capillary roots of plants.

FIBROSE, something consisting of fibres, as the roots of plants. See ROOT.

FICINUS (Marcius), of Florence, born 1433, applied himself particularly to the study of the Greek and Latin tongues; followed the Platonic sect; and translated into Latin the works of Plato, and of several great men who maintained that philosophy, as Jam-

blichus, Plotinus, Proclus, &c. He died in 1449.

FICOIDES, a name given to several distinct plants, as the mesembryanthemum, mufa, and opuntia. See MESEMBRYANTHEMUM.

FICTION. See FABLE, and POETRY.

FICUS, the FIG-TREE; a genus of the triocia order, belonging to the polygama class of plants. There are ten species, of which the following are the most remarkable.

1. The carica, or common fig, with an upright stem branching 15 or 20 feet high, and garnished with large palmated or hand-shaped leaves. Of this there are a number of varieties; as the common fig, a large, oblong, dark purplish blue fruit; which ripens in August either on standards or walls, and the tree carries a great quantity of fruit.—The brown or chestnut fig; a large, globular, chestnut-coloured fruit, having a purplish delicious pulp, ripening in July and August.—The black ischia fig; a middle-sized, shortish, flat-crowned, blackish fruit, having a bright pulp; ripening in the middle of August.—The green ischia fig; a large, oblong, globular-headed, greenish fruit, slightly stained by the pulp to a reddish-brown colour; ripens in the end of August.—The brown ischia fig; a small, pyramidal, brownish-yellow fruit, having a purplish very rich pulp; ripening in August and September.—The Malta fig; a small flat-topped brown fruit, ripening in the middle of August or beginning of September.—The round brown Naples fig; a globular, middle-sized, light-brown fruit, and brownish pulp; ripe in the end of August.—The long, brown, Naples fig; a long dark-brown fruit, having a reddish pulp; ripe in September.—The great blue fig; a large blue fruit, having a fine red pulp.—The black Genoa fig; a large, pear-shaped, black-coloured fruit, with a bright red pulp; ripe in August.

2. The lycamorus, or lycamore of scripture. According to Mr Hasselquist, this is a huge tree, the stem being often 50 feet round. The fruit is pierced in a remarkable manner by an insect. There is an opening made in the calyx, near the time the fruit ripens, which is occasioned in two different ways. 1. When the squamæ, which cover the calyx, wither and are bent back; which, however, is more common to the carica than the lycamore. 2. A little below the scales, on the side of the flower-cup, there appears a spot before the fruit is ripe: the fruit in this place is affected with a gangrene which extends on every side, and frequently occupies a finger's-breadth. It withers; the place affected becomes black; the fleshy substance in the middle of the calyx, for the breadth of a quill, is corroded; and the male blossoms, which are nearest to the bare side, appear naked, opening a way for the insect, which makes several furrows in the inside of the fruit, but never touches the stigmata, though it frequently eats the germen. The wounded or gangrenous part is at first covered or shut up by the blossoms; but the hole is by degrees opened and enlarged of various sizes in the different fruits; the margin and sides being always gangrenous, black, hard, and turned inwardly. The same gangrenous appearance is also found near the squamæ, after the insect has made a hole in that place. The tree is very common in the plains and fields of Lower Egypt. It buds in the latter end of March, and the fruit ripens in the beginning of June.

Ficoides
Ficus.

June. It is wounded or cut by the inhabitants at the time it buds; for without this precaution, they say, it would not bear fruit.

3. The *religiosa*, or banian-tree, is a native of several parts of the East Indies. It hath a woody stem, branching 20 or 30 feet high, with heart-shaped entire leaves, ending in acute points.—It is called by the Dutch, *devil's-tree*; and by the inhabitants of Ceylon, *budaghaha*, and *budaghass*. *Budda*, according to the tradition of these countries, was the name of the prophet who first taught the Indians under the grateful shade of this tree: for this reason, they not only give this species of fig a name commemorative of their prophet, but likewise pay it a particular veneration, by celebrating all their sacrifices under its shade.

Culture. The carica is the species most frequently cultivated in this country, and the only one which does not require to be kept in a stove. It may be propagated either by suckers arising from the root, by layers, or by cuttings.—The suckers are to be taken off as low down as possible; trim off any ragged part at bottom, leaving the tops entire, especially if for standards; and plant them in nursery-lines at two or three feet distance from each other, or they may at once be planted where they are to remain; observing, that if they are designed for walls or espaliers, they may be headed to six or eight inches in March, the more effectually to force out lateral shoots near the bottom; but, if intended for standards, they must not be topped, but trained with a stem, not less than 15 or 18 inches for dwarf-standards, a yard for half-standards, and four, five, or six feet for full standards. Then they must be suffered to branch out to form a head; observing, that, whether against walls, espaliers, or standards, the branches or shoots must never be shortened unless to procure a necessary supply of wood: for the fruit is always produced on the upper parts of the young shoots; and if these are cut off, no fruit can be expected.—The best season for propagating these trees by layers is in autumn; but it may be also done any time from October to March or April. Choose the young pliable lower shoots from the fruitful branches: lay them in the usual way, covering the body of the layers three or four inches deep in the ground, keeping the top entire, and as upright as possible; and they will be rooted and fit to separate from the parent in autumn; when they may be planted either in the nursery, or where they are to remain, managing them as above directed. The time for propagating by cuttings is either in autumn at the fall of the leaf, or any time in March: choose well-ripened shoots of the preceding summer; short, and of robust growth, from about 12 to 15 inches long; having an inch or two of the two-years wood at their base, the tops left entire; and plant them six or eight inches deep, in a bed or order of good earth, in rows two feet asunder: and when planted in autumn, it will be eligible to protect their tops in time of hard frost, the first winter, with any kind of long loose litter.

Uses. Figs are a considerable article in the materia medica, chiefly employed in emollient cataplasms and pectoral decoctions. The best are those which come from Turkey. Many are also brought from the south of France, where they prepare them in the following manner. The fruit is first dipped in scalding-hot ley

made of the ashes of the fig-tree, and then dried in the sun. Hence these figs stick to the hands, and scour them like lixivial salts; and for the same reason they excite to stool, without griping. They are moderately nutritimental, grateful to the stomach, and easier to digest than any other of the sweet fruits. They have been said to produce lice, when eaten as a common food; but this seems to be entirely without foundation. The reason of this supposition seems to be, that in the countries where they grow naturally, they make the principal food of the poor people, who are generally troubled with these vermin. The wood of the sycamore is not subject to rot; and has therefore been used for making of coffins, in which embalmed bodies were put. Mr Hasselquist affirms, that he saw in Egypt, coffins made of this kind of wood, which had been preserved found for 2000 years.

FIDDLE. See VIOLIN.

FIDDES (Richard), a learned divine and polite writer, was born in 1671, and educated at Oxford. He was presented to the living of Holfham, in Yorkshire, where he was so admired for the sweetness of his voice, and the gracefulness of his delivery, that the people for several miles round flocked to his sermons. Coming to London in 1712, he was, by the favour of dean Swift, introduced to the earl of Oxford, who made him one of his chaplains, and the queen soon after appointed him chaplain to the garrison at Hull: but losing his patrons upon the change of the ministry, he lost his chaplainship; and being obliged to apply himself to writing, composed, 1. A body of Divinity; 2. The life of Cardinal Wolsey; 3. A treatise of morality, &c. He died in 1725.

FIDEI-COMMISSUM, in Roman antiquity, an estate left in trust with any person, for the use of another. See TRUSTEE.

FIDES, or FAITH, one of the virtues, deified by the Pagans. She had a temple near the Capitol, founded by Numa Pompilius; but no animals were offered, or blood spilt, in her sacrifices. During the performance of her rites, her priests appeared in white vestments, with their heads and hands covered with linen, to shew that fidelity ought to be secret.

FIDIUS, in Pagan worship, a god who presided over alliances and promises. This deity, which the Romans borrowed from the Sabines, was also called *Sanctus*, *Semon*, and *Semi-pater*.

FIELDING (Henry), a well-known writer of the present age, son of lieutenant-general Fielding who served under the duke of Marlborough, was born in 1707. He had four sisters; of whom Sarah is well known, as writer of "The adventures of David Simple." On the death of his mother, his father married again; and Sir John Fielding who succeeded him in the commission of the peace for Middlesex, is his brother by this marriage. Henry was sent to study at Leyden; but a failure in his remittances obliged him to return in two years, when his own propensity to gaiety and profusion drove him to write for the stage at 20 years of age. His first dramatic piece "Love in several masques," which was well received, appeared in 1727; and all his plays and farces, to the amount of 18, were written before the year 1737; and many of them are still acted with applause. While he was thus employed, he married a young lady with 1500*l.* fortune, and

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inherited an estate of 200 l. a-year from his mother: all which, though on the plan of retiring into the country, he contrived to dissipate in three years; and then applied himself to the study of the law for a maintenance. In losing his fortune, he acquired the gout: which rendering it impossible for him to attend the bar, he with a shattered constitution had recourse to many extempore applications of his pen for immediate supplies; until, soon after the late rebellion, he accepted the office of acting justice for Middlesex, an employment much more profitable than honourable in the public esteem. Reduced at length by the fatigues of this office, and by a complication of disorders, he by the advice of his physicians went to Lisbon, where he died in 1754. He wrote a great number of fugitive pamphlets and periodical essays; but is chiefly distinguished by his "Adventures of Joseph Andrews," and "History of Tom Jones:" in the former he took his character of parson Adams from the reverend Mr Young, one of his most learned and esteemed friends; who was remarkable for his acquaintance with the Greek authors, and had as passionate a veneration for Æschylus as parson Adams had; the overflowings of his beneficence were as strong, and his fits of reverie and absence of mind occurred too upon the most interesting occasions. His works have been collected and published, with his life prefixed, by Mr Murphy.

FIELD, in agriculture, a piece of ground inclosed, whether for tillage or pasture.

FIELD, in heraldry, is the whole surface of the shield, or the continent, so called because it containeth those achievements anciently acquired in the field of battle. It is the ground on which the colours, bearings, metals, furs, charges, &c. are represented. Among the modern heralds, field is less frequently used in blazoning than shield or escutcheon. See the article **SHIELD**, &c.

FIELD-Book, in surveying, that wherein the angles, stations, distances, &c. are set down.

FIELD-Colours, in war, are small flags of about a foot and half square, which are carried along with the quarter-master general, for marking out the ground for the squadrons and battalions.

FIELD-Fare, in ornithology. See **TURDUS**.

FIELD-Officers, in the art of war. See **OFFICER**.

FIELD-Pieces, small cannons, from three to twelve pounders, carried along with an army in the field.

FIELD-Staff, a weapon carried by the gunners, about the length of a halbert, with a spear at the end; having on each side ears screwed on, like the cock of a match-lock, where the gunners screw in lighted matches, when they are upon command; and then the field-staffs are said to be armed.

FIELD-Works, in fortification, are those thrown up by an army in besieging a fortress, or by the besieged to defend the place. Such are the fortifications of camps, highways, &c.

Elysian Fields. See **ELYSIAN**.

FIENUS (Thomas), an ingenious and learned physician, born at Antwerp in 1566. He went into Italy to study physic under Mercualis and Aldrovandus; and on his return distinguished himself so much in the university of Louvain, that he was there chosen professor of physic, and was afterwards made physician to the duke of Bavaria. He wrote several works, among

which were, "De viribus imaginationis;" and "De formatione fetus." He died at Louvain in 1631.

FIERI FACIAS, in law, a writ that lies where a person has recovered judgment for debt or damages in the king's courts against one, by which the sheriff is commanded to levy the debt and damages on the defendant's goods and chattels.

FIFE, in music, is a sort of wind-instrument, being a small pipe. See **PIFE**.

FIFE, in geography, a county of Scotland bounded by the Frith of Tay on the north, by the German sea on the east, by the Frith of Forth on the south, and by Monteith and Stirling on the west. It is above 40 miles in length, and 17 in breadth. The face of the country is various. Towards the west it is mountainous; the middle is most proper for pasture; but the northern and southern parts are plain and fertile, producing excellent corn, full of towns, and indented with good bays and harbours. The whole coast is almost covered with fishing-towns; breed a great number of hardy seamen; and, being all royal boroughs, send many members to parliament. The inland parts of the county are adorned with plantations and woods, affording shelter to deer and all sorts of game. The hills are covered with sheep, whose wool is excellent; and the pastures feed plenty of black cattle. This county also produces quarries of excellent free-stone, coal-mines, and lead-ore in great quantity; together with variegated crystals. It is well watered by many lakes and rivers, the principal of which are the Leven and the Eden, both of which abound with salmon. On the present condition of the county of Fife Dr Campbell has the following observations*. "One would be apt to imagine, that from such an excellent situation, this country must have been distinguished by being wonderfully populous, crowded with towns, and these towns abounding with commerce. Anciently, it seems, it was so: and if it be not in this condition now, the reasons may easily be assigned; it would be well if they could be easily removed. After the accession of king James VI. to the throne of England, the court lords extended what they called the *power of the crown*; but which, resting in their hands, was, in reality, theirs beyond measure; and this was opposed, for purposes merely their own, by others, who, in right of popularity, exercised also a power more detrimental to the public peace, and not at all more directed to the public good; and thus the true principles of policy were in a manner lost. On the other hand, an unreasonable and ill-timed zeal for forms produced as unreasonable an aversion for things indifferent in themselves; and thus, while religion was all the cry, the true spirit of the Christian faith was in a manner extinguished. Party-disputes in church and state, destroying, as they ever will do, all sense of public spirit, made way for a civil war, which ruined the small remains of past prosperity. After the restoration, an oppressive government in one part of the country, which connived, for its own support, at the establishment of a more oppressive aristocracy in the other, extirpated all seeds of industry, and brought on that general decay in Agriculture, manufactures, and commerce, which, however visible, was, till very lately, rather to be lamented, even by the most disinterested patriots, than with any rational hopes of success to be put in any train of being recovered.

* Political
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Figure.

However distasteful, in one light, the contemplation of its former greatness may be, it cannot but afford us satisfaction in another; for what has once been, may most certainly be again. The country and the climate, without question, are as good as ever; and though the same thing cannot be said of its ports, yet, with some labour and a little expence, even these may be made so; after which, if any method can be found to employ in manufactures, and thereby engage the youth to remain at home, there is no doubt that an indefatigable application may quickly restore what a series of unfortunate accidents, succeeded by supine neglect, have brought into so melancholy a condition."

FIRE-Rails, in a ship, are those that are placed on banisters, on each side of the top of the poop, and fo along with haunces or falls. - They reach down to the quarter-deck, and to the stair of the gang-way.

FIFTH, in music. See **INTERVAL**.

FIG, or **FIG-TREE**. See **FICUS**.

FIGWORT, a plant called by the botanists **SCROPHULARIA**.

FIGURAL, **FIGURATE**, or *Figurative*, a term applied to whatever is expressed by obscure resemblances. The word is chiefly applied to the types and mysteries of the Mosaic law; as also to any expression which is not taken in its primary and literal sense.

FIGURE, in physics, expresses the surface or terminating extremities of any body.

FIGURES, in arithmetic, are certain characters whereby we denote any number which may be expressed by any combination of the nine digits, &c. See **ARITHMETIC**.

FIGURE, among divines, is used for the mysteries represented under certain types.

FIGURE, in dancing, denotes the several steps which the dancer makes in order and cadence, considered as they mark certain figures on the floor. See **DANCING**.

FIGURE, in painting and designing, denotes the lines and colours which form the representation of any animal, but more particularly of a human personage, See **PAINTING**, n^o 61—92.

FIGURE, in logic, denotes a certain order and disposition of the middle term in any syllogism.

Figures are fourfold. 1. When the middle term is the subject of the major proposition, and the predicate of the minor, we have what is called the first figure. 2. When the middle term is the predicate of both the premises, the syllogism is said to be in the second figure. 3. If the middle term is the subject of the two premises, the syllogism is in the third figure; and lastly, by making it the predicate of the major, and subject of the minor, we obtain syllogisms in the fourth figure. Each of these figures has a determinate number of moods, including all the possible ways in which propositions differing in quantity or quality can be combined, according to any disposition of the middle term, in order to arrive at a just conclusion. See **LOGIC**.

FIGURE, in composition. See **ORATORY**; also **ALLEGORY**, **APOSTROPHE**, **HYPERBOLE**, **METAPHOR**, **PERSONIFICATION**, &c.

A **FIGURE**, the means or instrument conceived to be the agent. When we survey a number of connected objects, that which makes the greatest figure employs

chiefly our attention; and the emotion it raises, if lively, prompts us even to exceed nature in the conceptions we form of it. Take the following examples.

For Ncleus' son Alcides' rage had slain.

A broken rock the force of Pirus threw.

In these instances, the rage of Hercules and the force of Pirus, being the capital circumstances, are so far exalted as to be conceived the agents that produce the effects.

In the following instances, hunger being the chief circumstance in the description, is itself imagined to be the patient.

Whose hunger has not tasted food these three days.

June Shore.

—As when the force

Of subterranean wind transports a hill.

Paradise lost.

—As when the potent rod

Of Amram's son, in Egypt's evil day

Way'd round the coast, upcall'd a pitchy cloud

Of locusts.

Paradise lost.

A **FIGURE**, which, among related objects, extends the properties of one to another. This figure is not dignified with a proper name, because it has been overlooked by writers. It merits, however, a place in this work; and must be distinguished from the others elsewhere treated, as depending on a different principle. *Giddy brink, jovial wine, daring wound*, are examples of this figure. Here are adjectives that cannot be made to signify any quality of the substantives to which they are joined: a *brink*, for example, cannot be termed *giddy* in a sense, either proper or figurative, that can signify any of its qualities or attributes. When we examine attentively the expression, we discover, that a *brink* is termed *giddy* from producing that effect in those who stand on it: in the same manner, a wound is said to be *daring*, not with respect to itself, but with respect to the boldness of the person who inflicts it: and wine is said to be *jovial*, as inspiring mirth and jollity. Thus the attributes of one subject are extended to another with which it is connected; and the expression of such a thought must be considered as a figure, because the attribute is not applicable to the subject in any proper sense.

How are we to account for this figure, which we see lies in the thought, and to what principle shall we refer it? Have poets a privilege to alter the nature of things, and at pleasure to bestow attributes upon a subject to which they do not belong? It is observed †, that the mind passeth easily and sweetly along a train of connected objects; and, where the objects are intimately connected, that it is disposed to carry part 1. §. 6. along the good or bad properties of one to another; especially when it is in any degree inflamed with these properties. From this principle is derived the figure under consideration. Language, invented for the communication of thought, would be imperfect, if it were not expressive even of the slightest propensities and more delicate feelings: but language cannot remain so imperfect among a people who have received any polish; because language is regulated by internal feeling, and is gradually improved to express whatever passes in the mind. Thus, for example, when a sword in the hand of a coward is termed a *coward sword*, the expression is significative of an internal operation; for the mind, in passing from the agent

Figure.

† Vid.
Elem. of
Criticism,
chap. II.

Figure. to its instrument, is disposed to extend to the latter the properties of the former. Governed by the same principle, we say *listening* fear, by extending the attribute *listening* of the man who listens, to the passion with which he is moved. In the expression, *bold deed*, or *audax facinus*, we extend to the effect what properly belongs to the cause. But not to waste time by making a commentary upon every expression of this kind, the best way to give a complete view of the subject, is to exhibit a table of the different relations that may give occasion to this figure. And in viewing the table, it will be observed, that the figure can never have any grace but where the relations are of the most intimate kind.

1. An attribute of the cause expressed as an attribute of the effect.

Audax facinus.

Of yonder fleet a bold discovery make.

An impious mortal gave the daring wound.

—————To my advent'rous song,

That with no middle flight intends to soar.

Paradise lost.

2. An attribute of the effect expressed as an attribute of the cause.

Quos peritiae ambos misero censebam in mari. Plautus.

No wonder, fallen such a pernicious height.

Paradise lost.

3. An effect expressed as an attribute of the cause.

Jovial wine, Giddy brink, Drowsy night, Musing midnight,
Panting height, Altonish'd thought, Mournful gloom.

Casting a dim religious light. MILTON, Comus.

And the merry bells ring round,

And the jocund rebecks found. MILTON, Allegro.

4. An attribute of a subject bestowed upon one of its parts or members.

Longing arms.

It was the nightingale, and not the lark,

That pierc'd the fearful hollow of thine ear.

Romeo and Juliet, act 3. sc. 7.

Oh, lay by

Those most ungentle looks and angry weapons;

Unless you mean my griefs and killing fears

Should stretch me out at your relentless feet

Fair Penitent, act 3.

—————And ready now

To stoop with weagled wing, and willing feet,

On the bare outside of this world. Paradise lost, b. 3.

5. A quality of the agent given to the instrument with which it operates.

Why peep you coward Swords half out their sheaths?

6. An attribute of the agent given to the subject upon which it operates.

High-climbing hill.

Milton.

7. A quality of one subject given to another.

Icci, beatis nunc Arabum invides

Gazis.

Horat. Carm. l. 1. ode 29.

When sapless age, and weak unable limbs,

Should bring thy father to his drooping chair.

Shakspear.

By art, the pilot through the boiling deep,

And howling tempest, steers the fearless ship.

Iliad xxiii. 385.

Then, nothing loath, th' enamour'd fair he led,

And sunk transport on the conscious bed.

Odyssey viii. 337.

A stupid moment motionless the flood.

Samuel, l. 1336.

8. A circumstance connected with a subject, expressed as a quality of the subject.

Breezy summit.

'Tis ours the chance of fighting fields to try.

Iliad. 301.

Oh! had I dy'd before that well-fought wall.

Odyssey v. 395.

From this table it appears, that the adorning a cause with an attribute of the effect, is not so agreeable as the opposite expression. The progress from cause to effect is natural and easy: the opposite progress resembles retrograde motion*; and therefore *panting height*, *astonish'd thought*, are strained and uncouth expressions, which a writer of taste will avoid.

It is not less strained, to apply to a subject in its present state, an epithet that may belong to it in some future state:

Submersisq; obire puppes.

Æneid i. 73.

And mighty ruins fall.

Iliad v. 411.

Impious sons their man-gled fathers wound.

Another rule regards this figure, That the property of one subject ought not to be bestowed upon another with which that property is incongruous:

K. Rich. ———How dare thy joints forget

To pay their awful duty to our presence?

Richard II. act 3. sc. 6.

The connection between an awful superior and his submissive dependent is so intimate, that an attribute may readily be transferred from the one to the other: but awfulness cannot be so transferred, because it is inconsistent with submission.

FIGURE of Speech, as peculiarly distinguished from the above and from those first referred to.] Under the article METAPHOR and Allegory, a figure of speech is defined, "The using a word in a sense different from what is proper to it;" and the new or uncommon sense of the word is termed the *figurative sense*. The figurative sense must have a relation to that which is proper; and the more intimate the relation is, the figure is the more happy. How ornamental this figure is to language, will not be readily imagined by any one who hath not given peculiar attention; and therefore we shall endeavour to unfold its capital beauties and advantages. In the first place, a word used figuratively, or in a new sense, suggests at the same time the sense it commonly bears: and thus it has the effect to present two objects; one signified by the figurative sense, which may be termed the *principal object*; and one signified by the proper sense, which may be termed *accessory*: the principal makes a part of the thought; the accessory is merely ornamental. In this respect, a figure of speech is precisely similar to concordant sounds in music, which, without contributing to the melody, make it harmonious.

To explain the matter by examples. *Youth*, by a figure of speech, is termed the *morning of life*: This expression signifies *youth*, the principal object which enters into the thought; it suggests, at the same time, the proper sense of *morning*; and this accessory object, being in itself beautiful, and connected by resemblance to the principal object, is not a little ornamental. *Impetuous ocean* is an example of a different kind, where an attribute is expressed figuratively: Together with *stormy*, the figurative meaning of the epithet *impetuous*, there is suggested its proper meaning, viz. the

Figure.

* See PERCEPTION and Ideas in a Train.

Elem. of Criticism.

Ætern

stern authority of a despotic prince; and these two are strongly connected by resemblance. Upon this figurative power of words, Vida descants with elegance, *Poet. lib. iii. 44.*

In the next place, this figure possesses a signal power of aggrandising an object, by the following means. Words, which have no original beauty but what arises from their sound, acquire an adventitious beauty from their meaning: a word signifying any thing that is agreeable, becomes by that means agreeable; for the agreeableness of the object is communicated to its name. This acquired beauty, by the force of custom adheres to the word even when used figuratively; and the beauty received from the thing it properly signifies, is communicated to the thing which it is made to signify figuratively. Consider the foregoing expression *Imperious ocean*, how much more elevated it is than *Stormy ocean*.

Thirdly, This figure hath a happy effect by preventing the familiarity of proper names. The familiarity of a proper name, is communicated to the thing it signifies by means of their intimate connection; and the thing is thereby brought down in our feeling. This bad effect is prevented by using a figurative word instead of one that is proper; as, for example, when we express the sky by terming it *the blue vault of heaven*; for though no work of art can compare with the sky in grandeur, the expression however is relished, because it prevents the object from being brought down by the familiarity of its proper name. With respect to the degrading the familiarity of proper names, Vida has the following passage.

Hinc si dura mihi passus dicendus Ulysses,
Non illum vero memorabo nomine, sed qui
E: mores hominum multorum vidit, ei urbes,
Naufragus everse post secula incendia Troje.

Poet. lib. ii. 1. 46.

Lastly, By this figure, language is enriched, and rendered more copious; in which respect, were there no other, a figure of speech is a happy invention. This property is finely touched by Vida; *Poet. lib. iii. 90.*

The beauties we have mentioned belong to every figure of speech. Several other beauties peculiar to one or other sort, we shall have occasion to remark afterwards.

Not only subjects, but qualities, actions, effects, may be expressed figuratively. Thus, as to subjects, *the gates of breath for the lips, the watery kingdom for the ocean.* As to qualities, *fierce for stormy*, in the expression *Fierce winter*; *altus for profound*, *Altus puteus, Altum mare*; *breathing for perspiring*, *Breathing plants*. Again, as to actions, *The sea rages*, Time will melt her frozen thoughts, *Time kills grief*. An effect is put for the cause, as *lux for the sun*; and a cause for the effect, as *bourn labores for corn*. The relation of resemblance is one plentiful source of figures of speech; and nothing is more common than to apply to one object the name of another that resembles it in any respect: Height, size, and worldly greatness, resemble not each other; but the emotions they produce resemble each other, and, prompted by this resemblance, we naturally express worldly greatness by height or size: One feels a certain uneasiness in seeing a great depth; and, hence depth is made to express

any thing disagreeable by excess, as *depth of grief, depth of despair*: Again, height of place, and time long past, produce similar feelings; and hence the expression, *Ut altius repetam*: Distance in past time, producing a strong feeling, is put for any strong feeling, *Nihil mihi antiquius nostra amicitia*: Shortness with relation to space, for shortness with relation to time, *Brevis esse laboro, obscurus fio*: Suffering a punishment resembles paying a debt; hence *pendere penas*. In the same manner, light may be put for glory, sunshine for prosperity, and weight for importance.

Many words, originally figurative, having, by long and constant use, lost their figurative power, are degraded to the inferior rank of proper terms. Thus the words that express the operations of the mind, have in all languages been originally figurative: the reason holds in all, that when these operations came first under consideration, there was no other way of describing them but by what they resembled: it was not practicable to give them proper names, as may be done to objects that can be ascertained by sight and touch. A *soft nature, jarring tempers, weight of wo, pompous phrase, heget compassion, assuage grief, break a vow, bend the eye downward, shower down curses, drown'd in tears, wrap in joy, warm'd with eloquence, loaded with spoils*, and a thousand other expressions of the like nature, have lost their figurative sense. Some terms there are, that cannot be said to be altogether figurative or altogether proper: originally figurative, they are tending to simplicity, without having lost altogether their figurative power. Virgil's *Regina saucia cura*, is perhaps one of these expressions: with ordinary readers, *sauca* will be considered as expressing simply the effect of grief; but one of a lively imagination will exalt the phrase into a figure.

For epitomising this subject, and at the same time for giving a clear view of it, lord Kaimes * gives a list of the several relations upon which figures of speech are commonly founded. This list he divides into two tables; one of subjects expressed figuratively, and one of attributes.

TAB. I. Subjects expressed figuratively.

1. A word proper to one subject employed figuratively to express a resembling subject.

There is no figure of speech so frequent, as what is derived from the relation of resemblance. Youth, for example, is signified figuratively by the *morning* of life. The life of a man resembles a natural day in several particulars: the morning is the beginning of a day, youth the beginning of life; the morning is cheerful, so is youth, &c. By another resemblance, a bold warrior is termed the *thunderbolt* of war; a multitude of troubles, a *sea* of troubles.

This figure, above all others, affords pleasure to the mind by variety of beauties. Besides the beauties above-mentioned, common to all sorts, it possesses in particular the beauty of a metaphor or of a simile: a figure of speech built upon resemblance, suggests always a comparison between the principal subject and the accessory; whereby every good effect of a metaphor or simile, may, in a short and lively manner, be produced by this figure of speech.

2. A word proper to the effect employed figuratively to express the cause.

Figure.

Lux for the sun; *Shadow* for cloud. A helmet is signified by the expression *glittering terror*; a tree by *shadow* or *umbrage*. Hence the expression:

Nec habet Pellion umbras. Ovid.

Where the dun umbrage hangs. Spring, l. 1023.

A wound is made to signify an arrow:

Vulnere non pedibus te confiquar. Ovid.

There is a peculiar force and beauty in this figure: the word which signifies figuratively the principal subject, denotes it to be a cause by suggesting the effect.

3. A word proper to the cause, employed figuratively to express the effect.

Bonumque labores for corn. *Sorrow* or *grief* for tears.

Again Ulysses veil'd his pensive head;

Again, unmann'd, a thow'r of sorrow shed.

Streaming Grief his faded cheek bedew'd.

Blindness for darkness:

Cæcis erramus in undis. Æneid. iii. 200.

There is a peculiar energy in this figure, similar to that in the former: the figurative name denotes the subject to be an effect, by suggesting its cause.

4. Two things being intimately connected, the proper name of the one employed figuratively to signify the other.

Day for light. *Night* for darkness; and hence, *A sudden night*. *Winter* for a storm at sea:

Interea magno misceri murmare pontum,
Emissamque Hyæmen sensit Neptunus. Æneid. i. 128.

This last figure would be too bold for a British writer, as a storm at sea is not inseparably connected with winter in this climate.

5. A word proper to an attribute, employed figuratively to denote the subject.

Youth and *beauty* for those who are young and beautiful:

Youth and beauty shall be laid in dust.

Majesty for the king:

What art thou, that usurp'st this time of night,
Together with that fair and warlike form
In which the Majesty of buried Denmark
Did sometime march? Hamlet, act 1. sc. 1.

Or have ye chosen this place

After the toils of battle, to repose

Your weary'd virtue.

Paradise lost.

Verdure for a green field. Summer, l. 301.

Speaking of cranes,

The pinyon nations wounds and death they bring,
And all the war defends upon the wing. Iliad iii. 10.

Cool age advances venerably wife. Iliad iii. 149.

The peculiar beauty of this figure arises from suggesting an attribute that embellishes the subject, or puts it in a stronger light.

6. A complex term employed figuratively to denote one of the component parts.

Funus for a dead body. *Burial* for a grave.

7. The name of one of the component parts instead of the complex term.

Tada for a marriage. The *East* for a country situated east from us. *Jovis vestigia servat*, for imitating Jupiter in general.

8. A word signifying time or place, employed figuratively to denote what is connected with it.

Figure.

Climate for a nation, or for a constitution of government: hence the expression, *Merciful climate*, *Fleecy winter* for snow, *Seculum felix*.

9. A part for the whole.

The *pole* for the earth. The *head* for the person:

Triginta minas pro capite tuo dedi. Plautus.

Tergum for the man:

Fugiens tergum. Ovid.

Vultur for the man:

Jam fulgor armorum fugaces

Terret equos, equitumque vultus. Horat.

Quis desiderio sit pudor aut modus

Tam chari capitis? Horat.

Dumque virent genua? Horat.

Thy growing virtues justify'd my cares,

And promis'd comfort to my silver hairs. Iliad ix. 616.

His mighty stature. Paradise: Lost.

The silent heart which grief affails. Parnell.

The peculiar beauty of this figure consists in marking that part which makes the greatest figure.

10. The name of the container, employed figuratively to signify what is contained.

Grove for the birds in it, *Vocal grove*. *Ships* for the seamen, *Agonizing ships*. *Mountains* for the sheep pasturing upon them, *Bleating mountains*. *Zacynthus*, *Ithaca*, &c. for the inhabitants. *Ex mæstis domibus*, Livy.

11. The name of the sustainer, employed figuratively to signify what is sustained.

Altar for the sacrifice. *Field* for the battle fought upon it, *Well-fought field*.

12. The name of the materials, employed figuratively to signify the things made of them.

Ferrum for *gladius*.

13. The names of the Heathen deities, employed figuratively to signify what they patronise.

Jove for the air, *Mars* for war, *Venus* for beauty, *Cupid* for love, *Ceres* for corn, *Neptune* for the sea, *Vulcan* for fire.

This figure bestows great elevation upon the subject; and therefore ought to be confined to the higher strains of poetry.

TAB. II. Attributes expressed figuratively.

When two attributes are connected, the name of the one may be employed figuratively to express the other.

Purity and virginity are attributes of the same person: hence the expression, *Virgin snow*, for pure snow.

2. A word signifying properly an attribute of one subject, employed figuratively to express a resembling attribute of another subject.

Tottering state. *Imperious ocean*. *Angry flood*. *Raging tempest*. *Shallow fears*.

My sure divinity shall bear the shield,
And edge thy sword to reap the glorious field.

Odyssey xx. 61.

Black omen, for an omen that portends bad fortune.

Aster odor. Virgil.

The peculiar beauty of this figure arises from suggesting a comparison.

3. A word proper to the subject, employed to express one of its attributes.

Mens for *intellectus*. *Mens* for a resolution:

Iliam,

Figure.

Istam, oro, exue mentem.

4. When two subjects have a resemblance by a common quality, the name of the one subject may be employed figuratively to denote that quality in the other:

Summer life for agreeable life.

5. The name of the instrument made to signify the power of employing it:

— Melpomene, cui liquidam pater
Vocem cum cithara dedit.

The ample field of figurative expression displayed in these tables, affords great scope for reasoning. Several of the observations relating to metaphor*, are applicable to figures of speech: these shall be slightly retouched, with some additions peculiarly adapted to the present subject.

1. As the figure under consideration is built upon relation, we find from experience, and it must be obvious from reason, that the beauty of it depends on the intimacy of the relation between the figurative and proper sense of the word. A slight resemblance, in particular, will never make this figure agreeable: the expression, for example, *Drink down a secret*, for listening to a secret with attention, is harsh and uncouth, because there is scarce any resemblance between *listening* and *drinking*. The expression *weighty crack*, used by Ben Johnson for *loud crack*, is worse if possible: a loud sound has not the slightest resemblance to a piece of matter that is weighty.

Phemius! let acts of gods, and heroes old,
What ancient bards in hall and bow'r have told,
Attemper'd to the lyre, your voice employ,
Such the pleas'd ear will drink with silent joy.

Odyssey i. 433.

Streptumque exterritus hausit.

Æneid vi. 559.

— Write, my queen,
And with mine eyes I'll drink the words you fend.

Cymbeline, act 1. sc. 2.

As thus th' effulgence tremulous I drink.

Summer, l. 1694.

Neque audit curus habenas.

Georg. i. 514.

O prince! (Lycan's valiant son reply'd),
As thine the steeds, be thine the talk to guide.
The horses practis'd to their lord's command,
Shall hear the rein, and answer to thy hand. *Iliad* v. 288.

The following figures of speech seem altogether wild and extravagant, the figurative and proper meaning having no connection whatever. *Moving* softness, *Freshness* breathes, *Breathing* prospect, *Flowing* spring, *Dewy* light, *Lucid* coolness, and many others of this false coin, may be found in Thomson's *Seasons*.

2. The proper sense of the word ought to bear some proportion to the figurative sense, and not soar much above it, nor sink much below it. This rule, as well as the foregoing, is finely illustrated by Vida, *Poet.* iii. 148.

3. In a figure of speech, every circumstance ought to be avoided that agrees with the proper sense only, not with the figurative sense; for it is the latter that expresses the thought, and the former serves for no other purpose but to make harmony:

Zacynthus green with ever-shady groves,
And Ithaca, presumptuous boud their loves;
Obtruding on my choice a second lord,
They press the Hymenean rite abhorrd.

Odyssey, xix. 152.

Zacynthus here standing figuratively for the inhabit-

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tants, the description of the island is quite out of place: it puzzles the reader, by making him doubt whether the word ought to be taken in its proper or figurative sense.

— Write, my queen,
And with mine eyes I'll drink the words you fend,
Though ink be made of gall. *Cymbeline*, act 1. sc. 2.

The disgust one has to drink ink in reality, is not to the purpose where the subject is drinking ink figuratively.

4. To draw consequences from a figure of speech, as if the word were to be understood literally, is a gross absurdity; for it is confounding truth with fiction:

Be Moubray's fins so heavy in his bosom,
That they may break his foaming courier's back,
And throw the rider headlong in the lists,
A castif recreant to my cousin Hereford.

Richard II. act 1. sc. 3.

Sin may be imagined heavy in a figurative sense: but weight in a proper sense belongs to the accessory only; and therefore to describe the effects of weight, is to desert the principal subject, and to convert the accessory into a principal:

Cromwell. How does your Grace?

Wolsey. Why, well;

Never to truly happy, my good Cromwell.

I know myself now, and I feel within me

A peace above all earthly dignities,

A still and quiet conscience. The King has cur'd me,

I humbly thank his Grace; and, from these shoulders,

These ruin'd pillars, out of pity, taken

A load would sink a navy, too much honour.

Henry VIII. act 3. sc. 6.

Ulysses speaking of Hector:

I wonder now how yonder city stands,

When we have here the base and pillar by us.

Tralus and Creffida, act 4. sc. 9.

Othello. No; my heart is turn'd to stone: I strike it, and it hurts my hand. *Othello*, act 4. sc. 5.

Not less, even in this despicable now,

'Than when my name fill'd Afric with affrights,

And froze your hearts beneath your torrid zone.

Don Sebastian King of Portugal, act 1.

How long a space, since first I lov'd it, it is!

To look into a glass I fear,

And am surpris'd with wonder, when I miss,

Grey hairs and wrinkles there.

Cowley, vol. 1. p. 86.

I chose the flourishing'ft tree in all the park,

With freshest boughs, and fairest head:

I cut my love into his gentle bark,

And in three days beheld 'tis dead;

My very written flames so violent be,

They've burnt and wither'd up the tree.

Cowley, vol. 1. p. 136.

Ah, mighty Love, that it were inward heat

Which made this precious limbeck-sweat!

But what, alas! ah what does it avail

That he weeps tears so wond'rous cold,

As scarce the ass's hoof can hold,

So cold, that I admire they fall not hat?

Cowley, vol. 1. p. 132.

Such a play of words is pleasant in a ludicrous poem.

Almeria. O Alphonso, Alphonso!

Devouring seas have wash'd thee from my sight,

No time shall raise thee from my memory;

No, I will live to be thy monument:

The cruel ocean is no more thy tomb;

But in my heart thou art interr'd.

Mourning Bride, act, 1. sc. 1.

This would be very right, if there were any inconfi-

Figure.

ence, in being interred in one place really, and in another place figuratively.

From considering, that a word used in a figurative sense suggests at the same time its proper meaning, we discover a fifth rule, 'That we ought not to employ a word in a figurative sense, the proper sense of which is inconsistent or incongruous with the subject: for every inconsistency, and even incongruity, though in the expression only and not real, is unpleasant:

*Interea genitor Tyberini ad fluminis undam
Vulnere jacebat lymphis* ———— *Æneid. x. 833.*

*Tres adeo incertos cæca caligine fœles
Erramus pælogo, totidem sine fidere noctes.* *Æneid. iii. 203.*

The foregoing rule may be extended to form a sixth, 'That no epithet ought to be given to the figurative sense of a word that agrees not also with its proper sense:

————— *Dicat Opuntia
Fratr Megillæ, quo beatus
Vulnere,* *Horat. Carm. lib. 1. ode 27.*
*Parcus decorum cultor, et infrequens,
Infansiens dum sapientia
Consultus erro.* *Horat. Carm. l. 1. ode 54.*

Seventhly, The crowding into one period or thought different figures of speech, is not less faulty than crowding metaphors in that manner: the mind is distracted in the quick transition from one image to another, and is puzzled instead of being pleased:

*I am of ladies most dejected and wretched,
That suck'd the honey of his music vows.* *Hamlet.*
My bleeding bosom tickles at the sound. *Odyssey l. 439.*

————— *Ah miser,
Quanta laboras in Clarydi!
Digne puer meliore flamma.
Quæ sapa, quis te solvere Theffalls
Magus venenis, quis poterit dens?
Vix illigatum te triforimi
Pegasus expedit Chimæra.* *Horat. Carm. lib. 1. ode 27.*

Eighthly, If crowding figures be bad, it is still worse to graft one figure upon another: For instance,
While his keen falchion drinks the warriors lives.

Iliad xi. 211.

A falchion drinking the warriors blood is a figure built upon resemblance, which is passable. But then in the expression, *lives* is again put for *blood*; and by thus grafting one figure upon another, the expression is rendered obscure and unpleasant.

Ninthly, Intricate and involved figures, that can scarce be analysed, or reduced to plain language, are least of all tolerable:

Votis incendimus aras. *Æneid. iii. 279.*
*————— Onerantque canistris
Dona laboræ Cereris.* *Æneid. viii. 189.*

Vulcan to the Cyclopes:

*Arma acri faciendâ viro: nunc viribus usus,
Nunc manibus rapidis, omni nunc arte magnifra:
Precipite moras.* *Æneid. viii. 441.*

————— *Hinc gladio, perque area secuta
Per tunica squalentem auro, latus hauriat apertum.* *Æneid. x. 373.*

*Scriberis Vario fortis, et hostium
Victor, Mæonii carminis alite.* *Horat. Carm. lib. 1. ode 6.*

Else shall our fates be number'd with the dead.

Iliad v. 294.

Commuted death the fate of war confounds.

Iliad viii. 85. and xi. 117.

Speaking of Proteus.

*Instant he wears, elusive of the rape,
The mimic force of every savage shape.*

Odyssey iv. 563.

*Rolling convulsive on the floor, is seen
The piteous object of a prostrate queen.*

Ibid. iv. 651.

The mingling tempest weaves its gloom.

Autumn, 337.

A various sweetness swells the gentle race.

Ibid. 640.

A sober calm fleeces unbounded ether.

Ibid. 967.

The distant water-fall swells in the breeze.

Winter, 739.

In the tenth place, When a subject is introduced by its proper name, it is absurd to attribute to it the properties of a different subject to which the word is sometimes applied in a figurative sense:

*Hear me, oh Neptune! thou whose arms are hurl'd
From shore to shore, and gird the solid world*

Odyssey ix. 617.

Neptune is here introduced personally, and not figuratively for the ocean: the description therefore, which is only applicable to the latter, is altogether improper.

It is not sufficient, that a figure of speech be regularly constructed, and be free from blemish: it requires taste to discern when it is proper, when improper; and taste perhaps is our only guide. One, however, may gather from reflections and experience, that ornaments and graces suit not any of the dispiriting passions, nor are proper for expressing any thing grave and important. In familiar conversation, they are in some measure ridiculous: Prospero, in the *Tempest*, speaking to his daughter Miranda, says,

*The fringed curtains of thine eyes advance,
And say what thou seest yond.*

No exception can be taken to the justness of the figure; and circumstances may be imagined to make it proper: but it is certainly not proper in familiar conversation.

In the last place, Though figures of speech have a charming effect when accurately constructed and properly introduced, they ought, however, to be scattered with a sparing hand: nothing is more luscious, and nothing consequently more satiating, than redundant ornaments of any kind.

FIGURED, in general, something marked with figures.

The term *figured* is chiefly applied to stuffs, whereon the figures of flowers, and the like, are either wrought or stamped.

FIGURED, in music, is applied either to simple notes or to harmony: to simple notes, as in these words *figured bass*, to express a bass whose notes carrying chords are subdivided into many other notes of lesser value; to harmony, when, by supposition and in a diatonic procedure, other notes than those which form the chord are employed*.

To *figure* is to pass several notes for one; to form runnings or variations; to add some notes to the air, in whatever manner it be done; in short, it is to give to harmonious sounds a figure of melody, by connect-

Figure,
Figured.

* See
Supposition.

Filament. ing them with other intermediate sounds.

FILAMENT, in anatomy, natural history, &c. a term used in the same sense with fibre, for those fine threads wherof the flesh, nerves, skin, plants, roots, &c. are composed. See FIBRE.

Vegetable FILAMENTS form a substance of great use in the arts and manufactures; furnishing thread, cloth, cordage, &c.

For these purposes the filamentous parts of the *Cannabis* and *Linum*, or hemp and flax, are employed among us*. But different vegetables have been employed in different countries for the same uses. Putrefaction destroys the pulpy or fleshy matter, and leaves the tough filaments entire: By curiously putrefying the leaf of a plant in water, we obtain the fine flexible fibres, which constituted the basis of the ribs and minute veins, and which now form as it were a skeleton of the leaf. Alkaline lixivium, in some degree, produce similar effects to putrefaction.

The Sieur de Flacourt, in his history of Madagascar, relates, that different kinds of cloth are prepared in that island, from the filaments of the bark of certain trees boiled in strong ley; that some of these cloths are very fine, and approach to the softness of silk, but in durability come short of cotton; that others are coarser and stronger, and last thrice as long as cotton; and that of these the sails and cordage of his vessel were made. See also the article BARK.

The same author informs us, that the stalks of nettles are used for the like purposes in his own country, France. And Sir Hans Sloane relates, in one of his letters to Mr Ray, that he has been informed by several, that muslin and callico, and most of the Indian linens, are made of nettles.

In some of the Swedish provinces, a strong kind of cloth is said to be prepared from hop-stalks: and in the transactions of the Swedish academy for the year 1750, there is an account of an experiment made in consequence of that report. Of the stalks, gathered in Autumn, about as many were taken, as equalled in bulk a quantity of flax that would have produced a pound after preparation. The stalks were put into water, and kept covered therewith during the winter. In March they were taken out, dried in a stove, and dressed as flax. The prepared filaments weighed nearly a pound, and proved fine, soft, and white: They were spun and woven into six ells of fine strong cloth. The author, Mr Shiller, observes, that hop-stalks take much longer time to rot than flax; and that, if not fully rotted, the woody part will not separate, and the cloth will neither prove white nor fine.

Hemp, flax, and all other vegetable filaments, and thread or cloth prepared from them, differ remarkably from wool, hair, silk, and other animal productions, not only in the principles into which they are resolvable by fire, but likewise in some of their more interesting properties, particularly in their disposition to imbibe colouring matters; sundry liquors, which give a beautiful and durable dye to those of the animal, giving no stain at all to those of the vegetable kingdom.

A solution of copper in aqua-fortis, which had been changed blue by an addition of volatile spirit, on being mixed with a little solution of tin, became turbid and greenish. Pieces of white silk and flannel boiled, without any previous preparation, in this mix-

ture, received a bright deep yellow dye, whilst pieces of linen, prepared and unprepared, came out as colourless as they were put in.

Fishing-nets are usually boiled with oak-bark or other like astringents, which render them more lasting. Those made of flax receive from this decoction a brownish colour, which, by the repeated alternations of water and air, is in a little time discharged, whilst the fine glossy brown, communicated by the same means to silken nets, permanently resists both the air and water, and stands as long as the animal filaments themselves. In like manner the stain of ink, or the black dye from solutions of iron, mixed with vegetable astringents, proves durable in silk and woollen; but from linen, the astringent matter is extracted by washing, and only the yellow iron-mould remains.

The red decoction of cochineal, which, heightened with a little solution of tin, gives the fiery scarlet dye to wool or silk that have been previously impregnated with solution of tartar, makes no impression upon linen or cotton prepared in the same manner. Mr du Fay informs us in the Memoirs of the French Academy for the year 1737, that having prepared a mixed cloth whose warp was of wool, and the woof of cotton, and thoroughly blended the two together by fulling, he still found the cotton to resist the action of the scarlet liquor, and the wool to receive the same colour from it as wool by itself, the stuff coming out all over marbled fiery and white.

Many other instances of this kind are known too well to the callico-printer; whose grand desideratum it is, to find means of making linen receive the same colours that wool does. The physical cause of the difference is wholly unknown; and indeed, of the theory of dyes in general, we know as yet extremely little. (See DYEING.) Are animal filaments tubular, and the colouring atoms received within them? Are vegetable filaments solid, and the colour deposited on the surface? Or does not their different susceptibility of colour depend rather on the different intrinsic properties of the two? There are many instances of a like diversity, even in the metallic kingdom, where a mechanical difference in texture can scarcely be presumed to be the cause: Thus silver receives a deep stain from sulphureous or putrid vapours, or the yolk of a boiled egg, which have no effect upon tin.

FILAMENTS, among botanists, particularly signify the stamina. See BOTANY, p. 1294.

FILANDERS, in falconry, a disease in hawks, &c. consisting of filaments or strings of blood coagulated; and occasioned by a violent rupture of some vein, by which the blood, extravasating, hardens into these figures, and incommodes the reins, hips, &c.

FILANDERS, are also worms as small as thread, and about an inch long, that lie wrapt up in a thin skin, or net, near the reins of an hawk, apart from either gut or gorge.

This malady is known by the hawk's poverty; by rustling her tail; by her straining the fist, or perch, with her pounces; and lastly, by croaking in the night, when the filanders prick her. The disease proceeds from bad food; and must be remedied in time, to prevent its spreading over the whole body, and destroying the bird. These must not be killed as other worms are, for fear of imposthumes from their corruption, be-

Filbert
||
Filigrane.

ing incapable of passing away with the hawk's meat. They must only be stupified, to prevent their being offensive; and this is done by giving the hawk a clove of garlic, after which she will feel nothing of the filanders for 40 days. It will be prudent in the falconer, when he observes the hawk poor and low, to give her a clove of garlic once a-month by way of prevention.

FILBERT, or FILBERD, the fruit of the corylus, or hazel. See CORYLUS.

FILE, among mechanics, a tool used in metal, &c. in order to smoothen, polish, or cut.

This instrument is of iron or forged steel, cut in little furrows, with chisels and a mallet, this and that way, and of this or that depth, according to the grain or touch required. After cutting the file, it must be tempered with a composition of chimney-foot, very hard and dry, diluted and wrought up with urine, vinegar, and salt; the whole being reduced to the consistence of mustard. Tempering the files consists in rubbing them over with this composition, and covering them in loam; after which they are put in a charcoal fire, and taken out by that time they have acquired a cherry colour, which is known by a small rod of the same steel put in along with them. Being taken out of the fire, they are thrown into cold spring-water; and when cold, they are cleaned with charcoal and a rag; and being clean and dry, are kept from rust by laying them up in wheat bran. Iron files require more heating than steel ones. Files are of different forms, sizes, cuts, and degrees of fineness, according to the different uses and occasions for which they are made. See FILING.

FILE, in the art of war, a row of soldiers, standing one behind another, which is the depth of the battalion or squadron. The files of a battalion of foot are generally three deep; as are sometimes those of a squadron of horse. The files must be straight and parallel one to another.

FILE, in law, a thread, string, or wire, upon which writs and other exhibits in courts and offices are fastened or filed, for the more safe keeping, and ready turning to the same. A file is a record of the court; and the filing of a process of a court makes it a record of it. An original writ may be filed after judgment given in the cause, issued forth before; declarations, &c. are to be filed, and affidavits must be filed, some before they are read in court, and some presently when read in court. Before filing a record removed by *certiorari*, the justices of B. R. may refuse to receive it, if it appears to be for delay, &c.; and remand it back for the expedition of justice: but if the *certiorari* be once filed, the proceedings below cannot be revived. An indictment, &c. cannot be amended after it is filed.

FILIAL, something belonging to the relation of son. See SON.

The divines usually distinguish between a *servile* and a *filial* fear. The most abandoned may have a servile fear of God, such as that of a slave to his master; but not a filial fear, i. e. a fear resulting from love and respect.

FILIGRANE, or FILIGREE, *Work*, any piece of gold or silver work that is curiously done with grains or drops on the filaments or threads.

Filicacia
||
Filter.

FILICACIA (Vincent), a celebrated Italian poet, was born at Florence in 1642. He was a member of the Academy della Crusca and of that of the Arcadi, and became secretary to the duke of Tuscany. He died in 1707. His poems are much esteemed for the delicacy and nobleness of their sentiments. Scipio de Filicacia, his son, had them all printed together, under the title of *Poesie Fesiano di Vincenzo da Filicacia*, in 1707, 4to.

FILICES, (from *filum* "a thread," *quasi filatim incisa*), FERNS; one of the seven tribes or families of the vegetable kingdom, according to Linnæus, by whom it is thus characterized: "having their fructification on the back side of the frondes." They constitute the first order in the class cryptogamia; and consist of 16 genera, which are divided into *fructificationes spicatae, frondosae, & radicales*. This order comprehends the entire xviith class of Tournefort, in whose system the filices make only a single genus, in the first section of the above-mentioned class.

FILICES, is also an order of plants in the *fragmenta methodi naturalis* of Linnæus. See BOTANY, p. 1317.

FILING, one of the principal operations in smithery, &c. succeeding to forging. See FILE.

The coarser cut files are always to be succeeded by finer; and in all the kinds the rule is, to lean heavy on the file in thrusting it forward, because the teeth of the file are made to cut forwards. But in drawing the file back again for a second stroke, it is to be lightly lifted just above the work, by reason it cuts not coming back.

The rough or coarse-toothed file (which, when large, is called a *rubber*) serves to take off the unevenness of the work left by the hammer in forging.

The bastard-toothed file is to take out too deep cuts, and file strokes made by the rough file. The fine-toothed file takes out the cuts or file-strokes the bastard-file made; and the smooth file those left by the fine file.

In this order, the files of several cuts are to succeed each other till the work is as smooth as it can be filed. After which it may be made yet smoother with emery, tripoli, &c. See POLISHING.

FILIPENDULA, in botany. See SPIRÆA.

FILIX, in botany. See FILICES.

FILLET, in anatomy. See FROENUM.

FILLET, or *Filet*, in architecture, a little square member, ornament, or moulding, used in divers places and upon divers occasions, but generally as a crowning over a greater moulding.

FILLET, in heraldry, a kind of orle or bordure, containing only a third or fourth part of the breadth of the common bordure. It is supposed to be withdrawn inwards, and is of a different colour from the field. It runs quite round, near the edge, as a lace over a cloak.

FILLET, in the manege, the loins of an horse, which begin at the place where the hinder part of the saddle rests.

FILLY, a term among horse-dealers, to denote the female or mare colt.

FILM, a thin skin or pellicle. In plants, it is used for that thin, woody skin, which separates the seeds in the pods, and keeps them apart.

FILTER, or *FILTRE*, in chemistry, a strainer commonly

Filtration
||
Finch.

monly made of bibulous or filtering paper in the form of a funnel, through which any fluid is passed, in order to separate the gross particles from it, and render it limpid.

FILTER, is also a charm, supposed to have a virtue of inspiring love. The word is derived from the Greek *φίλος*, which signifies the same thing, of *φιλος*, *amō*, "I love."

FILTRATION. See **CHEMISTRY**, n° 69.

FIMBRIÆ, denotes appendages disposed by way of fringe round the border of any thing.

FIMBRIATED, in heraldry, an ordinary with a narrow border or hem of another tincture.

FIN, in natural history, a well-known part of fishes, consisting of a membrane supported by rays, or little bony or cartilaginous ossicles.

The office of the fins has commonly been supposed to be analogous to that of feathers in fowls; and to assist the fish in its progressive motion, or swimming; but the later naturalists find this a mistake.

The tail is the great instrument of swimming: the fins only serve to keep the fish upright, and prevent vacillation or wavering.

FINAL, in general, whatever terminates or concludes a thing; as final judgment, final sentence, &c.

FINAL Cause. See **CAUSE**.

FINAL Letters, among the Hebrew grammarians, five letters so called, because they have a different figure at the end of words from what they have in any other situation.

FINAL, in geography, a port-town of Italy, subject to Genoa, and situated on the Mediterranean, about 37 miles south-west of that city. It was sold to the Genoese, in 1713, by the emperor Charles VI. E. Long. 9. 12. N. Lat. 44. 30.

FINANCES, in the French policy, denote the revenues of the king and state: much the same with the treasury or exchequer of the English, and the fiscus of the Romans.—The word is derived from the German *finantz*, "scrapping, usury." Tho' du Cange chooses rather to deduce it from the barbarous Latin *financia*, *præstatio pecuniaria*.

Council of the FINANCES, corresponds to our lords-commissioners of the treasury: the comptroller-general of the *finances*, to our lord high treasurer, &c.

The French have a peculiar kind of figures, or numerical character, which they call *chiffre de finance*.

FINCH-KIND, in ornithology, an appellation given to a genus of birds known among authors by the name of **FRINGILLA**.

FINCH (Heneage), earl of Nottingham, the son of Sir Heneage Finch, some time recorder of London, and of a younger branch of the Winchelsea family, was born in 1621. By his good parts and diligence, he became a noted proficient in the municipal laws; was made solicitor-general by Charles II. on his restoration, and was very active in the prosecution of the regicides. In 1670, he was appointed attorney-general; about three years after, lord keeper of the great seal, on the removal of the earl of Shaftesbury; and lord chancellor in 1675. He was created earl of Northampton in 1681; and died the year following, being quite worn out by the fatigues of business. He published several speeches on the trials of the judges of king Charles I. with some few other things; and left

behind him Chancery Reports in MS.

FINE, in law, hath divers applications. Sometimes it is used for a formal conveyance of lands or tenements, or of any thing inheritable, being in *esse temporis finis*, in order to cut off all controversies. Others define it to be a final agreement between persons, concerning any lands or reats, &c. of which any suit or writ is depending between them in any court.

FINE, sometimes signifies a sum of money paid for entering lands or tenements let by lease; and sometimes a pecuniary mulct for an offence committed against the king and his laws, or against the lord of the manor.

FINES for Alienation, in feudal law. One of the attendants or consequences of tenure by vassalship. *Blackst. Knight-Service*, was that of fines due to the lord for every alienation, whenever the tenant had occasion to make over his land to another. This depended on the nature of the feudal connection; it not being reasonable nor allowed, that a feudatory should transfer his lord's gift to another, and substitute a new tenant to do the service in his own stead, without the consent of the lord; and, as the feudal obligation was considered as reciprocal, the lord also could not alienate his feignory without the consent of his tenant, which consent of his was called an *attornment*. This restraint upon the lord soon wore away; that upon the tenant continued longer. For, when every thing came in process of time to be bought and sold, the lords would not grant a licence to their tenants to alienate, without a fine being paid; apprehending that, if it was reasonable for the heir to pay a fine or relief on the renovation of his paternal estate, it was much more reasonable that a stranger should make the same acknowledgment on his admission to a newly purchased feud. In England, these fines seem only to have been exacted from the king's tenants in *capite*, who were never able to alienate without a licence: but, as to common persons, they were at liberty, by *magna charta*, and the statute of *quia emptores*, (if not earlier), to alienate the whole of their estate, to be holden of the same lord as they themselves held it of before. But the king's tenants in *capite*, not being included under the general words of these statutes, could not alienate without a licence: for if they did, it was in ancient strictness an absolute forfeiture of the land; tho' some have imagined otherwise. But this severity was mitigated by the statute i Edw. III. c. 12. which ordained, that in such case the lands should not be forfeited, but a reasonable fine be paid to the king. Upon which statute it was settled, that one third of the yearly value should be paid for a licence of alienation; but, if the tenant presumed to alienate without a licence, a full year's value should be paid. These fines were at last totally taken away by statute 12 Car. II. c. 24. See **KNIGHT-Service**.

FINE-Drawing, or Rentering, a dexterous sewing up or rejoining the parts of any cloth, stuff, or the like, torn or rent in the dressing, wearing, &c.

It is prohibited to *fine-draw* pieces of foreign manufacture upon those of our own, as has formerly been practised. See **RENTERING**.

FINERS of GOLD and SILVER, are those who separate these metals from coarser ores. See **REFINERS**.

FINERY, in the iron-works, one of the forges at which

Fine
||
Finery.

Flaming
Fire.

which the iron is hammered and fashioned into what they call a *bloom*, or *square bar*.

FINCAL, a Caledonian chief, the hero of Ossian, flourished about the end of the third century. Vid. *Ossian's Poems*.

FINGERS, in anatomy, the extreme part of the hand divided into five members.

FINING of LIQUORS. See CLARIFICATION.

FINISTERRA, the most westerly cape or promontory of Spain, in 10. 15. W. Long. and 43° N. Lat. This cape is likewise the most westerly part of the continent of Europe.

FINITE, something bounded or limited, in contradistinction to INFINITE.

FINLAND (the duchy of), is bounded on the west by the gulph of Bothnia, on the east by Muscovy, on the south by the gulph of Finland and Ingria, and on the north by Bothnia and Lapland. It is about 200 miles in length, and almost as much in breadth. It contains many lakes; in which are several islands, which are generally rocks or inaccessible mountains. The inhabitants are small of stature, capable of enduring hardships, and good soldiers. The Russians have for some time rendered themselves masters of a good part of this province; the rest belongs to Sweden. It is divided into seven provinces: 1. Finland; 2. Cajana; 3. Thavasthia; 4. Nyeland; 5. Savolaxia; 6. Carrelia; and, 7. Kexholmia.

Finland Proper is an agreeable country, and lies over-against the city of Stockholm, near the place where the gulphs of Bothnia and Finland meet. It is divided into South and North Finland. It is diversified with mountains, forests, lakes, meadows, and pleasant fields. The inhabitants salt the fish they do not consume themselves, and send it into foreign countries.

FIR-TREE, in botany. See ABIES.

FIRE is that subtle, invisible, fluidity, by which all bodies are expanded, or enlarged in their dimensions, and then become hot to the touch; fluid substances of every kind are carried off in vapour; solid bodies become luminous, and are likewise dissipated in vapour, or, if incapable of being evaporated, become fluid, and at last are converted into glass. It seems likewise to be the chief agent in nature, on which animal and vegetable life have an immediate dependence, and without which it doth not appear that the system of nature itself could subsist a single moment.

No question in natural philosophy seems more difficult to be resolved than that concerning the nature of fire, and none has been more agitated. One set of philosophers, amongst whom are Lord Bacon, Mr Boyle, Sir Isaac Newton, &c. assert, that fire is not any substance of itself distinct from terrestrial bodies, but that it consists only in a vehement vibratory motion of their parts. Hence, lord Bacon defines heat, by which he means fire itself, to be "an expansive undulatory motion in the minute particles of a body, whereby they tend with some rapidity towards the circumference, and at the same time tend a little upwards." From this he infers, that if in any natural body you can excite a motion whereby it shall expand or dilate itself, and can repress and direct this motion upon itself, in such a manner, that the motion shall not proceed uniformly, but obtain in some parts and be checked in

others, you will generate heat, or fire.

To the same purpose Mr Boyle argues in a treatise on the mechanical origin of heat and cold. "In the production of heat, (says he,) there appears nothing on the part either of the agent or patient, but motion, and its natural effects. When a smith briskly hammers a small piece of iron, the metal thereby becomes exceedingly hot: yet there is nothing to make it so, except the forcible motion of the hammer impressing a vehement and variously determined agitation on the small parts of the iron; which, being a cold body before, grows, by that superinduced commotion of its small parts, hot—first, in a more loose acceptance of the word, with regard to some other bodies with which it was cold before: then sensibly hot, because this agitation exceeds that of the parts of our fingers; and, in this instance, oftentimes the hammer and anvil continue cold after the operation; which shews, that the heat acquired by the iron was not communicated by either of those implements as heat; but produced in it by a motion great enough strongly to agitate the parts of so small body as the piece of iron, without being able to have an effect upon so much greater masses of metal as the hammer or anvil. Though, if the percussions were often and briskly renewed, and the hammer were small, this also might be heated. Whence it is not necessary that a body should itself be hot to give heat.

"If a large nail is driven by a hammer into a plank of wood, it will receive several strokes on its head ere it grow hot; but when it is once driven to the head, a few strokes suffice to give it a considerable heat: for while, at every blow of the hammer, the nail enters further into the wood, the motion produced is chiefly progressive, and is of the whole nail tending one way; but when that motion ceases, the impulse given by the stroke, being unable to drive it further on, or break it, must be spent in making a various, vehement, and intestine commotion of the parts among themselves, wherein the nature of heat consists."

Sir Isaac Newton conjectures, that the sun and stars are only great earths vehemently heated: for large bodies, he observes, "preserve their heat the longest, their parts heating one another; and why may not great, dense, and fixed bodies, when heated beyond a certain degree, emit light so copiously, as by the emission and reaction thereof, and the reflections and refractions of the rays within the pores, to grow continually hotter, till they arrive at such a period of heat as is that of the sun? Their parts may be further preserved from fuming away, not only by their fixity, but by the vast weight and density of the atmosphere incumbent on them, strongly compressing them, and condensing the vapours and exhalations arising from them. Thus we see, that warm water, in an exhausted receiver, shall boil as vehemently as the hottest water open to the air; the weight of the incumbent atmosphere, in this latter case, keeping down the vapours, and hindering the ebullition, till it has received its utmost degree of heat. So also a mixture of tin and lead, put on a red-hot iron in *vacuo*, emits a fume and flame; but the same mixture in the open air, by reason of the incumbent atmosphere, does not emit the least sensible flame."

Agreeable to this, Sir Isaac is of opinion, that "gross bodies may be converted into light, by the

Fire.

2
Of Mr
Boyle.

3
Of Sir Isaac
Newton.

Fire. agitation of their particles; and light, again, into gross bodies, by being fixed therein:" and he defines fire to be "a body heated so hot, as to emit light copiously; for what, (says he,) is a red-hot iron, but fire?"

Of Doctor
Grave-
ande, Boer-
haave, &c.

By others, fire is considered as a fluid *sui generis*, an original element, which "exists in all bodies, and may be separated or procured from them by rubbing them against each other, and thus putting their fire in motion. But this motion by no means generates the fire." This is the account given by Dr s Graveande; with whom Lemery agrees, and endeavours to prove, that it is equally diffused through all space, is present in all places, in the void spaces between bodies, as well as the insensible interstices between their parts: of which opinion also was Dr Boerhaave.

Objections
against the
mechanical
origin of
fire.

The first hypothesis having been adopted by such an eminent philosopher as Sir Isaac Newton, hath from thence received very considerable weight, and been generally received by the philosophers in this country. It is, nevertheless, pressed with almost insurmountable difficulties. It can by no means be explained upon the principles of mechanism, because it directly contradicts them.—It is certain, that if one body gives motion to another that resists it, the quantity of motion produced will be less than that of the first body; because as much will be taken off as the resistance of the first body was equal to. Thus, suppose a body moves in such a manner as to be able to raise 12 pounds; if it meets with an obstacle equivalent to six pounds, it will not, after driving it out of the way, be able to raise any more than six pounds. The same rule must hold equally, whether we suppose the parts of matter in motion to be large or small. In the above example, if we take ounces instead of pounds, we cannot suppose that the effect will be in the least disproportionate. If instead of ounces we take grains, or half grains, or the minutest particles, the effect must still be the same. Let us now take Mr Boyle's example of iron becoming red-hot by being hammered. The *momentum* or quantity of motion impressed on the iron, by the blows it receives from the hammer, cannot be very great; we shall suppose them all together to amount to 500 pound weight. The momentum of the small particles of fire so produced, must be something less than 500 pound, on account of the resistance of them to motion. If these particles so put in motion, are employed to put in motion the particles of other matter, the momentum of these must be still less than that of the iron, on account of the new resistance met with. Thus, on every accession of new fuel, the fire must decay, and at last be quite extinguished. For, let us suppose the quantity of motion originally communicated to be great or small: if one part of matter gives motion to another, and that to a third, and so on, there is a constant loss of motion, occasioned by the resistance of the parts to be moved; and let us suppose this resistance as small as we please, as long as it is a resistance, an increase of the fire must be impossible. The contrary to all this, however, is confirmed by daily experience; and there seems to be no limit to the increase of fire, but the want of fuel. We cannot therefore mechanically account for the origin of fire merely on those principles by which we account for the motions of gravitating bodies.

To obviate in some measure objections of this kind,

Sir Isaac Newton seems to have supposed, that every particle of matter is endowed with a sphere of attraction, and beyond that with a sphere of repulsion. Hence, as soon as two particles of matter get without the sphere of one another's attraction, they begin to repel each other very strongly; and hence, says he, "as in algebra, where affirmative quantities cease, negative ones begin; so in mechanics, where attraction ceases, there the repelling power must succeed."

Upon this principle of repulsion alone it is that the mechanical origin of heat is tenible: for if the minute particles of any body have a force impressed upon them, in such a manner as to put them without the sphere of each other's attraction, and then they begin to repel one another strongly, it may be supposed, that putting the parts of other matter in a similar situation, and these again acting upon others in a like manner, a large mass of matter might be resolved into its minutest particles, and these scattered to an immense distance by the mutual repelling power between them, and thus produce the phenomena of heat and light.

Even this will be found quite unsatisfactory, if attentively examined; for the repelling power with which these particles are supposed to be endowed, will have as great a tendency to drive them back upon the body from whence they came, as to drive them away from it. To help our conceptions in this matter, let us suppose, that the repulsive sphere round each of the minute particles is an inch in diameter. Let us also suppose, that this repulsive force is sufficiently great to throw the particle to the distance of 1000 miles, when it comes within the repulsive power of another. If, therefore, a particle is driven off from any hard substance, suppose iron, it will indeed drive another before it, which is already in the way, but will as certainly drive back upon the iron those which are shaken off from it afterwards: for re-action is always equal to action; and if we suppose a number of such particles extricated from the body, their mutual action and re-action being always equal, the motion among them must very soon cease.

Upon this principle, however, the Newtonians explain the emission of light from luminous bodies. "A ray of light (says Sir Isaac), as soon as it is cast off from the luminous body by the vibrating motion of its parts, and is got out of the sphere of its attraction, is propelled with an immense velocity."—Now, with all due submission to such a great name as that of Sir Isaac Newton, what he advances here is utterly impossible. All the parts of the sun have a mutual attraction towards one another, by which they are kept together; and it is impossible that a particle of matter can be both attracted and repelled at the same moment by one body.—It is indeed inconceivable, how the particles of matter can be endowed with two such contrary powers, and yet remain together in one mass; for though those which lie contiguous to one another may mutually attract, yet they must also repel, and be repelled by, those which lie at a greater distance; and, from such a mixture of contrary forces, it does not seem that any body could solidly cohere together.

In support of this hypothesis, we may however suppose, that the vibratory motion of the parts of the sun is so great, that the particles of light are thrown off by it an immense way beyond the orbit of Saturn. But granting this,

Fire.

this, no sooner would they come within the sphere of one another's repulsion, than some of them would be thrown back with violence towards the sun; and, in their return, would meet with others, to which they would give a like direction; and in this they would be assisted by the attractive force of the sun himself, by which means the force with which the light was emitted, must at first be resisted, and at last entirely destroyed.

But, whatever might be the case with the sun, the vibratory force of whose parts we may suppose to be inconceivably great, it is impossible that upon this principle any fire could be kindled by man: for the vibratory motion induced among the particles of any body by him, could never be greater than the force originally applied; and thus must unavoidably decay, on account of the continual resistance met with in setting the particles of other matter in the like motion.

To these objections, we may also add, that, upon this hypothesis, fire ought to burn best *in vacuo*; because there the pressure of the atmosphere is taken off, and there should be the less resistance to the vibrations of the small particles. We find, however, that fire, so far from burning best *in vacuo*, is immediately extinguished; and that a free circulation of air is absolutely necessary to preserve it.—Professor Hamilton, indeed, of the university of Dublin, endeavours to account for this, by saying, that air is necessary only to blow off the ashes, &c. which would prevent the continuance of the motion. But if there were no other occasion for air than this, fixed or phlogisticated air would answer the same purpose; and both of these are found to extinguish fire. See AIR.

6 Whether the true pabulum of fire is contained in the air.
The property, indeed, that air hath of supporting fire, has generally induced people to think that the true *pabulum* or fuel of fire is contained in the air.—Others are by no means inclined to admit this hypothesis; and no conclusive argument hath yet been brought against it. Indeed, in a case where the agents are so exceedingly subtle, it seems impossible to prove the negative in this question. We see, that fire will not burn without air; therefore air brings continually a new supply of matter which is converted into fire. Our senses here give us positive evidence. Those who take the other side of the question, ought to bring a proof equally strong against this. Dr Hamilton, indeed, *supposes* fire to be otherwise sufficiently provided with pabulum; and, therefore, that air acts upon fire otherwise than by supplying it with fuel, as we have already hinted.

7 Dr Hamilton's opinion.
“Air (says he) is not less necessary for the support of fire than of animal-life; for fire will not long continue to burn without a circulation of air. Now, *I suppose*, this happens, not from its adding any thing to the pabulum of fire, (for fire seems to be otherwise sufficiently provided with pabulum), but rather on this account, That the air immediately about a body on fire is heated, and made specifically lighter than the air at some distance from it. This hot air, therefore, must ascend, and carry with it all those minute particles of different kinds which are thrown off from the burning body, and which would otherwise rest upon its surface, and thereby clog and stop the subtle vibrations of the burning matter, in which the nature of fire partly con-

sists. If, therefore, fire be confined in a close place, where there can be no circulation of air, the air about it, being soon saturated with the particles arising from the burning matter, will not be able to take up any more of them; and therefore the fire must go out, smothered, as it were, with such particles as are no longer combustible. Hence it is that fire burns faster when air is strongly blown upon it: for then the ashes are carried off as fast as they are formed on the surface of the burning body; and thereby the particles that have just taken fire, are kept quite free from every thing that can impede or clog their vibratory motion. The air in this case also will spread the fire quickly through the fuel, by blowing the particles that are already kindled, among those that are not; and perhaps the motion of the air in this case may promote the subtle vibrations in the burning matter by which the fire is propagated through its parts. As the air contains many subtle particles of the inflammable kind, it is not improbable, that these, mixing with the gross burning matter, may help to preserve and enliven the fire; but I think it most probable, that air supports fire chiefly by carrying off such particles as are burned out, and would therefore obstruct the progress of the fire; because we find, that the strong elastic steam of water driven violently out of the pipe of an æolipile, which will carry off those particles, will also blow up and increase the fire as well as air driven from the bellows, although the steam does not contain any inflammable particles.”

8 Deception in his reasoning.
Here we have no other reason given in support of this hypothesis, than that fire may be blown up by the steam issuing violently from an æolipile; but this reason is founded on a deception. This steam only blows up the fire by occasioning a violent motion in the air through which it passes; and thus forcibly drives it on the fuel, at the same time that it enters along with it; and thus is, in some measure, similar to the blowing up of a large fire by a stream of water, which is used in some places instead of bellows. Nevertheless, if the steam of the æolipile is only admitted to the fire, and the air totally excluded from it, the fire will be as effectually extinguished as if the stream of water employed to force the air into a large furnace was itself directed on the fuel.—Besides, on the Doctor's hypothesis, fixed, and many other kinds of air ought to be equally efficacious in preserving flame, as already observed; which are yet found to extinguish it as effectually, if not more so than water.

9 Hutchinso-
nian hypo-
thesis.
Among other hypotheses, it may not be amiss to mention the almost forgotten and exploded one published by Mr Hutchinson, and by him pretended to be plainly revealed in the sacred writings.—According to this gentleman, the nature of fire, of light, and air, are all at bottom the same, being only three different modifications of the same fluid. When air is blown upon a fire, then the grosser fluid is immediately reduced to its finest parts, and attains the utmost degree of possible fluidity, by the vehement attrition of its own particles, and those of the fire already kindled, against one another. Being continually pressed upon in this state by the surrounding gross air, it is sent out on all sides in streams of light, which being detained among the particles of the atmosphere, and having their motion stopped, become part of the air itself, and are again ready

Fire.

ready to reassume their luminous and fiery appearance on proper occasions.

Setting aside the pretended authority of revelation, many people have been of opinion, that this hypothesis might be supported by very strong arguments drawn from matter of fact. The principal are the following.

10
Arguments
in favour of
this opinion

1. It is well known, that in all mixtures of different kinds of fluids; those which are rarest, and consequently less acted upon by the force of gravity than others, will rise to the top, and occupy the uppermost place in the mixture. Thus, if water and oil are mixed together, they will soon separate themselves, and the oil will swim at the top. This separation happens in consequence of their different degrees of density, by which the oil is less affected by the force of gravity than the water; not through any principle of *innate levity*, or any power of repulsion between this fluid and the bottom of the vessel. In like manner, when we see any other two fluids mixed, and one of them ascends, we ought not to conclude, that there is any unknown power of repulsion in that which ascends, more than in the other. If only one of the two fluids is visible, and that happens to be the ascending one, we ought not therefore to seek for the cause of its ascent in unknown and imaginary repulsions and vibrations, but rather to conclude that it is pressed upwards by the tendency of an invisible fluid of greater density downwards. In most cases this is allowed by all philosophers to hold good. The smoke of a fire, for instance, does not ascend from it, on account of any principle of positive levity, or on account of a repulsive power betwixt it and the fire from which it ascends, but from the greater tendency of the air downwards; in consequence of which, it is driven upwards with a force equivalent to the difference of their specific gravities. By analogy, (say they) we ought to apply this to the emission of light itself. We have, no other proof of a repulsive power between the particles of this substance, than its constant ascent from a luminous body; and invent it in order to solve this phenomenon, when the same thing may be done with a much greater degree of probability, and more agreeable to the known laws of nature in other cases, by supposing the descent of a denser, though invisible, fluid towards that body.

2. It can be proved by experiment, that the matter of fire, or light, is convertible into a denser substance, subject to the laws of gravitation, and united to terrestrial bodies in such a manner as to become a part of their composition, while yet it is capable of being afterwards expelled by a renewal of heat, and of reappearing in the form of air.—The proof here rests upon the augmentation of weight observed in metals, when calcined either in the solar beams by means of a burning glass, or in a common fire. Thus, regulus of antimony, calcined in the focus of a large burning glass, gains almost an eighth part of its whole weight; red lead, in calcination, gains a tenth part; and some of the other metals have been observed to gain much more. When these calces are suffered to cool, and are again exposed to the action of a strong fire, they discharge a large quantity of air. The fire, therefore, say the adopters of this hypothesis, has here been evidently converted into air; it being impossible that, during the continuance of a violent heat, any thing could be imbibed from the air; for the fire would as effectually

prevent any such absorption at first, as it could expel the air afterwards.

Fire.

3. The phenomena of electricity show, that there is present between the grosser parts of bodies an invisible subtle fluid, of exceeding great power, which on certain occasions becomes visible, and then discovers itself to be the real element of fire itself. It always appears to our eyes as a stream of subtle fire, emitting a very perceptible light. It will kindle inflammable substances; melt the most difficultly fused metals, platina itself not excepted; and even turn gold into glass, which hath never yet been done either by the fiercest furnace or the strongest burning mirror.

Though this hypothesis has been laid down in its most distinct and plausible form by Hutchinson, or rather some of his followers, it appears very little if at all different from that of Boerhaave and others, who maintain the impossibility of generating fire, and affirm it to be a fluid *sui generis*. A direct proof of this, however, as well as of other suppositions concerning the nature of fire, is attended with great difficulties. Were we able to convert fire by itself into air, and convert air by itself into fire, the point would indeed be gained. But, though we blow ever so much air into a fire, unless we continually add new fuel, it will soon be extinguished. But this ought not to be the case on the Hutchinsonian hypothesis: for one quantity of air being reduced to its utmost degree of fluidity, ought to reduce to the same state every succeeding quantity which mixed itself with it; and not only would fire be kept up without any gross fuel, but there might be some danger of setting the whole atmosphere in a blaze at once.

11
Difficulties
attending
this hypothesis.

Thus, while one party is at a loss to account for the usefulness of air in supporting fire, the other is no less distressed with the gross fuel, such as wood, coals, &c. which seem to be equally necessary with the air itself for the support of our fires. The Hutchinsonians, indeed, find no other use for the fuel but to keep off too great a quantity of air, which would oppress and extinguish a small fire: but this purpose might be equally well answered by pieces of brick or stone; yet these will effectually put out a fire. The use of the fuel, therefore, which is continually to be added to our common fires, cannot be explained on the Hutchinsonian hypothesis.

The discoveries of Dr Priestley, however, have put the matter beyond a doubt with respect to air. He hath made it apparent, that terrestrial substances are necessary ingredients in the composition of air much purer than what we breathe, and much more capable of sustaining flame*; so that it is now an absurdity to talk of fire, and air being convertible into one another.

12
It is totally
overturn-
ed by Dr
Priestley's
experi-
ments.

* See Air.

The great proof on the Hutchinsonian side, and which they look upon as absolutely unanswerable, is the increase of weight in metalline calces when exposed to the action of a strong fire. This increase is found to be owing to air, as we have already mentioned: and though it should by no means be found either fit for respiration, or for the purposes of supporting flame; yet it will be sufficient for their purpose to prove, that the element of fire is capable of being converted into a gravitating substance; which, when disengaged, appears in the form of a permanently ela-

13
sile

stic fluid, and thus becomes a certain species of air.—That it really doth so, however, is very dubious: for it is certain, that metals cannot be calcined without the free access of air; and therefore it cannot certainly be known whether the air in the calx comes from the fixation of the fire, or whether it is attracted from the surrounding atmosphere, especially if, as some alledge, the calx receives no increment in weight while kept hot.

M. la Voisier mentions some very fine experiments with regard to the calcination of metals, which ought to throw a considerable light on this subject.—Having put three drachms of lead in a stone crucible placed under a glass-receiver inverted in quicksilver, he exposed it to one of Tschirnhausen's great burning-glasses; keeping it, however, a full inch from the true focus, that the heat might not be much greater than was necessary to melt the metal.

At the very instant the lead melted, though it was perfectly clean and bright on every side, a pellicle was produced on its surface. In the progress of the calcination, this pellicle became of a yellow massicot colour, and wrinkled on one side. In ten or twelve minutes the calcination stopped, and no farther effect was observed; only when the heat was a little stronger, the yellow pellicle fused in some places, and formed a yellowish glass. From the portions thus vitrified fumes arose plentifully, which tarnished the top of the cucurbit. This evaporation he opposed as much as possible, by removing the lead farther and farther from the true focus of the lens.

The metal having been exposed to the action of this lens for an hour and 15 minutes, and the vessels then perfectly cooled, it was found to have gained $2\frac{1}{2}$ grains. The mercury was found to have gained $2\frac{1}{2}$ lines above its former level. The diameter of the receiver in that place was $4\frac{1}{8}$ inches, so that the whole quantity of air absorbed was $\frac{3}{4}$ cubic inches. The proportion of the increase of weight in the calx then, had been $\frac{3}{4}$ of a grain for each inch of air, which is about one fourth more than the weight of an equal quantity of atmospherical air. Having made some experiments on the air which remained in the receiver, he found that it would not precipitate lime-water, and thus seemed to be deprived of its fixed part.

To the same purpose Dr Priestley hath made experiments on metallic calcinations; and acquaints us, that if a metal is calcined over lime-water, it doth not become turbid; because, though the calcareous earth attracts the fixed air, yet the metallic calx doth it much more strongly, and consequently no precipitation can ensue. The same reason he gives why metals cannot be calcined in nitrous air; namely, that there is then no fixed air with which the metallic calx may combine, and upon which the calcination seemed to him to depend; nevertheless, the metals fused copiously, though the phlogiston was not separated.

These experiments seem totally unanswerable by the Hutchinsonsians. It is well known, that fixed air is one of the component parts of our atmosphere; and from Mr la Voisier's and Dr Priestley's experiments, it would seem impossible to deprive a metal of its phlogiston, but by allowing the calx to combine with fixed air; and as the fire, though constantly applied, is not

able to produce this fixed air, but must have the assistance of the common atmosphere, this seems a demonstration, that fire is not convertible into an elastic fluid of any kind.

The only reply which the Hutchinsonsians can give to this is, that metals will be increased in weight tho' kept over the fire in close vessels. But this may very reasonably be supposed to proceed from the small quantity of air contained in the vessels where they are put, or from some inaccuracy in closing them, so that there may be some communication between the metals and the external air. To make these experiments perfect, the glasses ought first to be well exhausted of their air, and then hermetically sealed.

It doth not appear, therefore, that ever the element of fire hath been by human art converted into a grosser fluid of any kind; and consequently the only resource left the Hutchinsonsians is in arguments drawn from the similarity of the electric fluid and the substance of light or fire. The late discoveries in electricity, indeed, have thrown so much light upon that subject, that there are now but few who deny the existence of fire as a distinct element. It doth not, however, appear, that this element can ever be converted into any other fluid of a grosser nature, as the Hutchinsonsians affirm. The electric fluid seems to be equally subtle, and equally penetrating, with fire or light; and though it should remain ever so long at rest, it doth not appear that its fluidity is thereby lost in the smallest degree. But for a full account of the experiments most likely to ascertain the identity of elementary and electric fire, see the articles ELECTRICITY, HEAT, IGNITION, LIGHT, &c.

Wild Fire, a kind of artificial or factitious fire, which burns even under water, and that with greater violence than out of it.

It is composed of sulphur, naphtha, pitch, gum, and bitumen; and is only extinguishable by vinegar mixed with sand and urine, or by raw hides.

Its motion or tendency is said to be contrary to that of natural fire, and always follows the direction in which it is thrown; whether it be downwards, sideways, or otherwise. The French call it *Greek fire*, or *feu Gregeois*, because first used by the Greeks, about the year 660; as is observed by the Jesuit Petavius, on the authority of Nicetas, Theophanes, Cedrenus, &c.

The inventor, according to the same Jesuit, was an engineer of Heliopolis, in Syria, named *Callinicus*, who first applied it in the sea-fight commanded by Constantine Pogonates against the Saracens, near Cyzicus, in the Hellespont; and with such effect, that he burnt the whole fleet therewith, wherein were 30,000 men.

But others will have it of a much older date; and hold Marcus Gracchus the inventor: which opinion is supported by several passages, both in the Greek and Roman writers, which shew it to have been anciently used by both those nations in their wars. See *Scaliger* against *Cardan*.

Constantine's successors used it on divers occasions, with equal advantage as himself; and what is remarkable enough, is, that they were so happy as to keep the secret of the composition to themselves, so that no other nation knew it in the year 960.

Hugh, king of Burgundy, demanding ships of the emperor

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emperor Leo, for the siege of Frefne, desired likewise the Greek fire. Chorier *Hist. de Dauph.*

F. Daniel gives us a good description of the Greek fire, in his account of the siege of Damietta under St Louis. Every body, says that author, was astonished with the Greek fire, which the Turks then prepared; and the secret whereof is now lost. They threw it out of a kind of mortar; and sometimes shot it with an odd sort of cross-bow, which was strongly bent by means of a handle, or winch, of much greater force than the mere arm. That thrown with the mortar, sometimes appeared in the air of the size of a tun, with a long tail, and a noise like that of thunder. The French by degrees got the secret of extinguishing it; in which they succeeded several times.

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xviii. 117.

Machine for Preserving from FIRE. This machine, consists of a pole, a rope, and a basket. The pole is of fir, or a common scaffold pole, of any convenient length from 36 to 46 feet; the diameter at bottom, or greatest end, about five inches; and at the top, or smallest end, about three inches. At three feet from the top is a mortise through the pole, and a pulley fixed to it of nearly the same diameter with the pole in that part. The rope is about three quarters of an inch diameter, and twice the length of the pole, with a spring hook at one end, to pass through the ring in the handle of the basket when used: it is put through the mortise over the pulley, and then drawn tight on each side to near the bottom of the pole, and made fast there till wanted. The basket should be of strong wicker-work, three feet and a half long, two feet and a half wide, rounded off at the corners, and four feet deep, rounding every way at the bottom. To the top of the basket is fixed a strong iron curve or handle, with an eye or ring in the middle; and to one side of the basket, near the top, is fixed a small cord, or guide-rope, of about the length of the pole. When the pole is raised, and set against a house over the window from which any persons are to escape, the manner of using it is so plain and obvious, that it needs not be described. The most convenient distance from the house, for the foot of the pole to stand, where practicable, is about 12 or 14 feet. If two strong iron straps, about three feet long, rivetted to a bar cross, and spreading about 14 inches at the foot, were fixed at the bottom of the pole, this would prevent its turning round or slipping on the pavement. And if a strong iron hoop, or ferule, rivetted (or welded) to a semi-circular piece of iron spreading about 12 inches, and pointed at the ends, were fixed on at the top of the pole, it would prevent its sliding against the wall.

When these two last mentioned irons are fixed on, they give the pole all the steadiness of a ladder; and because it is not easy, except to persons who have been used to it, to raise and set upright a pole of 40 feet or more in length, it will be convenient to have two small poles, or spars, of about two inches diameter, fixed to the sides of the great pole at about two or three feet above the middle of it, by iron eyes rivetted to two plates, so as to turn every way; the lower end of these spars to reach within a foot of the bottom of the great pole, and to have ferules and short spikes to prevent sliding on the pavement, when used occasionally to support the great pole, like a tripod. There should be two strong ash trundles let through the pole, one at

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four feet and one at five feet from the bottom, to stand out about eight inches on each side, and to serve as handles, or to twist the rope round in lowering a very heavy weight. If a block and pulley were fixed at about the middle of the rope, above the other pulley, and the other part of the rope made to run double, it would diminish any weight in the basket nearly one half, and be very useful in drawing any person up, to the assistance of those in the chambers, or for removing any effects out of a chamber, which it might be dangerous to attempt by the stairs.

It has been proved, by repeated trials, that such a pole as we have been speaking of can be raised from the ground, and two or three persons taken out of the upper windows of an house and set down safely in the street, in the space of 35 seconds, or a little more than half a minute. Sick and infirm persons, women, children, and many others, who cannot make use of a ladder, may be safely and easily brought down from any of the windows of an house on fire by this machine, and, by putting a short pole through the handles of the basket, may be removed to any distance without being taken out of the basket. The pole must always have the rope ready fixed to it, and may be conveniently laid up upon two or three iron hooks under any shade or gate-way, and the basket should be kept at the watch-house. When the pole is laid up, the two spars should always be turned towards the head of it. The basket should be made of peeled rods, and the pole and spars painted of a light stone-colour, to render it more visible when used in the night.

Godfrey's Machines for Extinguishing FIRE. Of these the following account is given by Mr Ambrose Godfrey, grandson to the inventor. "The machine to be employed, consists of a small portion of gun-powder closely confined; which, when animated by fire, acts by its elastic force, upon a proper medium, and not only divideth it into the minutest atoms, but disperseth it also in every direction, so as immediately to extinguish any fire within a certain distance. This medium is a liquor strongly impregnated with a preparation of antiplogistic principles, which, by their action upon burning materials, extinguish the flames, and reduce them in general to a state of a black coal; and, by its opposite nature to fire, hinders the remaining sparks, notwithstanding the admission of the air, from kindling the flames afresh. By this means, the great point is obtained, in giving sufficient time for totally extinguishing any remains of fire.

"They who presume that water only will perform this, will find themselves greatly mistaken, as the draught of air will certainly rekindle the neighbouring materials, which are very fit to receive a fresh flame, the fire not being extinguished by the quantity of water, but rather by the expansion and rarefaction of its particles. There are several sizes of these machines, from five to fifty pounds weight, in a portable and rather small compass, and may generally be carried to any place where a man can go himself.

"But tho' these machines will prevent great fires by a timely application, they will not extinguish them after they have reached a frightful height, and several houses, perhaps near a whole street, are in flames. The floors must be standing, and access to the building safe, otherwise no person can be supposed to approach

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near enough to apply them in a proper manner. Every fire has its beginning, for the most part, in some apartment; and as soon as discovered, the family, instead of losing all presence of mind, should immediately apply one or more of these machines, which will then fully answer the intention. The proper time of applying them, supposes that they are ready at hand. It will be in vain to think of fetching them from any considerable distance, as it will then be too late for them to perform any important service; except indeed being the probable means of saving some adjacent house, by extinguishing the flames as often as they break out, till the building first on fire is totally consumed, and, by falling into ruins, leaves the other in perfect safety."

On the 19th of May 1761, at noon, Mr Godfrey's experiment for extinguishing fire, was tried in an house erected for that purpose, near Mary-le-bone. Their royal highnesses the duke of York, prince William Henry, prince Henry Frederick, a great number of persons of rank and distinction, and many of the learned world, gave their attendance on this singular occasion. The house, which is of brick, consists of three rooms, one above another, a stair-case, chimney, lath-and-plaster ceilings, and a kind of wainscoting round the rooms, of rough deal. Exactly at 12 o'clock the ground-room, and that up one pair of stairs, were set on fire, by lighting the faggots and shavings laid in there for that purpose: in about 15 minutes the wain-foot of the under room was thought to be sufficiently in flames, and three of the machines were thrown in; which, by almost immediate and sudden explosions, instantaneously extinguished the flames, and the very smoke in that apartment in a few minutes totally disappeared. By this time, the firemen, &c. who had the care of throwing in the machines, gave an alarm that the stair-case had taken fire, and that it was necessary directly to go to work upon the next room; which was accordingly done, and with the same effect. The experiment, however, hitherto did not universally satisfy: in the last instance especially it was thought to be too hastily put in execution; and the populace, without side the pangs, who were supposed to amount to near 20,000, and whose curiosity, from the very nature of their situation, remained much dissatisfied, began to grow rather riotous, and talked of a second bottle-conjuror. For the sake of the experiment, therefore, and to remove all manner of doubt, Mr Godfrey consented to a third experiment in the upper room, which was entirely of wood. The flames were now suffered to get to a considerable height, and even the window-frames destroyed, before the machines were thrown in: which, however, answered exactly as the former had done; and, being quite in sight of the out-landers, met with universal approbation.

In the year 1734, the states of Sweden offered a premium of 20,000 crowns for the best method of stopping the progress of accidental fires; when one Mr Fuches, a German physician, made a preparation for that end, and the experiment was made on a house built on purpose, of dry fir, at Legard island. In the buildings were placed several tubs of tar and pitch, and a great quantity of chips, all which were set on fire; flames issuing through the top of the house, windows, &c. when he threw in one of the barrels containing the preparation, which immediately quenched the flames;

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a second barrel entirely cleared the smoke away; and the whole was executed to the satisfaction of the spectators, and to the no small satisfaction of the inventor, who was about to return home, when unexpectedly the flames broke out again, supposed to be occasioned by a small quantity of combustible matter being introduced and set on fire secretly by some malicious person. Upon this the wrong-headed mob fell upon Mr Fuches, and beat him most unmercifully, so that he narrowly escaped with his life. He soon after left the country, and never could be prevailed on (tho' strongly persuaded by some of the most eminent citizens) to return. It is said, another experiment of the same kind was tried in the year 1761 in Holland; but rendered abortive through the perverseness of the populace.

These machines of Mr Godfrey's, it is evident, would be of great use in extinguishing fires on shipboard; and might be considered as a no less necessary part of a ship's lading, than her stores or ammunition.

The hint of these machines is said to have been taken by Dr Godfrey from the invention of one Zachary Grey, who exhibited machines similar to those of Dr Godfrey, before persons of the first rank, but without meeting with any encouragement. His machines were made of wood, and the liquor employed was only water, and consequently inferior to Dr Godfrey's in its power of extinguishing fire. The latter is said to have mixed his water with a certain quantity of oil of vitriol, or with sal ammoniac. These machines, however, are found to be only serviceable in the beginning of a fire. When the roof had fallen in, they had no effect.

Water-Engine for Extinguishing FIRE. See HYDROSTATICS, n^o 33.

In using this machine we have the following improvement by Dr Hoffman, which promises to be of great efficacy. As soon as the engine is in readiness to work, stir into the water that immediately is to be discharged, seven or eight pounds of pearl-ashes in powder, and continue to add it in this manner as occasion requires; taking care that it be directed against the timber or wainscot, &c. just beginning to burn, and not waited against the brickwork; or, where time will admit, dissolve any quantity of pearl-ashes in a copper with water, and as fast as it dissolves, which will be in a few minutes, mix a pailful with the water in the engine, pretty often; and whatever burning wood it is played upon, will be extinguished as if it was dipped in water, and will not burn afresh in the part extinguished.

Use of Gun-powder for Extinguishing FIRES. It is well known, that the inner parts of chimneys easily take fire; the foot that kindles therein emits a greater flame, according as the tunnel is more elevated, because the inferior air feeds the fire. If this air could therefore be suppressed, the fire would soon be extinguished. In order to this, some discharge a pistol into the chimney, which produces no effect: others lay under the chimney a copper full of water; but the vapours that rise from it, far from extinguishing the fire, seem to give it new force. Water thrown into the chimney at top is equally of no effect, because it comes down through the middle of the tunnel, and not along the sides. It would be more advisable to stop with dung the upper orifices of the tunnel for quenching

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ing the fire. But the surest and readiest method is, to take a little gunpowder, and, having humected it with spittle for binding it, to form it into small masses, and so throw it into the hearth of the chimney. When it is burnt, and has produced a considerable vapour, a second, afterwards a third, are thrown, and so on, as much as is necessary. In a little time the fire is extinguished, and, as it were, choaked by this vapour; and cakes of inflamed foot are seen to fall from the tunnel, till at last not the least vestige of fire appears.

FIRE, in theology. See **HELL**.

We read of the sacred fire in the first temple of Jerusalem, concerning which the Jews have a tradition that it came down from heaven: it was kept with the utmost care, and they were forbidden to carry any strange fire into the temple. This fire is one of the five things which the Jews confels were wanting in the second temple.

The pagans had their sacred fires, which they kept in their temples with the most religious care, and which were never to be extinguished. Numa was the first who built a temple to Fire as a goddess, at Rome, and instituted an order of priestesses for the preservation of it. See **VESTALS**.

Fire was the supreme god of the Chaldeans; the Magi were worshippers of fire; and the Greeks and Armenians still keep up a ceremony called the *holy fire*, upon a persuasion that every Easter-day a miraculous fire descends from heaven into the holy sepulchre, and kindles all the lamps and candles there.

FIRE kindled spontaneously in the Human Body. See *Extraordinary Cases of BURNING*.

FIRE-BARREL. See **FIRE-SHIP**, Note (B.)

FIRE-BRIM. Ibid. Note (D.)

FIRE-ARROW, in naval artillery, is a small iron dart furnished with springs and bars, together with a match impregnated with sulphur and powder, which is wound about its shaft. It is intended to fire the sails of the enemy, and is for this purpose discharged from a musketoon or swivel-gun. The match being kindled by the explosion, communicates the flame to the sail against which it is directed, where the arrow is fastened by means of its bars and springs. This weapon is peculiar to hot climates, particularly the West Indies, where the sails being extremely dry by reason of the great heats, they instantly take fire, and of course set fire to the masts and rigging, and lastly to the vessel itself.

FIRE-BALL, a composition of meal-powder, sulphur, salt-petre, pitch, &c. about the bigness of a hand-grenade, coated over with flax, and primed with the slow composition of a fuse. This is to be thrown into the enemy's works in the night-time, to discover where they are; or to fire houses, galleries, or blinds of the besiegers; but they are then armed with spikes or hooks of iron, that they may not roll off, but stick or hang where they are desired to have any effect.

FIRE-COCKS. Churchwardens in London and within the bills of mortality, are to fix firecocks at proper distances in streets, and keep a large engine and hand-engine for extinguishing fire, under the penalty of 10*l*. stat. 6 Ann. c. 31.

On the breaking out of any fire in London or Westminster, the constables and headles of parishes shall repair to the place with their slaves, and assist in ex-

tinguishing it, and cause the people to work for that end, &c.

FIRE-ENGINE. See **STEAM-ENGINE**.

FIRE-FLAIRE, in ichthyology. See **RAJA**.

FIRE-FLIES, a species of flies common in Guiana, of which there are two species. The largest is more than an inch in length, having a very large head connected with the body by a joint of a particular structure, with which at sometimes it makes a loud knock, particularly when laid on its back. The fly has two feelers or horns, two wings, and six legs. Under its belly is a circular patch, which, in the dark, shines like a candle; and on each side of the head near the eyes, is a prominent, globular, luminous body, in size about one third larger than a mustard-seed. Each of these bodies is like a living star, emitting a bright, and not small, light; since two or three of these animals, put into a glass-vessel, afford light sufficient to read without difficulty, if placed close to the book. When the fly is dead, these bodies will still afford considerable light, though it is less vivid than before; and if bruised, and rubbed over the hands or face, they become luminous in the dark, like a board smeared over with English phosphorus. They have a reddish-brown or chestnut colour; and live in rotten trees in the day, but are always abroad in the night. The other kind is not more than half as large as the former: their light proceeds from under their wings, and is seen only when they are elevated, like sparks of fire appearing or disappearing at every second. Of these the air is full in the night, tho' they are never seen in the day. They are common not only in the southern, but in the northern parts of America, during the summer.

FIRE-LOCK, or *Fusil*, a small gun which fires with a flint. It is distinguished from an old musquet, or match-lock, which was fired with a match. The firelock is now in common use in the European armies.

FIRE-POTS, in the military art, small earthen pots, into which is put a charged grenade, and over that powder enough till the grenade is covered; then the pot is covered with a piece of parchment, and two pieces of match across lighted: this pot being thrown by a handle of matches where it is desired, it breaks and fires the powder, and burns all that is near it, and likewise fires the powder in the grenade, which ought to have no fuse, to the end its operations may be the quicker.

FIRE-REDS. See the next article, Note (c.)

FIRE-SHIP, an old vessel filled with combustible materials, and fitted with grappling irons to hook, and set fire to, the enemies ships in battle, &c.

As there is nothing particular in the construction of this ship, except the apparatus by which the fire is instantly conveyed from one part to another, and from thence to the enemy, it will be sufficient to describe the fire-room, where these combustibles are enclosed, together with the instruments necessary to grapple the ship intended to be destroyed.

The fire-room is built between decks, and limited on the after-part by a *bulk-head*, L, behind the main-mast, from which it extends quite forward, as represented in fig. 1. Plate CXIV. The train inclosed in this apartment is contained in a variety of wooden troughs, D, G, which intersect each other in different parts of the ship's length; being supported at proper distances

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by cross-pieces and flanchions. On each side of the ship are six or seven ports, H₃, about 18 inches broad, and 15 inches high; and having their lids to open downward, contrary to the usual method.

Against every port is placed an iron chamber (A), which, at the time of firing the ship, blows out the port-lid, and opens a passage for the flame. Immediately under the main and fore-shrouds is fixed a wooden funnel M; whose lower end communicates with a fire-barrel (a), by which the flame passing through the funnel is conducted to the shrouds. Between the funnels, which are likewise called *fire trunks*, are two scuttles, or small holes in the upper deck, serving also to let out the flames. Both funnels must be flopped with plugs, and have fail-cloth or canvas nailed close over them, to prevent any accident happening from above to the combustibles laid below.

The ports, funnels, and scuttles, not only communicate the flames to the outside and upper-works of the ship and her rigging; but likewise open a passage for the inward air, confined in the fire-room, which, is thereby expanded so as to force impetuously thro' those out-lets, and prevent the blowing up of the decks, which must of necessity happen from such a sudden and violent rarefaction of the air as will then be produced.

On each side of the bulk-head behind is cut a hole L, of sufficient size to admit a trough of the same dimensions as the others. A leading trough, L I, whose foremost-end communicates with another trough within the fire-room, is laid close to this opening, from whence it extends obliquely to a fally-port I, cut thro' the ship's side. The decks and troughs are well covered with melted rosin. At the time of the firing either of the leading troughs, the flame is immediately

conveyed to the opposite side of the ship, whereby both sides burn together.

The spaces N, O, behind the fire-room, represent the cabins of the lieutenant and master, one of which is on the starboard, and the other on the larboard side. The captain's cabin, which is separated from these by a bulk-head, is exhibited also by P.

Four of the eight fire-barrels are placed under the four fire-trunks; and the other four between them, two on each side the fire-scuttles, where they are securely cleated to the deck. The longest reeds (c) are put into the fore and aft troughs, and tied down: the shortest reeds are laid in the troughs athwart, and tied down also. The bavins (d), dipped at one end, are tied fast to the troughs over the reeds, and the curtains are nailed up to the beams, in equal quantities, on each side of the fire-room.

The remainder of the reeds are placed in a position nearly upright, at all the angles of every square in the fire-room, and there tied down. If any reeds are left, they are to be put round the fire-barrels, and other vacant places, and there tied fast.

Instructions to prime.

TAKE up all your reeds, one after another, and strow a little composition at the bottom of all the troughs under the reeds, and then tie them gently down against next strow composition upon the upper part of the reeds throughout the fire-room; and upon the said composition lay double quick-match upon all the reeds, in all the troughs: the remainder of the composition strow over all the fire-room, and then lay your bavins loose.

Cast off all the covers of the fire-barrels, and hang the quick-match loose over their sides, and place leaders

(A) The iron-chambers are ten inches long, and 3.5 in diameter. They are breeched against a piece of wood fixed across the ports, and let into another a little higher. When loaded, they are almost filled with corn-powder, and have a wooden tomion well driven into their muzzles. They are primed with a small piece of quick-match thrust through their vents into the powder, with a part of it hanging out. When the ports are blown open by means of the iron-chambers, the port-lids either fall downward, or are carried away by the explosion.

(B) The fire-barrels ought to be of a cylindrical form, as most suitable to contain the reeds with which they are filled, and more convenient for stowing them between the troughs in the fire-room. Their inside chambers should not be less than 27 inches, and 30 inches is sufficient for their length. The bottom parts are first well fored with short double-dipped reeds placed upright; and the remaining vacancy is filled with fire-barrel composition, well mixed and melted, and then poured over them. The composition used for this purpose is a mass of sulphur, pitch, tar, and tallow.

There are five holes, of three-fourths inch in diameter, and three inches deep, formed in the top of the composition while it is yet warm; one being in the centre, and the other four at equal distances round the sides of the barrel. When the composition is cold and hard, the barrel is primed by filling those holes with fuse-composition, which is firmly driven into them, so as to leave a little vacancy at the top to admit a strand of quick-match twice doubled. The centre-hole contains two strands at their whole length, and every strand must be driven home with mealed powder. The loose ends of the quick-match being then laid within the barrel, the whole is covered with a dipped curtain, fastened on with a hoop that slips over the head of the barrel, to which it is nailed.

The barrels should be made very strong, not only to support the weight of the composition before firing, when they are moved or carried from place to place, but to keep them together whilst burning: for if the flaves are too light and thin, so as to burn very soon, the remaining composition will tumble out and be dissipated, and the intention of the barrels, to carry the flame aloft, will accordingly be frustrated.

The curtain is a piece of coarse canvas, nearly a yard in breadth and length, thickened with melted composition, and covered with saw-dust on both sides.

(C) The reeds are made up in small bundles of about a foot in circumference, cut even at both ends, and tied together in two places. They are distinguished into two kinds, viz. the long and short: the former of which are four feet, and the latter two feet five inches in length. One part of them are singly dipped, i. e. at one end: the rest are dipped at both ends in a Kettle of melted composition. After being immersed about seven or eight inches in this preparation, and then drained, they are sprinkled over with pulverised sulphur upon a tanned hide.

(D) The bavins are made of birch, heath, or other brush-wood, which is tough and readily kindled. They are usually two or three feet in length, and have all their bush-ends lying one way, the other ends being tied together with small cords. They are dipped in composition at the bush-ends, whose branches are afterwards confined by the hand, to prevent them from breaking off by moving about; and also to make them burn more fiercely. After being dipped in the same manner as the reeds, they also are sprinkled with sulphur.

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ers of quick-match from the reeds into the barrels, and from thence into the vent of the chambers, in such a manner as to be certain of their blowing open the ports, and setting fire to the barrels. Two troughs of communication from each door of the fire-room to the fall-ports, must be laid with a strong leader of quick-match, four or five times double: also a cross-piece to go from the fall-port, when the ship is fired, to the communication trough, laid with leaders of quick-match, that the fire may be communicated in both sides at once.

What quick-match is left place so that the fire may be communicated to all parts of the room at once, especially about the ports and fire-barrels, and see that the chambers are well and fresh primed. [N.B. The port-fire used for firing the ship, burns about 12 minutes. Great care must be taken to have no powder on board when the ship is fired.]

The sheer-hooks (represented by fig. 2.) are fitted so as to fasten on the yard-arms of the fire-ship, where they hook the enemy's rigging. The fire-grapplings, (fig. 3.) are either fixed on the yard-arms, or thrown by hand, having a chain to confine the ships together, or fasten those instruments wherever necessary.

When the commanding officer of a fleet displays the signal to prepare for action, the fire-ships fix their sheer-hooks, and dispose their grapplings in readiness. The battle being begun, they proceed immediately to prime, and prepare their fire-works. When they are ready for grappling, they inform the admiral thereof by a particular signal.

To avoid being disabled by the enemy's cannon during a general engagement, the fire-ships continue sufficiently distant from their line of battle, either to windward or to leeward.

They cautiously shun the openings or intervals of the line, where they would be directly exposed to the enemy's fire, from which they are covered by lying on the opposite side of their own ships. They are attentively to observe the signals of the admiral, or his seconds, in order to put their designs immediately in execution.

Although no ship of the line should be previously appointed to protect any fire-ship, except a few of the smallest particularly declined to this service, yet the ship before whom the passes in order to approach the enemy, should escort her thither, and assist her with an armed boat, or whatever succour may be necessary in her situation.

The captain of the fire-ship should himself be particularly attentive that the above instructions are punctually executed, and that the yards may be so braced when he falls along-side of the ship intended to be destroyed, that the sheer-hooks and grapplings fastened to the yard-arms, &c. may effectually hook the enemy. He is expected to be the last person who quits the vessel; and being furnished with every necessary assistance and support, his reputation will greatly depend on the success of his enterprise.

Fire from Cold Liquors. See CHEMISTRY, n° 219.

Lambent Fires, as the shining of meat at certain seasons, the luminousness of the sea, of insects, vapours, &c. See the articles LIGHT, PHOLAS, MEDUSA, NEREIS, FIRE-FLIES, GLOW-WORM, &c.

Port-Fire. See PORT-Fire.

Spur-Fire. See SPUR-Fire.

FIRING-IRON, in farriery, an instrument not unlike the blade of a knife; which being made red-hot, is applied to a horse's hams, or other places standing in need of it, as in preternatural swellings, farcy, knots, &c. in order to discuss them.

FIRKIN, an English measure of capacity for things liquid, being the fourth part of the barrel: it contains eight gallons of ale, soap, or herrings; and nine gallons of beer. See MEASURE and BARREL.

FIRLOT, a dry measure used in Scotland. The oat-firLOT contains $21\frac{3}{4}$ pints of that country; the wheat-firLOT contains about 2211 cubical inches; and the barley-firLOT, 31 standard-pints. Hence it appears that the Scotch wheat-firLOT exceeds the English bushel by 33 cubical inches.

FIRMAMENT, in the Ptolemaic astronomy, the eighth heaven or sphere, with respect to the seven spheres of the planets which it surrounds. It is supposed to have two motions: a diurnal motion, given to it by the primum mobile, from east to west, about the poles of the ecliptic; and another opposite motion from west to east: which last it finishes, according to Tycho, in 25412 years, according to Ptolemy in 36000, and according to Copernicus in 25800, in which time the fixed stars return to the same points in which they were at the beginning. This period is commonly called the *Platonic year*, or the *great year*.

FIRMAMENT is also used, in divers places of scripture, to denote the middle region of the air.

FIRMAN is a passport or permit granted by the great mogul to foreign vessels, to trade within the territories of his jurisdiction.

FIRMICUS MATERNUS (Julius), a famous writer, who composed in Latin, about the year 345, an excellent book in defence of Christianity, entitled *De errore profanarum religionum*, which is printed with the notes of John Wouwer. There are also attributed to him eight books of astronomy, printed by Aldus Manutius in 1501; but this last work appears to have been written by another Julius Firmicus, who lived at the same time.

FIRMNESS, denotes the consistence of a body, or that state wherein its sensible parts cohere in such a manner that the motion of one part induces a motion in the rest.

FIRMIN (Thomas), an eminent citizen of London, born in 1632, who distinguished himself by his public benefactions and extensive charities, as also by some opinions contrary to the received doctrine of the Trinity. The plague in 1665, the great conflagration in 1666, with the arrival of the French protestants in 1680 and 1681, all furnished him with great opportunities of exerting his benevolent disposition. He died in 1697; and was buried in the cloisters of Christ's hospital, where his virtues are recorded in a monumental inscription.

FIRST-FRUITS, (*primities*,) among the Hebrews, were oblations of part of the fruits of the harvest, offered to God as an acknowledgement of his sovereign dominion. The first of these fruits was offered in the name of the whole nation, being either two loaves of bread, or a sheaf of barley which was threshed in the court of the temple. Every private person was obliged to bring his first-fruits to the temple; and these

Fire
Firft.

confisted.

consisted of wheat, barley, grapes, figs, apricots, olives, and dates.

There was another sort of first-fruits which were paid to God. When bread was kneaded in a family, a portion of it was set apart, and given to the priest or Levite who dwelt in the place: if there was no priest or Levite there, it was call into the oven, and consumed by the fire. These offerings made a considerable part of the revenues of the Hebrew priesthood.

First-fruits are frequently mentioned in ancient Christian writers as one part of the church-revenue. One of the councils of Carthage enjoins, that they should consist only of grapes and corn; which shews, that this was the practice of the African church.

FIRST-Fruits, in the church of England, are the profits of every spiritual benefice for the first year, according to the valuation thereof in the king's books.

FISCUS, *FISCUS*, in the civil law, the treasury of a prince, or state; or that to which all things due to the public do fall. The word is derived from the Greek *πικτωρ*, a great basket, used when they went to market.—By the civil law, none but a sovereign prince has a right to have a fisc or public treasury.

At Rome, under the emperors, the term *erarium* was used for the revenues destined for support of the charges of the empire; and *fiscus* for those of the emperor's own family. The treasury, in effect, belonged to the people, and the *fiscus* to the prince.

FISCAL, in the civil law, something relating to the pecuniary interest of the prince or people. The officers appointed for the management of the fisc, were called *procuratores fisci*, and *advocati fisci*; and among the cases enumerated in the constitutions of the empire where it was their business to plead, one is against those who have been condemned to pay a fine to the fisc on account of their litigiousness, or frivolous appeals.

FISH, in natural history, an animal that lives in the waters as the natural place of its abode.

The most general division of fishes is into *fresh* and *salt* water ones. Some, however, are of opinion, that all fishes naturally inhabit the salt-waters, and that they have mounted up into rivers only by accident. A few species only swim up into the rivers to deposit their spawn; but by far the greatest number keep in the sea, and would soon expire in fresh water. There are about 400 species of fishes (according to Linnæus) of which we know something; but the unknown ones are supposed to be many more; and as they are thought to lie in great depths of the sea remote from land, it is probable that many species will remain for ever unknown.

Naturalists observe an exceeding great degree of wisdom in the structure of fishes, and in their conformation to the element in which they are to live. Most of them have the same external form, sharp at either end, and swelling in the middle, by which they are enabled to traverse the fluid in which they reside with greater velocity and ease. This shape is in some measure imitated by men in those vessels which they design to sail with the greatest swiftness; but the progress of the swiftest sailing ship is far inferior to that of fishes. Any of the large fishes overtake a ship in full sail with the greatest ease, play round it as though it did not move at all, and can get before it at pleasure.

The chief instruments of a fish's motion have been supposed to be the fins; which in some are much more numerous than in others. A fish completely fitted for swimming with rapidity, is generally furnished with two pair of fins on the sides, and three single ones, two above, and one below. But it does not always happen that the fish which has the greatest number of fins, is the swiftest swimmer. The shark is thought to be one of the swiftest fishes, and yet it has no fins on its belly; the haddock seems to be more completely fitted for motion, and yet does not move so swiftly. It is even observable, that some fishes which have no fins at all, such as lobsters, dart forward with prodigious rapidity, by means of their tail; and the instrument of progressive motion, in all fishes, is now found to be the tail. The great use of the fins is to keep the body in *equilibrium*; and if the fins are cut off, the fish can still swim; but will turn upon its sides or its back, without being able to keep itself in an erect posture as before. If the fish desires to turn, a blow from the tail sends it about in an instant; but if the tail strikes both ways, then the motion is progressive.

All fishes are furnished with a slimy, glutinous matter, which defends their bodies from the immediate contact of the surrounding fluid, and which likewise, in all probability, assists their motion through the water. Beneath this, in many kinds, is found a strong covering of scales; which, like a coat of mail, defends it still more powerfully; and, under that, before we come to the muscular parts of the body, lies an oily substance, which also tends to preserve the requisite warmth and vigour.

By many naturalists fishes are considered as of a nature very much inferior to land-animals, whether beasts or birds. Their sense of feeling, it is thought, must be very obscure on account of the scaly coat of mail in which they are wrapped up. The sense of smelling also, it is said, they can have only in a very small degree. All fishes, indeed, have one or more nostrils; and even those that have not the holes perceptible without, yet have the bones within, properly formed for smelling. But as the air is the only medium we know proper for the distribution of odours, it cannot be supposed that these animals which reside constantly in the water can be affected by them. As to tasting, they seem to make very little distinction. The palate of most fishes is hard and boney, and consequently incapable of the powers of relishing different substances; and accordingly these voracious animals have often been observed to swallow the fisherman's plummet instead of the bait. Hearing is generally thought to be totally deficient in fishes, notwithstanding the discoveries of some anatomists who pretend to have found out the bones designed for the organ of hearing in their heads. They have no voice, it is said, to communicate with each other, and consequently have no need of an organ for hearing. Sight seems to be that sense of which they are possessed in the greatest degree; and yet even this seems obscure, if we compare it with that of other animals. The eye, in almost all fishes, is covered with the same transparent skin which covers the rest of the head, and which probably serves to defend it in the water, as they are without eyelids. The globe is more depressed anteriorly, and is furnished behind with a muscle which serves to lengthen or flatten it.

Fish.

it as there is occasion. The crystalline humour, which in quadrupeds is flat, and of the shape of a button-mould, or like a very convex lens, in fishes is quite round, or sometimes oblong like an egg. Hence it is thought that fishes are extremely near-sighted; and that, even in the water, they can perceive objects only at a very small distance. Hence, say they, it is evident how far fishes are below terrestrial animals in their sensations, and consequently in their enjoyments. Even their brain, which is by some supposed to be of a size with every creature's understanding, shews that fishes are very much inferior to birds in this respect.

Objections
to these
arguments.

Others argue differently with regard to the nature of fishes.—With respect to the sense of feeling, say they, it cannot be justly argued that fishes are deficient, merely because they are covered with scales, as it is possible these scales may be endued with as great a power of sensation as we can imagine. The sense of feeling is not properly connected with *sensibility* in any organ, more than with *hardness* in it. A similar argument may be used with regard to smelling; for though we do not know how smells can be propagated in water, that is by no means a proof that they are not so. On the contrary, as water is found to be capable of absorbing putrid effluvia from the air*, nothing is more probable than that these putrid effluvia, when mixed with the water, would affect the olfactory organs of fishes, as well as they affect ours when mixed with the air.—With regard to taste, it certainly appears, that fishes are able to distinguish their proper food from what is improper, as well as other animals. Indeed, no voracious animal seems to be endued with much sensibility in this respect; nor would it probably be consistent with that way of promiscuously devouring every creature that comes within its reach, without which these kinds of animals could not subsist.

* See Air,
no 29.

With respect to the hearing of fishes, it is urged, that, when, they, kept in a pond may be made to answer at the call of a whistle or the ringing of a bell; and they will even be terrified at any sudden and violent noise, such as thunder, the firing of guns, &c. and shrink to the bottom of the water. Among the ancients, many were of opinion that fishes had the sense of hearing, though they were by no means satisfied about the ways or passages by which they heard. Placentini afterwards discovered some bones in the head of the pike, which had very much the appearance of being organs of hearing, though he could never discover any external passages to them. Klein affirmed, from his own experiments and observations, that all fishes have the organs of Hearing; and have also passages from without to these organs, though in many species they are difficult to be seen; and that even the most minute and obscure of these are capable of communicating a tremulous motion to those organs, from sounds issuing from without. This is likewise asserted by M. Geoffroy†, who gives a particular description of the organs of hearing belonging to several species. These organs are a set of little bones extremely hard, and white, like fine porcelain, which are to be found in the heads of all fishes: The external auditory passages are very small; being scarce sufficient to admit a hog's bristle; though with care they may be distinguished in almost all fishes. It can by no means

† Dissertation
sur l'
organe de
l'ouïe, p. 97,
et seq.

Fish.

be thought that the water is an improper medium of sound, seeing daily experience shews us that sounds may be conveyed not only through water, but through the most solid bodies‡. It seems indeed very difficult to determine the matter by experiment. Mr Gouan, who kept some gold-fishes in a vase, informs us, that whatever noise he made, he could neither terrify nor disturb them; he halloo'd as loud as he could, putting a piece of paper between his mouth and the water, to prevent the vibrations from affecting the surface, and the fishes still seemed insensible: but when the paper was removed, and the sound had its full effect on the water, the case was then altered, and the fishes instantly sunk to the bottom. This experiment, however, or others similar to it, cannot prove that the fishes did not hear the sounds before the paper was removed; it only shews that they were not alarmed till a sensible vibration was introduced into the water. The call of a whistle may also be supposed to affect the water in a fish-pond with a vibratory motion: but this certainly must be very obscure; and if fishes can be assembled in this manner when no person is in sight, it amounts to a demonstration that they actually do hear.

The arguments used against the sight of fishes are the weakest of all. Many instances which daily occur, shew that fishes have a very acute sight, not only of objects in the water, but of those in the air. Their jumping out of the water in order to catch flies is an abundant proof of this; and this they will continue to do in a fine summer-evening, even after it is so dark that we cannot distinguish the insects they attempt to catch.

Though fishes are formed for living entirely in the water, yet they cannot subsist without air. On this subject Mr Hawkebee made several experiments, which are recorded in the Philosophical Transactions. The fishes he employed were gudgeons; a species that are very lively in the water, and can live a considerable time out of it. Three of them were put into a glass vessel with about three pints of fresh water, which was designed as a standard to compare the others by. Into another glass, to a like quantity of water, were put three more gudgeons, and thus the water filled the glass to the very brim. Upon this he screwed down a brass-plate with a leather below, to prevent any communication between the water and the external air; and, that it might the better resemble a pond frozen over, he suffered as little air as possible to remain on the surface of the water. A third glass had the same quantity of water put into it; which, first by boiling, and then by continuing it a whole night in *vacuo*, was purged of its air as well as possible; and into this also were put three gudgeons. In about half an hour, the fishes in the water from whence the air had been exhausted, began to discover some signs of uneasiness by a more than ordinary motion in their mouths and gills. Those who had no communication with the external air, would at this time also frequently ascend to the top, and suddenly swim down again: and in this state they continued for a considerable time, without any sensible alteration. About five hours after this observation, the fishes in the exhausted water were not so active as before, upon shaking the glass which contained them. In three hours more, the included fishes

† See
Acoustics.

Fishes can
not live
without air.

Fish.

lay all at the bottom of the glafs with their bellies upwards; nor could they be made to shake their fins or tail by any motion given to the glafs. They had a motion with their mouths, however, which fhewed that they were not perfectly dead. On uncovering the vefel which contained them, they revived in two or three hours, and were perfectly well next morning; at which time thofe in the exhaufted water were alfo recovered. The vefel containing thefe laft being put under the receiver of an air-pump, and the air exhaufted, they all infantly died. They continued at top while the air remained exhaufted, but funk to the bottom on the admiffion of the atmofphere.

The ufe of air to fifhes is very difficult to be explained; and indeed their method of obtaining the fupply of which they ftand constantly in need, is not eafily accounted for. The motion of the gills in fifhes is certainly analogous to our breathing, and feems to be the operation by which they feparate the air from the water. Their manner of breathing is as follows. The fifh firft takes a quantity of water by the mouth, which is driven to the gills; thefe clofe, and keep the water which is fwallowed from returning by the mouth; while the bony covering of the gills prevents it from going through them till the animal has drawn the proper quantity of air from it: then the bony covers open, and give it a free paffage; by which means alfo the gills are again opened, and admit a frefh quantity of water. If the fifh is prevented from the free play of its gills, itfoon falls into convulfions, and dies. But though this is a pretty plaufible explanation of the refpiration of fifhes, it remains a difficulty not eafily folved, what is done with this air. There feems to be no receptacle for containing it, except the air-bladder, or fwim; which, by the generality of modern philofophers, is defined not to anfwer any vital purpofe, but only to enable the fifh to rife or funk at pleafure.

6
Motion of the gills of fifhes analogous to our breathing.

7
Of the ufe of the air-bladder in fifhes.

The air-bladder is a bag filled with air, compofed fometimes of one, fometimes of two, and fometimes of three divifions, fituated towards the back of the fifh, and opening into the maw or the gullet. The ufe of this in raifing or depressing the fifh, is proved by the following experiment. A carp being put into the air-pump, and the air exhaufted, the bladder is faid to burft by the expansion of the air contained in it; after which, the fifh can no more rife to the top, but ever afterwards crawls at the bottom. The fame thing alfo happens when the air-bladder is pricked or wounded in fuch a manner as to let the air out; in thefe cafes alfo the fifh continues at the bottom, without a poffibility of rifing to the top. From this it is inferred, that the ufe of the air-bladder is, by fwelling at the will of the animal, to increafe the furface of the fifh's body, and thence diminifhing its fpecific gravity, to enable it to rife to the top of the water, and to keep there at pleafure. On the contrary, when the fifh wants to defend, it is thought to contract the air-bladder; and being thus rendered fpecifically heavier, it descends to the bottom.

The ancients were of opinion, that the air-bladder in fifhes ferved for fome purpofes effentially neceffary to life; and Dr Priettley alfo conjectures, that the raifing or depressing the fifh is not the only ufe of thefe air-bladders, but that they alfo may ferve fome other

purpofes in the economy of fifhes. There are many arguments indeed to be ufed on this fide of the queftion: the moft conclufive of which is, that all the cartilaginous kind of fifhes want air-bladders, and yet they rife to the top, or funk to the bottom, of the water, without any difficulty; and though moft of the eel-kind have air-bladders, yet they cannot raife themfelves in the water without great difficulty.

Fifhes are remarkable for their longevity. "Moft of the diforders incident to mankind (fays Bacon) arife from the changes and alterations in the atmofphere; but fifhes refide in an element little fubject to change: theirs is a uniform exiftence; their movements are without effort, and their life without labour. Their bones, alfo, which are united by cartilages, admit of indefinite extension; and the different fizes of animals of the fame kind among fifhes, is very various. They ftill keep growing: their bodies, inftead of fuffering the rigidity of age, which is the caufe of the natural decay of land-animals, ftill continue increafing with frefh fupplies; and as the body grows, the conduits of life furnifh their ftores in greater abundance. How long a fifh, that feems to have fcarce any bounds put to its growth, continues to live, is not afcertained; perhaps the life of a man would be not fufficient to meafure that of the fmalleft."—There have been two methods fallen upon for determining the age of fifhes; the one is by the circles of the fcales, the other by the tranfverfe fection of the back bone. When a fifh's fcale is examined by a microfcope, it is found to confift of a number of circles one within another, in fome meafure refembling thofe which appear on the tranfverfe fection of a tree, and is fuppofed to give the fame information. For, as in trees we can tell their age by the number of their circles; fo, in fifhes, we can tell theirs by the number of circles in every fcale, reckoning one ring for every year of the animal's exiftence.—The age of fifhes that want fcales may be known by the other method, namely, by feparating the joints of the back-bone, and then minutely obferving the number of rings which the furface, where it was joined, exhibits.

8
Longevity of fifhes.

9
Methods of determining their age.

Fifhes are, in general, the moft voracious animals in nature. In moft of them, the maw is placed next the mouth; and, though poffeffed of no fenfible heat, is endowed with a very furprizing faculty of digeftion. Its digeftive power feems, in fome meafure, to increafe in proportion to the quantity of food with which the fifh is fupplied. A fingle pike has been known to devour 100 roaches in three days. Whatever is poffeffed of life, feems to be the moft defirable prey for fifhes. Some, that have very fmall mouths, feed upon worms, and the fpawn of other fifh: others, whofe mouths are larger, feek larger prey; it matters not of what kind, whether of their own fpecies, or any other. Thofe with the largeft mouths purfue almoft every thing that hath life; and often meeting each other in fierce oppofition, the fifh with the largeft fwallow comes off with the victory, and devours its antagonist.—As a counterbalance to this great voracity, however, fifhes are incredibly prolific. Some bring forth their young alive, others produce only eggs: the former are rather the leaft fruitful; yet even thefe produce in great abundance. The viviparous blenny, for inftance, brings forth 200 or 300 at a time. Thofe which produce eggs, which they are obliged to leave to chance, either

10
Extreme voracity of fifhes.

11
Their amazing increafe.

Fishes.

ther on the bottom where the water is shallow, or floating on the surface where it is deeper, are all much more prolific, and seem to proportion their stock to the danger there is of consumption.—Lewenhoeck assures us, that the cod spawns above nine millions in a season. The flounder commonly produces above one million, and the mackarel above 500,000. Scarce one in 100 of these eggs, however, brings forth an animal: they are devoured by all the lesser fry that frequent the shores, by water-fowl in shallow waters, and by the larger fishes in deep waters. Such a prodigious increase, if permitted to come to maturity, would overstock nature; even the ocean itself would not be able to contain, much less provide for, one half of its inhabitants. But two wise purposes are answered by this amazing increase: it preserves the species in the midst of numberless enemies, and serves to furnish the rest with a sustenance adapted to their nature.

With respect to the generation of many kinds of fishes, the common opinion is, that the female deposits her spawn or eggs, and that the male afterwards ejects his sperm or male semen upon it in the water. The want of the organs of generation in fishes, gives an apparent probability to this; but it is strenuously opposed by Linnæus. He affirms, that there can be no possibility of impregnating the eggs of any animal out of its body. To confirm this, the general course of nature, not only in birds, quadrupeds, and insects, but even in the vegetable world, has been called in to his assistance, as proving that all impregnation is performed while the egg is in the body of its parent: and he supplies the want of the organs of generation by a very strange process, affirming, that the males eject their semen always some days before the females deposit their ova or spawn; and that the females swallow this, and thus have their eggs impregnated with it. He says, that he has frequently seen, at this time, three or four females gathered about a male, and greedily snatching up into their mouths the semen he ejects. He mentions some of the eeloes, some perch, and some of the cyprini, in which he had seen this process.

Many opinions have been started in order to account how it happens that fishes are found in pools, and ditches, on high mountains, and elsewhere. But Gmelin observes, that the duck-kind swallow the eggs of fishes; and that some of these eggs go down, and come out of their bodies unhurt, and so are propagated just in the same manner as has been observed of plants.

As to the *Division of Fishes*, see ZOOLOGY, n° 10.

Breeding of Fishes may be turned to great advantage; for, besides furnishing the table, obliging one's friends, and raising money, the land will be thereby greatly improved, so as to yield more this way than by any other employment whatever. See FISH-POND, *infra*; and BREEDING of Fish.

Feeding of Fishes. When they are fed in large pools or ponds, either malt boiled, or fresh grains, is the best food; thus carps may be raised and fed like capons, and tenches will feed as well. The care of feeding them is best committed to a gardener or the butler, who should be always at hand. When fed in a stew, any sort of grain boiled, especially peas, and malt coarsely ground, are proper food; also the grains after brewing, while fresh and sweet; but one bushel

of malt not brewed, will go as far as of grains.

Fish and Fijbing, as regulated by law. No fisherman shall use any net or engine for destroying the fry of fishes; and persons using nets for that purpose, or taking salmon or trout out of season, or any fish under certain lengths, are liable to forfeit 20s. and justices of peace, and lords of leets, have power to put the acts in force. See 1 *Edw. c. 17*. 3 *Jac. I. c. 12*. 30 *Geo. II. c. 21*. & *post*. No person may fatten nets, &c. across rivers to destroy fish, and disturb the passage of vessels, on pain of 5*l.* *stat. 2. Hen. VI. c. 15*. None shall fish in any pond or moat, &c. without the owner's licence, on pain of three months imprisonment; 31 *Hen. VIII. c. 2*. And no person shall take any fish in any river, without the consent of the owner, under the penalty of 10*s.* for the use of the poor, and treble damage to the party aggrieved, leviable by distress of goods; and for want of distress, the offender is to be committed to the house of correction for a month: also nets, angles, &c. of poachers, may be seized by the owners of rivers, or by any persons by warrant from a justice of peace, &c. 22 & 23 *Car. II. c. 25*. 4 & 5 *W. & M. c. 23*. The *stat. 4 & 5 Ann. c. 21*. was made for the increase and preservation of salmon in rivers in the counties of Southampton and Wilts; requiring that no salmon be taken between the first of August and 12th of November, or under size, &c. And, by 1 *Geo. I. c. 18*. salmon taken in the rivers Severn, Dee, Wye, Were, Ouse, &c. are to be 18 inches long at least, or the persons catching them shall forfeit 5*l.* And sea-fish sold must be of the lengths following; *viz.* bret and turbot, 16 inches; brill and pearl, 14; codlin, bass, and mullet, 12; sole and plaice, 8; flounders, 7; whiting, 6 inches long, &c. on pain of forfeiting 20*s.* to the poor, and the fish. *Vide* the Statute. Persons importing any fish contrary to *stat. 1 Geo. I. c. 18*. for better preventing fresh fish taken by foreigners from being imported into this kingdom, &c. shall forfeit 100*l.* to be recovered in the court at Westminster; one moiety to informers, and the other to the poor; and masters of smacks, hoys, boats, &c. in which the fish shall be imported, or brought on shore, forfeit 50*l.* Also selling the same in England, liable to 20*l.* penalty; *Stat. 9 Geo. II. c. 33*.

By the *stat. 22 Geo. II. c. 49*. contracts for the buying fish (except fresh salmon, or soles brought by land-carriage, oysters, or salt or dried fish) to be sold by retail before the same are brought to market, and exposed to sale, are declared void; and each party contracting shall forfeit 50*l.* And fishermen not selling their fish within eight days after their arrival on the coast between North Yarmouth and Dover, shall forfeit the cargo, vessel, and tackle, &c. And sea-fish, under the dimensions prohibited by the *stat. 1 Geo. I.* may be exposed to sale, provided they are taken with a hook, and so not capable of being preserved alive. But see *stat. 35 Geo. II. c. 27*. made to regulate the sale of fish at the first hand in the fishmarkets in London and Westminster; and to prevent salemen of fish buying fish to sell again on their own account; and to allow bret, cod, turbot, brill, and pearl, although under the respective dimensions mentioned in 1 *Geo. I. c. 18*. to be imported and sold; and to punish persons who shall take or sell any spawn, brood, or fry of fish, unfizeable fish, or fish out of season, or smelts under the

Fishes.

12
Generation
of fishes.

size of five inches. By this act, every master of a vessel is to give a true account of the several sorts of fish brought alive to the *Nore* in his vessel; and if, after such arrival, he shall wilfully destroy or throw away any of the said fish, not being unwholesome or unmarketable, &c. he is liable to be committed to the house of correction, and kept to hard labour, for any time not exceeding two months, nor less than one. And see farther, 2 *Geo.* III. c. 15. for the better supplying the citizens of London and Westminster with fish, and to reduce the exorbitant price thereof, and to protect and encourage fishermen.

Preserving of Fish for Cabinets. Linnæus's method is, to expose them to the air; and when they acquire such a degree of putrefaction that the skin loses its cohesion to the body of the fish, it may be slid off almost like a glove: the two sides of this skin may then be dried upon paper like a plant, or one of the sides may be filled with plaster of Paris to give the subject a due plumpness.

A fish may be prepared, after it has acquired this degree of putrefaction, by making a longitudinal incision on the belly, and carefully dissecting the fleshy part from the skin, which are but slightly attached to it in consequence of the putrefecency. The skin is then to be filled with cotton and the antiseptic powder as directed for birds; and, lastly, to be sewed up where the incision was made. See *Methods of Preserving Birds*.

Gilding on Fish. In the posthumous papers of Mr Hooke, a method is described of gilding live craw-fish, carps, &c. without injuring the fish. The cement for this purpose is prepared, by putting some burgundy-pitch into a new earthen pot, and warming the vessel till it receives so much of the pitch as will flick round it; then strewing some finely-powdered amber over the pitch when growing cold, adding a mixture of three pounds of linseed oil and one of oil of turpentine, covering the vessel, and boiling them for an hour over a gentle fire, and grinding the mixture, as it is wanted, with so much pumice-stone in fine powder as will reduce it to the consistence of paint. The fish being wiped dry, the mixture is spread upon it; and the gold-leaf being then laid on, and gently pressed down, the fish may be immediately put into water again, without any danger of the gold coming off, for the matter quickly grows firm in water.

Fish, in a ship, a plank or piece of timber, fastened to a ship's mast or yard, to strengthen it; which is done by nailing it on with iron spikes, and winding ropes hard about them.

Fishes, in heraldry, are the emblems of silence and watchfulness; and are borne either upright, imbowed, extended, endorsed respecting each other, surmounting one another, fretted, &c.

In blazoning fishes, those borne feeding, should be termed *devouring*; all fishes borne upright and having fins, should be blazoned *auriant*; and those borne transverse the escutcheon, must be termed *naïant*.

Fish-Ponds, those made for the breeding or feeding of fish.

Fish-ponds are no small improvement of watery and boggy lands, many of which are fit for no other use. In making of a pond, its head should be at the lowest part of the ground, that the trench of the flood-gate or

sluice, having a good fall, may not be too long in emptying. The best way of making the head secure, is to drive in two or three rows of stakes above six feet long, at about four feet distance from each other, the whole length of the pond-head, whereof the first row should be rammed at least about four feet deep. If the bottom is false, the foundation may be laid with quicklime; which slaking, will make it as hard as a stone. Some lay a layer of lime, and another of earth dug out of the pond, among the piles and stakes; and when these are well covered, drive in others as they see occasion, ramming in the earth as before, till the pond-head be of the height designed.

The dam should be made sloping on each side, leaving a waste to carry off the over-abundance of water in times of floods or rains; and as to the depth of the pond, the deepest part need not exceed six feet, rising gradually in shoals towards the sides, for the fish to sun themselves, and lay their spawn. Gravelly and sandy bottoms, especially the latter, are best for breeding; and a fat soil with a white fat water, as the washings of hills, commons, streets, sinks, &c. is best for fattening all sorts of fish. For storing a pond, carp is to be preferred for its goodness, quick growth, and great increase, as breeding five or six times a-year. A pond of an acre, if it be a feeding and not breeding one, will every year feed 200 carps of three years old, 300 of two years old, and 400 of a year old. Carps delight in ponds that have marle or clay bottoms, with plenty of weeds and grass, whereon they feed in the hot months.

Ponds should be drained every three or four years, and the fish sorted. In breeding ones, the smaller ones are to be taken out, to store other ponds with; leaving a good stock of females, at least eight or nine years old, as they never breed before that age. In feeding ponds, it is best to keep them pretty near of a size. See *BREEDING OF FISH*.

FISHER (John), bishop of Rochester; was born at Beverly in Yorkshire, in the year 1459, and educated in the collegiate church of that place. In 1484, he removed to Michael-house in Cambridge, of which college he was elected master in the year 1495. Having applied himself to the study of divinity, he took orders; and, becoming eminent as a divine, attracted the notice of Margaret, countess of Richmond, mother of Henry VII. who made him her chaplain and confessor. In 1501, he took the degree of doctor of divinity, and the same year was elected chancellor of the university. In the year following, he was appointed Lady Margaret's first divinity-professor; and, in 1504, consecrated bishop of Rochester; which small bishopric he would never resign, though he was offered both Ely and Lincoln. It is generally allowed, that the foundation of the two colleges of Christ-church and St John's, in Cambridge, was entirely owing to bishop Fisher's persuasion, and influence with the countess of Richmond: he not only formed the design, but superintended the execution. On the promulgation of Martin Luther's doctrine, our bishop was the first to enter the lists against him. On this occasion he exerted all his influence, and is generally supposed to have written the famous book by which Henry VIII. obtained the title of *Defender of the Faith*. Hitherto he continued in favour with the king; but in 1527, opposing his dis-

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voice, and denying his supremacy, the implacable Harry determined, and finally effected, his destruction. In 1534, the parliament found him guilty of misprision of treason, for concealing certain prophetic speeches of a fanatical impostor, called the *Holy Maid of Kent*, relative to the king's death; and condemned him, with five others, in loss of goods, and imprisonment during his majesty's pleasure; but he was released on paying 300 l. for the king's use.

King Henry being now married to Anne Boleyn, his obsequious parliament took an oath of allegiance proper for the occasion. This oath the bishop of Rochester steadily refused; alleging, that his conscience could not be convinced that the king's first marriage was against the law of God. For refusing this oath of succession, he was attainted by the parliament of 1534; and committed to the Tower, where he was cruelly treated, and where he would probably have died a natural death, had not the pope created him a cardinal. The king, now positively determined on his destruction, sent Rich, the solicitor-general, under a pretence of consulting the bishop on a case of conscience, but really with a design to draw him into a conversation concerning the supremacy. The honest old bishop spoke his mind without suspicion or reserve, and an indictment and conviction of high-treason was the consequence. He was beheaded on Tower-hill, on the 22d of June 1535, in the 77th year of his age. Thus died this good old prelate; who, notwithstanding his inflexible enmity to the reformation, was undoubtedly a learned, pious, and honest man. He wrote several treatises against Luther, and other works, which were printed at Wurtzburgh, in 1597, in one volume folio.

FISHERY, a place where great numbers of fish are caught.

The principal fisheries for salmon, herring, mackrel, pilchards, &c. are along the coasts of Scotland, England, and Ireland; for cod, on the banks of Newfoundland; for whales, about Greenland; and for pearls, in the East and West Indies.

FISHERY, denotes also the commerce of fish, more particularly the catching them for sale.

Were we to enter into a very minute and particular consideration of fisheries, as at present established in this kingdom, this article would swell beyond its proper bounds; because, to do justice to a subject of such concernment to the British nation, requires a very ample and distinct discussion. We shall, however, observe, that since the Divine Providence hath so eminently stored the coasts of Great Britain and Ireland with the most valuable fish; and since fisheries, if successful, become permanent nurseries for breeding expert seamen; it is not only a duty we owe to the Supreme Being, not to despise the wonderful plenty he hath afforded us, by neglecting to extend this branch of commerce to the utmost; but it is a duty we owe to our country, for its natural security, which depends upon the strength of our royal navy. No nation can have a navy, where there is not a fund of business to breed and employ seamen without any expence to the public; and no trade is so well calculated for training up these useful members of this society, as fisheries.

The situation of the British coasts is the most advantageous in the world for catching fish: the Scottish

islands, particularly those to the north and west, lie most commodious for carrying on the fishing trade to perfection; for no country in Europe can pretend to come up to Scotland in the abundance of the finest fish, with which its various creeks, bays, rivers, lakes, and coasts, are replenished. King Charles I. was so sensible of the great advantage to be derived from fisheries, that he began the experiment, together with a company of merchants; but the civil wars soon occasioned that project to be set aside. King Charles II. made a like attempt; but his pressing wants made him withdraw what money he had employed that way, whereupon the merchants that joined with him did the same. Since the union, several attempts have been made to retrieve the fisheries, and a corporation settled to that effect, entitled the *Royal British Fishery*.

In the year 1750, the parliament of Great Britain taking the state of the fisheries into consideration, an act was passed for the encouragement of the white-herring fishery, granting a charter, whereby a corporation is created, to continue 21 years, by the name of the *Society of the Free British Fishery*, to be under the direction of a governor, president, vicepresident, council, &c. who are to continue in office the space of three years, with power to make bye-laws, &c. and to raise a capital of 500,000 l. by way of subscription. And any number of persons, who, in any part of Great Britain, shall subscribe 10,000 l. into the stock of this society, under the name of the *fishing-chamber*, and carry on the said fishery on their own account of profit and loss, shall be entitled to the same bounty allowed to the society. The bounty is 30s. the tun, to be paid yearly, for 14 years, besides 3 per cent. for the money advanced by each chamber. The act contains other proper regulations, relative to the nets, marks on the herring-barrels, number of hands, and the quantity of salt that is entitled to the bounty, &c. It is, then, by the encouragement given by this act, that we now see a laudable emulation prevailing over the two kingdoms, and fishing buffes fitted out from almost every port, in order to repair to the Shetland islands, where the herring-fishery is carried on with an ardor becoming so important a branch of trade. Scotland, which suffered incredibly from the neglect of this valuable and natural produce of the seas, has not been backward to join in a scheme that tends so evidently to its own advantage; for the cities of Edinburgh, Glasgow, the towns of Montrose, Dundee, Perth, Inverness, and some other boroughs, have raised the proper sum, and chambers have been erected in each of them; the gentlemen of estates adjoining to the respective places above-mentioned, liberally contributing with merchants, towards the prosecution of an undertaking so visibly tending to the good of their country in general.

Free FISHERY, in law, or an exclusive right of fishing in a public river, is a royal franchise; and is considered as such in all countries where the feudal polity has prevailed: though the making such grants, and by that means appropriating, what it seems unnatural to restrain, the use of running water, was prohibited for the future by king John's Great Charter; and the rivers that were fenced in his time were directed to be laid open, as well as the forests to be disforested. This

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opening was extended by the second and third charters of Henry III. to those also that were fenced under Richard I.; so that a franchise of free fishery ought now to be as old at least as the reign of Henry II. This differs from a *several* of piscary, because he that has a *several* fishery must also be the owner of the soil, which in a free-fishery is not requisite. It differs also from a *common* fishery, in that the free fishery is an exclusive right, the common fishery is not so; and therefore, in a free fishery, a man has a property in the fish before they are caught; in a common piscary, not till afterwards. Some indeed have considered a *free* fishery not as a royal franchise; but merely as a private grant of a liberty to fish in the *several* fishery of the grantor. But the considering such right as originally a flower of the prerogative, till restrained by Magna Charta, and derived by royal grant (previous to the reign of Richard I.) to such as now claim it by prescription, may remove some difficulties in respect to this matter with which our law-books are embarrassed.

Cod-FISHERY. There are two kinds of cod-fish; the one green or white cod, and the other dried or cured cod: tho' it is all the same fish, differently prepared; the former being sometimes salted and barrelled, then taken out for use; and the latter, having lain some competent time in salt, dried in the sun or smoke. We shall therefore speak of each of these apart; and first of the

Green-Cod FISHERY. The chief fisheries for green cod are in the bay of Canada, on the great bank of Newfoundland, and on the isle of St Peter, and the isle of Sable; to which places vessels resort from divers parts both of Europe and America. They are from 100 to 150 tons burden, and will catch between 30,000 and 40,000 cod each. The most essential part of the fishery is, to have a master who knows how to cut up the cod, one who is skilled to take off the head properly, and above all a good salter, on which the preserving of them, and consequently the success of the voyage, depends. The best season is from the beginning of February to the end of April; the fish, which in the winter retire to the deepest water, coming then on the banks, and fattening extremely. What is caught from March to June keeps well; but those taken in July, August, and September, when it is warm on the banks, are apt to spoil soon. Every fisher takes but one at a time: the most expert will take from 350 to 400 in a day; but that is the most, the weight of the fish and the great coldness on the bank fatiguing very much. As soon as the cod are caught, the head is taken off; they are opened, gutted, and salted; and the salter flows them in the bottom of the hold, head to tail, in beds a fathom or two square; laying layers of salt and fish alternately, but never mixing fish caught on different days. When they have lain thus three or four days to drain off the water, they are replaced in another part of the ship, and salted again; where they remain till the vessel is loaded. Sometimes they are cut in thick pieces, and put in barrels for the convenience of carriage.

Dry-Cod FISHERY. The principal fishery for this article is, from Cape Rose to the Bay des Exports, along the coast of Placentia, in which compass there are divers commodious ports for the fish to be dried in. These, though of the same kind with the fresh cod, are

much smaller, and therefore fitter to keep, as the salt penetrates more easily into them. The fishery of both is much alike; only this latter is most expensive, as it takes up more time, and employs more hands, and yet scarce half so much salt is spent in this as in the other. The bait is herrings, of which great quantities are taken on the coast of Placentia. When several vessels meet and intend to fish in the same port, he whose shallop first touches ground, becomes entitled to the quality and privileges of admiral: he has the choice of his station, and the refusal of all the wood on the coast at his arrival. As salt as the masters arrive, they unrig all their vessels, leaving nothing but the shrouds to sustain the masts; and in the mean time the mates provide a tent on shore, covered with branches of trees, and sails over them, with a scaffold of great trunks of pines, 12, 15, 16, and often 20 feet high, commonly from 40 to 60 feet long, and about one third as much in breadth. While the scaffold is preparing, the crew are a-fishing; and as salt as they catch, they bring their fish ashore, and open and salt them upon moveable benches; but the main salting is performed on the scaffold. When the fish have taken salt, they wash and hang them to drain on rails; when drained, they are laid on kinds of stages, which are small pieces of wood laid across, and covered with branches of trees, having the leaves stripped off for the passage of the air. On these stages, they are disposed, a fish thick, head against tail, with the back uppermost, and are turned carefully four times every 24 hours. When they begin to dry, they are laid in heaps ten or twelve thick, in order to retain their warmth; and every day the heaps are enlarged, till they become double their first bulk; then two heaps are joined together, which they turn every day as before: lastly, they are salted again, beginning with those first salted; and being laid in huge piles, they remain in that situation till they are carried on board the ships, where they are laid on the branches of trees disposed for that purpose, upon the ballast, and round the ship, with mats to prevent their contracting any moisture.

There are four kinds of commodities drawn from cod, *viz.* the zounds, the tongues, the roes, and the oil extracted from the liver. The first is salted at the fishery, together with the fish, and put in barrels from 600 to 700 pound. The tongues are done in like manner, and brought in barrels from 400 to 500 pounds. The roes are also salted in barrels, and serve to cast into the sea to draw fish together, and particularly pilchards. The oil comes in barrels, from 400 to 520 pounds, and is used in dressing leather.—In Scotland, they catch a small kind of cod on the coasts of Buchan, and all along the Murray frith on both sides; as also in the frith of Forth, Clyde, &c. which is much esteemed. They salt and dry them in the sun upon rocks, and sometimes in the chimney. They also cure skait, and other smaller fish in the same manner; but most of these are for home-consumption.

Herring FISHERY. For the migrations of herrings, and the directions of their course, see the article CLUPEA. Our great stations for this fishery are off the Shetland and Western Isles, and off the coast of Norfolk; in which the Dutch also share. There are two seasons for fishing herring: the first from June to the end of August; and the second in Autumn, when the

† See
Gadus.

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the fogs become very favourable for this kind of fishing. The Dutch begin their herring-fishing on the 24th of June, and employ a vast number of vessels therein, called *buffes*, being between 45 and 60 tons burden each, and carrying three or four small cannon. They never stir out of port without a convoy, unless there be enough together to make about 18 or 20 cannon among them, in which case they are allowed to go in company. Before they go out, they make a verbal agreement, which has the same force as if it were in writing. The regulations of the admiralty of Holland are partly followed by the French and other nations, and partly improved and augmented with new ones; as, that no fisher shall cast his net within 100 fathoms of another boat: that while the nets are cast, a light shall be kept on the hind-part of the vessel: that when a boat is by any accident obliged to leave off fishing, the light shall be cast into the sea: that when the greater part of a fleet leaves off fishing, and calls anchor, the rest shall do the same, &c.

* Hist. of
Commerce.

Mr Anderson * gives to the Scots a knowledge of great antiquity in the herring-fishery. He says that the Netherlanders resorted to these coasts as early as A.D. 836, to purchase salted fish of the natives; but, imposing on the strangers, they learned the art, and took up the trade, in after-times of such immense emolument to the Dutch.

Sir Walter Raleigh's observations on that head, extracted from the same author, are extremely worthy the attention of the curious, and excite reflections on the vast strength resulting from the wisdom of well applied industry.

In 1603, remarks that great man, the Dutch sold to different nations, as many herrings as amounted to L. 1,759,000 Sterling.

In the year 1615, they sent out once sent 2000 buffes, and employed in them 37,000 fishermen.

In the year 1618, they sent out 3000 ships, with 50,000 men to take the herrings, and 9000 more ships to transport and sell the fish; which by sea and land employed 150,000 men, besides those first mentioned. All this wealth was gotten on our coasts; while our attention was taken up in a distant whale-fishery.

The Scottish monarchs for a long time seemed to direct all their attention to the preservation of the salmon fishery; probably because their subjects were such novices in sea-affairs. At length James III. endeavoured to stimulate his great men to these patriotic undertakings; for by an act of his third parliament, he compelled "certain lords spiritual and temporal, and burrows, to make ships, buffes, and boats, with nets, and other pertinents, for fishing. That the same should be made in each burgh; in number according to the substance of each burgh, and the least of them to be of twenty tun: and that all idle men be compelled by the sheriffs in the country to go on board the same."

But his successors, by a very false policy, rendered this wise institution of little effect: for they in a manner prevented their subjects from becoming a maritime people, by directing that no white fish should be sent out of the realm, but that strangers may come and buy them; that free ports be first served; the cargoes sold to the freemen, who are to come and transport the same. The Dutch at this very time had an open trade.

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It is well known that there have been many attempts made to secure this treasure to ourselves, but without success. In the late reign, a very strong effort was made, and bounties allowed for the encouragement of British adventurers: the first was of 30s. per ton to every bus of 70 tons and upwards. This bounty was afterwards raised to 50s. per ton, to be paid to such adventurers as were entitled to it by claiming it at the places of rendezvous. The buffes are from 20 to 90 tons burden, but the best size is 80. A vessel of 80 tons ought to take ten lasts, or 120 barrels of herrings, to clear expences, the price of the fish to be admitted to be a guinea a barrel. A ship of this size ought to have 18 men, and three boats: one of 20 tons should have six men; and every five tons above, require an additional hand.

To every ton are 280 yards of nets; so a vessel of 80 tons carries 20,000 square yards: each net is 12 yards long, and 10 deep; and every boat takes out from 20 to 30 nets, and puts them together, so as to form a long train: they are sunk at each end of the train by a stone, which weighs it down to the full extent: the top is supported by buoys, made of sheepskin, with a hollow slick at the mouth, fastened tight; through this the fish is blown up, and then stopped with a peg, to prevent the escape of the air. Sometimes these buoys are placed at the top of the nets; at other times the nets are suffered to sink deeper, by the lengthening the cords fastened to them, every cord being for that purpose 10 or 12 fathoms long. But the best fisheries are generally in more shallow water.

Of the Scots fishery in the Western Isles, the following * *Voyage to the Hebrides*, account is given by Mr Pennant *. "The fishing is always performed in the night, unless by accident. The P. 329.

buffes remain at anchor, and send out their boats a little before sun-set; which continue out, in winter and summer, till day-light; often taking up and emptying their nets, which they do 10 or 12 times in a night, in case of good success. During winter it is a most dangerous and fatiguing employ, by reason of the greatness and frequency of the gales in these seas, and in such gales are the most successful captures: but, by the Providence of heaven, the fishers are seldom lost; and, what is wonderful, few are visited with illness. They go out well prepared, with a warm great coat, boots, and skin aprons, and a good provision of beef and spirits. The same good fortune attends the buffes, which in the tempestuous season, and in the darkest nights, are continually shifting, in these narrow seas, from harbour to harbour.

"Sometimes 80 barrels of herrings are taken in a night by the boats of a single vessel. It once happened, in Loch-Slappan, in Skie, that a bus of 80 tons might have taken 200 barrels in one night, with 10,000 square yards of net; but the master was obliged to desist, for want of a sufficient number of hands to preserve the capture.

"The herrings are preserved by salting, after the entrails are taken out: an operation performed by the country people, who get three-halfpence per barrel for their trouble; and sometimes, even in the winter, can gain fifteen pence a-day. This employs both women and children; but the salting is only entrusted to the crew of the buffes. The fish are laid on their backs in the barrels, and layers of salt between them. The entrails

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entrails are not loft, for they are boiled into an oil: 8000 fifh will yield ten gallons, valued at one fhilling the gallon.

"A vefel of 80 tons takes out 144 barrels of falt: a drawback of 2s. 8d. is allowed for each barrel ufed by the foreign or Irifh exportation of the fifh; but there is a duty of 1s. per barrels for the home-confumption, and the fame for thofe fent to Ireland.

"The barrels are made of oak-ftaves, chiefly from Virginia; the hoops from feveral parts of our own ifland, and are either of oak, birch, hazel, or willow: the laft from Holland, liable to a duty.

The barrels coft about 3s. each: they hold from 500 to 800 fifh, according to the fize of the fifh; and are made to contain 32 gallons. The barrels are infpected by proper officers: a cooper examines if they are ftatutable and good; if faulty, he deftroys them, and oblige the maker to ftand to the lofs.

"The herrings in general are exported to the Weft-Indies, to feed the negroes; or to Ireland, for the Irifh are not allowed to fifh in thefe feas. By having a drawback of 5d. a barrel, and by repacking the fifh in new barrels of 28 gallons, they are enabled to export them to our colonies at a cheaper rate than the Scots can do.

"The trade declines apace; the bounty, which was well paid, originally kept up the fpirit of the fifhery; but, for the laft fix years, the arrears have been very injurious to feveral adventurers, who have fold out at 30 per cent. lofs, befides that of their intereft.

"Loch-Broom has been celebrated for three or four centuries as the refort of herrings. They generally appear here in July: thofe that turn into this bay are part of the brigade that detaches itfelf from the Weft-tern column of that great army which annually deferts the vaft depths of the arctic circle, and come, heaven-directed, to the feats of population, offered as a cheap food to millions, whom wafteful luxury, or iron-hearted avarice, hath deprived, by enhancing the price, of the wonted fupports of the poor.

"The migration of thefe fifh from their Northern retreat is regular; their vifits to the Weft-tern ifles and coasts, certain; but their attachment to one particular loch, extremely precarious. All have their turns: that which fwarmed with fifh one year, is totally deferted the following; yet the next loch to it may be crowded with the fhools. Thefe changes of place give often full employ to the bufles, who are continually fhifting their harbour in queft of news refpecting thefe important wanderers.

"They commonly appear here in July; the latter end of Auguft they go into deep water, and continue there for fome time, without any apparent caufe: in November, they return to the fhallows, when a new fifhery commences, which continues till January; at that time the herrings become full of roe, and are ufelefs as articles of commerce. Some doubt, whether thefe herrings that appear in November are not part of a new migration; for they are as fat, and make the fame appearance, as thofe that compofed the firft.

"The figns of the arrival of the herrings are flocks of gulls, who catch up the fifh while they skim on the furface; and of gannets, who plunge and bring them up from confiderable depths. Both thefe birds are clofely attended to by the fifhers.

"Cod-fifh, haddocks, and dog-fifh, follow the herrings in vaft multitudes; thefe voracious fifh keep on the outfides of the columns, and may be a concurrent reafon of driving the fhools into bays and creeks. In fummer, they come into the bays generally with the warmeft weather, and with eafy gales. During winter, the hard gales from north-weft are fuppofed to afift in forcing them into fhelter. Eaft winds are very unfavourable to the fifhery.

"In a fine day, when the fifh appear near the furface, they exhibit an amazing brilliancy of colours; all the various corufcations that dart from the diamond, fapphire, and emerald, enrich their traft: but, during night, if they break, *i. e.* play on the furface, the fea appears on fire, luminous as the brighteft phofphorus."

Herrings are cured either white or pickled, or red.

1. Of the firft, thofe done by the Dutch are the moft efteemed, being diftinguifhed into four forts, according to their fizes; and the beft are thofe that are fat, flefhy, firm, and white, falted the fame day they are taken, with good falt, and well barrelled. The Britifh cured herrings are little inferior, if not equal, to the Dutch; for in fpite of all their endeavours to conceal the fecret, their method of curing, lalting, or calking the herrings, has been difcovered, and is as follows. After they have hauled in their nets, which they drag in the ftern of their veffels backwards and forwards in traverfing the coaft, they throw them upon the fhip's deck, which is cleared of every thing that for that purpofe: the crew is feparated into fundry divifions, and each divifion has a peculiar task; one part opens and guts the herrings, leaving the melts and roes; another cures and falts them, by lining or rubbing their infide with falt; the next packs them, and between each row and divifion they fpinkle handfuls of falt; laftly, the cooper puts the finifhing hand to all, by heading the calks very tight, and flowing them in the hold.

2. Red herrings muft lie 24 hours in the brine, in as much as they are to take all their falt there; and when they are taken out, they are fpitted, that is, ftrung by the head on little wooden fplits, and then hung in a chimney made for that purpofe. After which, a fire of brush-wood, which yields a deal of fmoke but no flame, being made under them, they remain there till fufficiently smoked and dried, and are afterwards barrelled up for keeping.

Pearl-Fifhery. See PEARL.

Pilchard FIFHERY. The chief-pilchard fifheries are along the coasts of Dalmatia, on the coaft of Bretagne, and along the coasts of Cornwall and Devonfhire. That of Dalmatia is very plentiful: that on the coasts of Bretagne employs annually about 300 fhips. Of the pilchard fifhery on the coaft of Cornwall the following account is given by Dr Borlase: "It employs a great number of men on the fea, training them thereby to naval affairs; employs men, women and children, at land, in falting, preffing, wafhing, and cleaning; in making boats, nets, ropes, calks, and all the trades depending on their conftruction and fale. The poor are fed with the offals of the captures, the land with the refufe of the fifh and falt; the merchant finds the gains of commiffion and honeft commerce, the fifherman the gains of the fifh. Ships are often freighted hither with falt, and into foreign coun-

countries with the fish, carrying off at the same time part of our tin. The usual produce of the great number of hogheads exported each year for ten years from 1747 to 1756 inclusive, from the four ports of Fowey, Falmouth, Penzance, and St Ives, it appears that Fowey has exported yearly 1732 hogheads; Falmouth, 14,631 hogheads and two thirds; Penzance and Mounts-Bay, 12,149 hogheads and one third; St Ives, 1282 hogheads: in all amounting to 29,795 hogheads. Every hoghead for ten years last past, together with the bounty allowed for each hoghead exported, and the oil made out of each hoghead, has amounted, one year with another at an average, to the price of one pound 13 shillings and three pence; so that the cash paid for pilchards exported has, at a medium, annually amounted to the sum of 49,532l. 10s." —The numbers that are taken at one shooting out of the nets are amazingly great. Mr Pennant says, that Dr Borlase assured him, that, on the 5th of October 1767, there were at one time inclosed in St Ives's Bay 7000 hogheads, each hoghead containing 35,000 fish, in all 245 millions.

The pilchards naturally follow the light, which contributes much to the facility of the fishery: the season is from June to September. On the coasts of France they make use of the roes of the cod-fish as a bait; which, thrown into the sea, makes them rise from the bottom, and run into the nets. On our coasts there are persons posted ashore, who, spying by the colour of the water where the shoals are, make signs to the boats to go among them to cast their nets. When taken, they are brought on shore to a warehouse, where they are laid up in broad piles, supported with backs and sides; and as they are piled, they salt them with bay-salt; in which lying to soak for 30 or 40 days, they run out a deal of blood, with dirty pickle and bitterness: then they wash them clean in sea-water; and, when dry, barrel and press them hard down to squeeze out the oil, which issues out at a hole in the bottom of the cask.

Salmon * FISHERY. The chief salmon-fisheries in Europe are in England, Scotland, and Ireland, in the rivers, and sea-coasts adjoining to the river-mouths. The most distinguished for salmon in Scotland are, the river Tweed, the Clyde, the Tay, the Dee, the Don, the Spey, the Nefs, the Bewly, &c. in most of which it is very common, about the height of summer, especially if the weather happens to be very hot, to catch four or five score salmon at a draught. The chief rivers in England for salmon are, the Tyne, the Trent, the Severn, and the Thames. The fishing is performed with nets, and sometimes with a kind of locks or weirs made on purpose, which in certain places have iron or wooden grates so disposed, in an angle, that being impelled by any force in a contrary direction to the course of the river, they may give way and open a little at the point of contact, and immediately shut again, closing the angle. The salmon, therefore, coming up into the rivers, are admitted into these grates, which open, and suffer them to pass through, but shut again, and prevent their return. The salmon is also caught with a spear, which they dart into him when they see him swimming near the surface of the water. It is customary likewise to catch them with a candle and lantern, or wisp of straw set on fire; for the fish naturally following the

light, are struck with the spear, or taken in a net spread for that purpose, and lifted with a sudden jerk from the bottom.

"The capture of salmon in the Tweed, about the month of July, (says Mr Pennant*) is prodigious. In a good fishery, often a boat-load, and sometimes near two, are taken in a tide: some few years ago there were above 700 fish taken at one haul, but from 50 to 100 is very frequent. The coopers in Berwick then begin to salt both salmon and gillies in pipes and other large vessels, and afterwards barrel them to send abroad, having then far more than the London markets can take off their hands.

"Most of the salmon taken before April, or to the setting in of the warm weather, is sent fresh to London in baskets: unless now and then the vessel is disappointed, by contrary winds, of sailing immediately; in which case the fish is brought ashore again to the coopers offices, and boiled, pickled, and kitted, and sent to the London markets by the same ship, and fresh salmon put in the baskets in lieu of the stale ones. At the beginning of the season, when a ship is on the point of sailing, a fresh clean salmon will sell from a shilling to eighteen pence a pound; and most of the time that this part of the trade is carried on, the prices are from five to nine shillings per stone; the value rising and falling according to the plenty of fish, or the prospect of a fair or foul wind. Some fish are sent in this manner to London the latter end of September, when the weather grows cool; but then the fish are full of large roes, grow very thin-bellied, and are not esteemed either palatable or wholesome.

"The season for fishing in the Tweed begins November 30th, but the fishermen work very little till after Christmas: it ends on Michaelmas-day; yet the corporation of Berwick (who are conservators of the river) indulge the fishermen with a fortnight past that time, on account of the change of the tide.

"There are on the river 41 considerable fisheries, extending upwards, about 14 miles from the mouth, (the others above being of no great value), which are rented for near 5400l. *per annum*: the expence attending the servants wages, nets, boats, &c. amount to 5000l. more; which together makes up the sum 10,400l. Now, in consequence, the produce must defray all, and no less than 20 times that sum of fish will effect it; so that 208,000 salmon must be caught there one year with another.

"Scotland possesses great numbers of fine fisheries on both sides of that kingdom. The Scotch in early times had most severe laws against the killing of this fish; for the third offence was made capital, by a law of James IV. Before that, the offender had power to redeem his life. They were thought in the time of Henry VI. a present worthy of a crowned head: for in that reign the queen of Scotland sent to the dutches of Clarence, ten casks of salted salmon; which Henry directed to pass duty-free. The salmon are cured in the same manner as at Berwick, and a great quantity is sent to London in the spring; but after that time, the adventurers begin to barrel and export them to foreign countries: but we believe that commerce is far less lucrative than it was in former times, partly owing to the great increase of the Newfoundland fishery, and partly to the general relaxation of the discipline of abstinence in the Romish church.

"Ireland (particularly the north) abounds with this fish: the most considerable fishery is at Cranna, on the river Ban, about a mile and an half from Coleraine. When I made the tour of that hospitable kingdom in 1754, it was rented by a neighbouring gentleman for 620*l.* a-year; who assured me, that the tenant, his predecessor, gave 1600*l.* *per annum*, and was a much greater gainer by the bargain, for the reasons before-mentioned, and on account of the number of poachers who destroy the fish in the fence-months.

"The mouth of this river faces the north; and is finely situated to receive the fish that roam along the coast, in search of an inlet into some fresh water, as they do all along that end of the kingdom which opposes itself to the northern ocean. We have seen near Ballinacastle, nets placed in the sea at the foot of the promontories that jut into it, which the salmon strike into as they are wandering close to shore; and numbers are taken by that method.

"In the Ban they fish with nets 18 score yards long, and are continually drawing night and day the whole season, which we think lasts about four months, two sets of 16 men each alternately relieving one another. The best drawing is when the tide is coming in: we were told, that at a single draught there were once 840 fish taken.

"A few miles higher up the river is a wear, where a considerable number of fish that escape the nets are taken. We were lately informed, that, in the year 1760, about 320 tons were taken in the Cranna fishery."

Curing Salmon. When the salmon are taken, they open them along the back, take out the guts and gills, and cut out the greatest part of the bones, endeavouring to make the inside as smooth as possible: they then salt the fish in large tubs for the purpose, where they lie a considerable time soaking in brine; and about October, they are packed close up in barrels, and sent to London, or exported up the Mediterranean. They have also in Scotland, a great deal of salmon salted in the common way, which after soaking in brine a competent time, is well pressed, and then dried in smoke: this is called *kipper*, and is chiefly made for home consumption; and, if properly cured and prepared, is reckoned very delicious.

Sturgeon † **FISHERY.** The greatest sturgeon-fishery is in the mouth of the Volga, on the Caspian sea; where the Muscovites employ a great number of hands, and catch them in a kind of inclosure formed by huge stakes representing the letter Z repeated several times. These fisheries are open on the side next the sea, and close on the other; by which means the fish ascending in its season up the river, is embarrassed in these narrow angular retreats, and so is easily killed with a harping-iron. Sturgeons, when fresh, eat deliciously; and in order to make them keep, they are salted or pickled in large pieces, and put up in cags from 30 to 50 pounds. But the great object of this fishery is the roe, of which the Muscovites are extremely fond, and of which is made the caviar, or kavia, so much esteemed by the Italians. — See **CAVEAR.**

Whale * **FISHERY.** Whales are chiefly caught in the north seas: the largest sort are found about Greenland, or Spitzbergen. At the first discovery of this country, whales not being used to be disturbed, frequently came

into the very bays, and were accordingly killed almost close to the shore; so that the blubber being cut off was immediately boiled into oil on the spot. The ships in those times took in nothing but the pure oil and the whalebone, and all the business was executed in the country; by which means a ship could bring home the product of many more whales than she can according to the present method of conducting this trade. The fishery also was then so plentiful, that they were obliged sometimes to send other ships to fetch off the oil they had made, the quantity being more than the fishing ships could bring away. But time and change of circumstances have shifted the situation of this trade. The ships coming in such numbers from Holland, Denmark, Hamburg, and other northern countries, all intruders upon the English, who were the first discoverers of Greenland, the whales were disturbed, and gradually, as other fish often do, forsaking the place, were not to be killed so near the shore as before; but are now found, and have been so ever since, in the openings and space among the ice, where they have deep water, and where they go sometimes a great many leagues from the shore.

The whale-fishery begins in May, and continues all June and July; but whether the ships have good or bad success, they must come away, and get clear of the ice, by the end of August; so that in the month of September at farthest, they may be expected home; but a ship that meets with a fortunate and early fishery in May, may return in June or July.

The manner of taking whales at present is as follows.—Every ship is provided with six boats, to each of which belong six men for rowing the boat, and an harpooner whose business is to strike the whale with his harpoon. Two of these boats are kept constantly on the watch at some distance from the ship, fastened to pieces of ice, and are relieved by others every four hours. As soon as a whale is perceived, both the boats set out in pursuit of it, and if either of them can come up before the whale finally descends, which is known by his throwing up his tail, the harpooner discharges his harpoon at him. There is no difficulty in choosing the place where the whale is to be struck, as some have asserted; for these creatures only come up to the surface in order to spout up the water, or *blow*, as the fishermen term it, and therefore always keep the soft and vulnerable part of their bodies above water. A late improvement was made in the method of discharging the harpoon; namely, by shooting it out of kind of swivel or musquetoon: but it doth not appear, that, since this improvement was made, the whale-fishing ships have had better success than before.—As soon as the whale is struck, the men set up one of their oars in the middle of the boat as a signal to those in the ship. On perceiving this, the watchman alarms all the rest with the cry of *fall! fall!* upon which all the other boats are immediately sent out to the assistance of the first.

The whale finding himself wounded, runs off with prodigious violence. Sometimes he descends perpendicularly; at others goes off horizontally, at a small depth below the surface. The rope which is fastened to the harpoon is about 200 fathoms long, and properly coiled up, that it may freely be given out as there is a demand for it. At first, the velocity with which

† See *Asiaticus*.

* See *Asiaticus*.

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which this line runs over the side of the boat is so great, that it is wetted to prevent its taking fire; but in a short time the strength of the whale begins to fail, and the fishermen, instead of letting out more rope, strive as much as possible to pull back what is given out already, though they always find themselves necessitated to yield at last to the efforts of the animal, to prevent his sinking their boat. If he runs out the 200 fathoms of line contained in one boat, that belonging to another is immediately fastened to the end of the first, and so on; and there have been instances, where all the rope belonging to the six boats has been necessary, though half that quantity is seldom required. The whale cannot stay long below water, but again comes up to blow; and being now much fatigued and wounded, stays longer above water than usual. This gives another boat time to come up with him, and he is again struck with an harpoon. He again descends, but with less force than before; and when he comes up again, is generally incapable of defending, but suffers himself to be wounded and killed with long lances which the men are provided with for the purpose. He is known to be near death when he spouts up the water deeply tinged with blood.

The whale being dead, is lashed along-side the ship. They then lay it on one side, and put two ropes, one at the head, and the other in the place of the tail, which, together with the fins, is struck off as soon as he is taken, to keep those extremities above water. On the off-side of the whale are two boats, to receive the pieces of fat, utensils, and men, that might otherwise fall into the water on that side. These precautions being taken, three or four men with irons at their feet to prevent slipping, get on the whale, and begin to cut out pieces of about three feet thick and eight long, which are hauled up at the capstain or windlafs. When the fat is all got off, they cut off the whippers of the upper jaw with an ax. Before they cut, they are all lashed to keep them firm; which also facilitates the cutting, and prevents them from falling into the sea: when on board, five or six of them are bundled together, and properly stowed; and after all is got off, the carcase is turned a-drift, and devoured by the bears, who are very fond of it. In proportion as the large pieces of fat are cut off, the rest of the crew are employed in slicing them smaller, and picking out all the lean. When this is prepared, they stow it under the deck, where it lies till the fat of all the whales is on board; then cutting it still smaller, they put it up in tubs in the hold, cramming them very full and close. Nothing now remains but to sail homewards, where the fat is to be boiled and melted down into train-oil.

It were in vain to speak in this place of the advantages that may be derived to Great Britain from the whale-fishery. We shall only remark, that the legislature think that trade of so great importance, as to grant a very considerable bounty for the encouragement of it; for every British vessel of 200 tons or upwards, bound to the Greenland seas on the whale-fishery, if found to be duly qualified according to the act, obtains a licence from the commissioners of the customs to proceed on such voyage; and on the ship's return, the master and mate making oath that they proceeded on such voyage and no other, and used all

their endeavours to take whales, &c. and that all the whale-fins, blubber, oil, &c. imported in their ship, were taken by their crew in those seas, there shall be allowed 40 s. for every ton according to the admeasurement of the ship.

Besides these fisheries, there are several others both on the coasts of Great Britain and in the North Seas, which, although not much the subject of merchandize, nevertheless employ great numbers both of ships and men; as, 1. The oyster-fishing at Colchester, Faversham, the Isle of Wight, in the Swales of the Medway, and in all the creeks between Southampton and Chichester, from whence they are carried to be fed in pits about Wevenhoe and other places. (See OSTRÆA.) 2. The lobster-fishing all along the British Channel, the Frith of Edinburgh, on the coast of Northumberland, and on the coast of Norway, from whence great quantities are brought to London. (See CANCER.) 3. and lastly, The fishing of the pot-fish, fin-fish, sea-unicorn, sea-horse, and the seal, or dog-fish: all which are found in the same seas with the whales, and yield blubber in a certain degree; besides, the horn of the unicorn is as estimable as ivory, and the skins of the seals are particularly useful to trunk-makers.

FISHING, in general, the art of catching fish, whether by means of nets, of spears, or of the line and hook.

FISHING in the great, performed by the net, spear, or harpoon, has been explained in the preceding article. That performed by the rod, line and hook, is usually termed ANGLING: See that article; and for the particular manner of angling for the different kinds of fish, see their respective names, as DACE, EEL, PERCH, &c. The following were omitted in their order.

1. The *Barbel**, (so called on account of the barb* See *Cyprinus* or beard that is under his chops), though a coarse fish, gives considerable exercise to the angler's ingenuity. They swim together in great shoals, and are at their worst in April, at which time they spawn, but come soon in season: the places whither they chiefly resort, are such as are weedy and gravelly rising grounds, in which this fish is said to dig and root with his nose like a swine. In the summer he frequents the strongest, swiftest, currents of water; as deep bridges, weirs, &c. and is apt to settle himself amongst the piles, hollow places, and moss, or weeds; and will remain there immoveable: but in the winter he retires into deep waters, and helps the female to make a hole in the sands to hide her spawn in, to hinder its being devoured by other fish. He is a very curious and cunning fish; for if his baits be not sweet, clean, well-scoured, and kept in sweet moss, he will not bite; but well-ordered and curiously kept, he will bite with great eagerness. The best bait for him is the spawn of a salmon, trout, or any other fish; and if you would have good sport with him, bait the places where you intend to fish with it a night or two before, or with large worms cut in pieces; and the earlier in the morning or the later in the evening that you fish, the better it will be. Your rod and line must be both strong and long, with a running plummet on the line; and let a little bit of lead be placed a foot or more above the hook, to keep the bullet from falling on it: so the worm will be at the bottom, where they always bite; and when

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the fish takes the bait, your plummet will lie and not choke him. By the bending of your rod you may know when he bites, as also with your hand you will feel him make a strong snatch; then strike, and you will rarely fail, if you play him well; but, if you manage him not dexterously, he will break your line. The best time of fishing is about nine in the morning, and the most proper season is the latter end of May, June, July, and the beginning of August.

* See
Cyprinus.

2. The *Bleak**, is an eager fish, caught with all sorts of worms bred on trees or plants; as also with flies, paste, sheep's blood, &c. They may be angled for with half a score of hooks at once, if they can be all fattened on: he will also in the evening take a natural or artificial fly. If the day be warm and clear, there is no fly so good for him as the small fly at the top of the water, which he will take at any time of the day, especially in the evening: but if the day is cold and cloudy, gentles and caddis are the best; about two feet under water. No fish yields better sport to a young angler than the bleak. It is so eager, that it will leap out of the water for a bait.

There is another way of taking bleak, which is by whipping them in a boat, or on a bank-side in fresh water in a summer's evening, with a hazel top about five or six feet long and a line twice the length of the rod. But the best method is with a drabble, thus: Tie eight or ten small hooks across a line two inches above one another; the biggest hook the lowermost, (whereby you may sometimes take a better fish), and bait them with gentles, flies, or some small red worms, by which means you may take half a dozen or more at a time.

† See
Cyprinus.

3. For the *Bream*†, observe the following directions, which will also be of use in carp-fishing.—Procure about a quart of large red worms; put them into fresh moss well washed and dried every three or four days, feeding them with fat mould and chopped fennel, and they will be thoroughly scoured in about three weeks.

Let your lines be silk and hair, but all silk is the best: let the floats be either swan-quills, or goose-quills. Let your plumb be a piece of lead in the shape of a pear, with a small ring at the little end of it: fasten the lead to the line, and the line-hook to the lead, about ten or twelve inches space between lead and hook will be enough; and take care the lead be heavy enough to sink the float. Having baited your hook well with a strong worm, the worm will draw the hook up and down in the bottom, which will provoke the bream to bite the more eagerly. It will be best to fit up three or four rods and lines in this manner, and set them as will be directed, and this will afford you much the better sport. Find the exact depth of the water if possible, that your float may swim on its surface directly over the lead; then provide the following ground-bait: take about a peck of sweet gross-ground malt; and having boiled it a very little, strain it hard through a bag, and carry it to the water-side where you have fished; and in the place where you suppose the fish frequent, there throw in the malt by handfuls squeezed hard together, that the stream may not separate it before it comes to the bottom; and be sure to throw it in at least a yard above the place where you intend the hook shall lie, otherwise the

stream will carry it down too far. Do this about nine o'clock at night, keeping some of the malt in the bag; and go to the place about three the next morning: but approach very warily, lest you should be seen by the fish; for it is certain, that they have their sentinels watching on the top of the water, while the rest are feeding below. Having baited your hook so that the worm may crawl to and fro, the better to allure the fish to bite, cast it in at the place where you find the fish to stay most, which is generally in the broadest and deepest part of the river, and so that it may rest about the midst of your bait that is on the ground. Cast in your second line so that it may rest a yard above that, and a third about a yard below it. Let your rods lie on the bank with some stones to keep them down at the great ends; and then withdraw yourself, yet not so far but that you can have your eye upon all the floats: and when you see one bitten and carried away, do not be too hasty to run in, but give time to the fish to tire himself, and then touch him gently. When you perceive the float sink, creep to the water-side, and give it as much line as you can. If it is a bream or carp, they will run to the other side; which strike gently, and hold your rod at a bent a little while; but do not pull, for then you will spoil all; but you must first tire them before they can be landed, for they are very shy. If there are any carps in the river, it is an even wager that you take one or more of them: but if there are any pike or perch, they will be sure to visit the ground-bait, though they will not touch it, being drawn thither by the great resort of the small fish; and until you remove them, it is in vain to think of taking the bream or carp. In this case, bait one of your hooks with a small bleak, roach, or gudgeon, about two foot deep from your float, with a little red worm at the point of your hook; and if a pike be there, he will be sure to snap at it. This sport is good till nine o'clock in the morning; and, in a gloomy day, till night: but do not frequent the place too much, lest the fish grow shy.

4. The *carp**. A person who angles for carp must arm himself with abundance of patience, because of its extraordinary subtilty and policy: they always choose to lie in the deepest places, either of ponds or rivers, where there is but a small running stream.

Further, observe, that they will seldom bite in cold weather; and you cannot be too early or too late at the sport in hot weather: and if he bite, you need not fear his hold; for he is one of those leather-mouthed fish that have their teeth in their throat.

Neither must you forget, in angling for him, to have a strong rod and line; and since he is so very wary, it will be proper to entice him, by baiting the ground with a coarse paste.

He seldom refuses the red worm in March, the caddis in June, nor the grasshopper in June, April, and September.

This fish does not only delight in worms, but also in sweet paste; of which there is great variety: the best is made of honey and sugar, and ought to be thrown into the water some hours before you begin to angle; neither will small pellets thrown into the water two or three days before be worse for this purpose, especially if chickens guts, garbage, or blood mixed with bran and cow-dung, be also thrown in.

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But more particularly, as to a paste very proper for this use, you may make it in the manner following: Take a sufficient quantity of flour, and mingle it with veal, cut small, making it up with a compound of honey; then pound all together in a mortar till they are so tough as to hang upon the hook without washing off. In order to effect which the better, mingle whitish wool with it; and if you keep it all the year round, add some virgin wax and clarified honey.

Again, if you fish with gentles, anoint them with honey, and put them on your hook, with a deep scarlet dipped in the like, which is a good way to deceive the fish.

Honey and crumbs of white-bread, mixed together, make also a very good paste.

In taking a carp either in pond or river, if the angler intends to add profit to his pleasure, he must take a peck of ale-grains, and a good quantity of any blood to mix with the grains, baiting the ground with it where he intends to angle. This food will wonderfully attract the scale-fish, as carp, tench, roach, dace, and bream.

Let him angle in a morning, plumbing his ground, and angling for carp with a strong line: the bait must be either paste, or a knotted red worm; and by this means he will have sport enough.

5. The *chub*, or *chevin**, is a very strong, though inactive fish, yielding in a very little time after he is struck; and the larger he is, the more quietly he is taken. As for his food, he loves all sorts of worms and flies; also cheese, grain, and black worms, their bellies being split that the white may appear. He is to be angled for early in the morning with snails: but in the heat of the day make use of some other bait; and in the afternoon, fish for him at ground or with fly; of the last of which there is none he covets more than a moth with a great head, whose body is yellow, with whitish wings, which is commonly found in gardens about the evening.

Description of proper Baits for the several sorts of Fish referred to in the annexed Table.

Flies.] 1. Stone-fly, found under hollow stones at the side of rivers, is of a brown colour, with yellow streaks on the back and belly, has large wings, and is in season from April to July. 2. Green-drake, found among stones by river-sides, has a yellow body ribbed with green, is long and slender, with wings like a butterfly, his tail turns on his back, and from May to Midsummer is very good. 3. Oak-fly, found in the body of an old oak or ash, with its head downwards, is of a brown colour, and excellent from May to September. 4. Palmer-fly or worm, found on leaves of plants, is commonly called a *caterpillar*, and when it comes to a fly is excellent for trout. 5. Ant-fly, found in ant-hills from June to September. 6. The May-fly is to be found playing at the river-side, especially against rain. 7. The black-fly is to be found upon every Hawthorn, after the buds are come off.

Pastes.] 1. Take the blood of sheeps hearts, and mix it with honey and flour worked to a proper consistence. 2. Take old cheese grated, a little butter sufficient to work it, and colour it with saffron: in winter use rusty bacon instead of butter. 3. Crumbs of bread chewed or worked with honey, (or sugar), moistened with gum-ivy water. 4. Bread chewed, and worked

in the hand till stiff.

Worms.] 1. The earth-bob, found in sandy ground after ploughing; it is white, with a red head, and bigger than a gentle: another is found in heathy ground, with a blue head. Keep them in an earthen vessel well covered, and a sufficient quantity of the mould they harbour in. They are excellent from April to November. 2. Gentles, to be had from putrid flesh: let them lie in wheat-bran a few days before used. 3. Flag-worms, found in the roots of flags; they are of a pale yellow colour, are longer and thinner than a gentle, and must be scowered like them. 4. Cow-turd-bob, or clap-bait, found under a cow-turd from May to Michaelmas; it is like a gentle, but larger. Keep it in its native earth like the earth-bob. 5. Cadis-worm, or cod-bait, found under loose stones in shallow rivers; they are yellow, bigger than a gentle, with a black or blue head, and are in season from April to July. Keep them in flannel bags. 6. Lob-worm, found in gardens; it is very large, and has a red-head, a streak down the back, and a flat broad tail. 7. Marsh-worms, found in marshy ground: keep them in moss ten days before you use them: their colour is a bluish red, and are a good bait from March to Michaelmas. 8. Brandling red-worms, or blood-worms, found in rotten dung-hills and tanners bark; they are small red-worms, very good for all small fish, have sometimes a yellow tail, and are called *tag-tail*.

Fish and insects.] 1. Minnow. 2. Gudgeon. 3. Roach. 4. Dace. 5. Smelt. 6. Yellow frog. 7. Snail slit. 8. Grasshopper.

FISHING-FLY, a bait used in angling for divers kinds of fish. See *FISHING*.

The fly is either *natural* or *artificial*.

I. *Natural* flies are innumerable. The more usual for this purpose are mentioned in the preceding column.

There are two ways to fish with natural flies; either on the surface of the water, or a little underneath it.

In angling for chevin, roach, or dace, move not your natural fly swiftly, when you see the fish make at it; but rather let it glide freely towards him with the stream: but if it be in a still and slow water, draw the fly slowly sidewise by him, which will make him eagerly pursue.

II. The *artificial* fly is seldom used but in blustering weather, when the waters are so troubled by the winds, that the natural fly cannot be seen, nor rest upon them. Of this artificial fly there are reckoned no less than 12 sorts, of which the following are the principal.

1. For March, the dun-fly; made of dun-wool, and the feathers of the partridge's wing; or the body made of black wool, and the feathers of a black drake. 2. For April, the stone-fly; the body made of black wool, dyed yellow under the wings and tail. 3. For the beginning of May, the ruddy fly; made of red wool, and bound about with black silk, with the feathers of a black capon hanging dangling on his sides next his tail. 4. For June, the greenish fly; the body made of black wool, with a yellow list on either side, the wings taken off the wings of a buzzard, bound with black broken hemp. 5. The moorish fly, the body made of dusky wool, and the wings of the blackish mail of

Fishing.

An Epitome of the whole art of FISHING, wherein is shewn (at one view), the harbours, seasons, and depths, for catching all sorts of fish usually angled for; also the various baits for each, so digested as to contain the effence of all the treatises ever wrote on the subject, except from their superfluities, which tend more to perplex than instruct.

Names.	Where found.	Season.	Time to ang.	Depth from ground.	Proper Baits.				
					Fish. No.	Puffers. No.	Worms. No.	Fish and Insects. No.	
Bream	rough Br. river or mid. pond	April to Mich.	ten-fife to 9 5 to Sun-fet	touch ground		1 3	2 6 7		
Barbel	gravel-banks in currents under bridges	April to Aug.	very early in the	ditto					
Blak	early bottom, deep rivers, deep rivers	May to Oct.	all day	6 inches from bottom	1 2	2	2 3 3		
Carp	still deep mud-bottom, pond or river	May to Aug.	ten-fife to 9 5 to Sun-fet	3 inches from bottom, hot weather, mid-water		1 3 4	1 2 3 4 7		
Club or Dace	ditto	May to Dec.	ditto	ditto	1 to 5	2	1 2 4 5	7 8	
Clavon	early bottom, deep rivers, deep rivers	May to Oct.	all day	6 to 12 inches from bottom	ditto	3 4	1 to 5 N. 6		
Carpsion Pike	gravel shoals near clay-banks	May to Oct.	ditto	near or on ground mid-water	wh. Br. and flap	ditto	2 8	1 2 3 4 5 6 7	
Pearch	river in stream } gravel } good deep part } bottom } deep holes in river } nearly bottom, deep river, deep river	May to Aug.	ten-fife to 10 2 to Sun-fet	ditto	2	1	3 5 7 8	1 6	
Poye	deep holes in river	Aug. to May.	mid-day	6 inches from bottom	5		all		
Roach	deep holes in river	May to Oct.	all day	6 to 12 inches	1 2 4 5	3 4	ditto	8	
Salmon	deep rivers	Mar. to Sept.	8 to 9, 3 to 6	mid-way to the bottom	all large		1 5 6 7	1	
Smelt	deep rivers and shoals	Apr. to Oct.	all day	mid-way to the bottom variable	all small		1 2 5	bites of insects	
Trout	running stream and sides of } Mar. to Mech. } heavy bottom river		ditto	cold weather 6 inches to 9 hot weather, top to mid-wat.	1 to 5		1 2 5 to 8	1 8	
Treuch	mud-bottom river or pond	All the year	ten-fife to 9 5 to Sun-fet	hot weather 6 to 9 inches cold weather, top to mid-wat.	1 to 5	1 3 4	1 3 4 to 7	1 8	
Timber or Crayling	clay bottom, fresh stream	All the year	all day	cold weather, 6 to 9 inches hot weather, top to mid-wat.	1 to 5		all	1 8	

Sportsm.
Dig.

a drake. 6. The tawny fly, good till the middle of June; the body made of tawny wool, the wings made contrary one against the other, of the whitish mail of a white drake. 7. For July, the wasp-fly; the body made of black wool, cast about with yellow silk, and the wings of drakes feathers. 8. The steel-fly, good in the middle of July; the body made with greenish

wool, cast about with the feathers of a peacock's tail, and the wings made of those of the buzzard. 9. For August, the drake-fly; the body made with black wool cast about with black silk; his wings of the mail of a black drake, with a black head.

The best rules for artificial fly-fishing are,

1. To fish in a river somewhat disturbed with rain;

Fishing.

or in a cloudy day, when the waters are moved by a gentle breeze: the fourth wind is best; and if the wind blow high, yet not so but that you may conveniently guard your tackle, the fish will rise in plain deeps; but if the wind be small, the best angling is in swift streams. 2. Keep as far from the water-side as may be; fish down the stream with the sun at your back, and touch not the water with your line. 3. Ever angle in clear rivers, with a small fly and slender wings; but in muddy, places use a larger. 4. When, after rain, the water becomes brownish, use an orange fly; in a clear day, a light-coloured fly; a dark fly for dark waters, &c. 5. Let the line be twice as long as the rod, unless the river be encumbered with wood. 6. For every sort of fly, have several of the same, differing in colour, to suit with the different complexions of several waters and weathers. 7. Have a nimble eye, and active hand, to strike presently with the rising of the fish; or else he will be apt to spue out the hook. 8. Let the fly fall first into the water, and not the line, which will scare the fish. 9. In slow rivers, or still places, cast the fly a-crofs the river, and let it sink a little in the water, and draw it gently back with the current.

Salmon-fishes should be made with their wings standing one behind the other, whether two or four. This fish delights in the gaudiest colours that can be; chiefly in the wings, which must be long, as well as the tail.

FISHING-Floats, are little appendages to the line, serving to keep the hook and bait suspended at the proper depth, to discover when the fish has hold of them, &c. Of these there are divers kinds; some made of Muscovy-duck quills, which are the best for slow waters; but for strong streams, sound cork, without flaws or holes, bored through with an hot iron, into which is put a quill of a fit proportion, is preferable: pare the cork to a pyramidal form, and make it smooth.

FISHING-Hook, a small instrument made of steel-wire, of a proper form to catch and retain fish.

The fishing-hook, in general, ought to be long in the shank, somewhat thick in the circumference, the point even and straight; let the bending be in the shank.

For setting the hook on, use strong, but small silk, laying the hair on the inside of your hook; for if it be on the outside, the silk will fret and cut it asunder.

There are several sizes of these fishing-hooks, some big, some little: and of these, some have peculiar names; as, 1. Single hooks. 2. Double hooks; which have two bendings, one contrary to the other. 3. Snappers, or gorgers, which are the hooks to whip the artificial fly upon, or bait with the natural fly. 4. Springers, or spring-hooks; a kind of double hooks, with a spring, which flies open upon being struck into any fish, and so keep its mouth open.

FISHING-Line, is either made of hair, twiled; or silk; or the Indian grass.—The best colours are the forrel, white, and grey; the two last for clear waters, the first for muddy ones. Nor is the pale watery green despicable; this colour is given artificially, by keeping the hair in a liquor made of alum, foot, and the juice of walnut-leaves, boiled together.

FISHING-Rod, a long slender rod or wand, to which the line is fastened, for angling.—Of these there are several sorts; as, 1. A troller, or trolling-rod, which has a ring at the end of the rod, for the line to go thro' when it runs off a reel. 2. A whipper, or whipping-

rod; a top-rod, that is weak in the middle, and top-heavy, but all slender and fine. 3. A dropper; which is a strong rod and very light. 4. A snapper, or snapper-rod; which is a strong pole, peculiarly used for the pike. 5. A bottom-rod; being the same as the dropper, but somewhat more pliable. 6. A sniggling or procking stick; a forked stick, having a short strong line, with a needle, baited with a lobe worm: this is only for eels in their holes.

FISHING-Frog, or Angler. See **LOPHIUS**.

Right of FISHING, and property of fish. It has been held, that where the lord of the manor hath the soil on both sides of the river, it is a good evidence that he hath a right of fishing; and it puts the proof upon him who claims *liberam piscariam*: but where a river ebbs and flows, and is an arm of the sea, there it is common to all, and he who claims a privilege to himself must prove it; for if the trespass is brought for fishing there, the defendant may justify, that the place where is *brachium maris, in quo unusquisque subditus domini regis habet et habere debet liberam piscariam*. In the Severn the soil belongs to the owners of the land on each side; and the soil of the river Thames is in the king, but the fishing is common to all. He who is owner of the soil of a private river, hath *separatis piscariis*; and he that hath *libera piscaria*, hath a property in the fish, and may bring a possessory action for them; but *communis piscaria* is like the case of all other commons. One that has a close pond in which there are fish, may call them *piscis suus*, in an indictment, &c. but he cannot call them *bona & catalla*, if they be not in trunks. There needs no privilege to make a fish-pond, as there doth in the case of a warren. See **FRANCHISE**.

FISURES, in the history of the earth, certain interruptions, that in an horizontal or parallel manner divide the several strata of which the body of our terrestrial globe is composed.

Fissure of the Bones, in surgery, is when they are divided either transversely or longitudinally, not quite through, but cracked after the manner of glass, by any external force. See **SURGERY**.

FISTULA, in the ancient music, an instrument of the wind-kind, resembling our flute or flageolet.

The principal wind-instruments of the ancients, were the tibia and the fistula. But how they were constituted, wherein they differed, or how they were played upon, does not appear.

FISTULA, in surgery, a deep, narrow, and callous ulcer, generally arising from abscesses.

It differs from a *sinus*, in its being callous, the latter not. See **SURGERY**.

FISTULA, in farriery. See **FARRIERY**, § xxxi.

FISTULARIA, or **TOBACCO-PIPE FISH**; a genus of fishes, belonging to the order of abdominales. Of this genus Linnæus reckons two species; but we have a description only of one, viz. the tabacaria. It is described by Mr Catelby, from the only one he ever saw. It was almost a foot in length; the fore-part from the nose to half-way the body of nearly equal bigness; from whence it grew tapering to the tail, which was forked, and from which grew a slender taper whip, four inches long, of the consistence of whale-bone; the mouth narrow, from which to the eyes was almost three inches. The whole fish was of a brown colour. They are sometimes taken on the coasts of Jamaica.

Fishing

Fistularia.

Jacob's
Law Dist.

FIT. See PAROXYSM.

Dr Cheyne is of opinion that fits of all kinds, whether epileptic, hysterical, or apoplectic, may be cured solely by a milk-diet, of about two quarts of cows milk a-day, without any other medicine.

FITCHY, in heraldry, (from the French *fishé*, i. e. *fixed*); a term applied to a cross when the lower branch ends in a sharp point: and the reason of it Mackenzie supposes to be, that the primitive Christians were wont to carry crosses with them wherever they went; and when they stopped on their journey at any place, they fixed those portable crosses in the ground for devotion's sake.

FITCHES, in husbandry, a sort of pulse, more generally known by the name of *chick-pea*. See CICER.

Fitches are cultivated either for feeding cattle, or improving the land. They make a wholesome and nourishing food, whether given in the straw or threshed out. When sown only to improve the soil, they are ploughed in just as they begin to blossom, by which means a tough stiff clay-soil is much enriched.

FITCHET, a name used in some places for the weasel, called also the *foumart*. See MUSTELA.

FITZ, makes part of the surname of some of the natural sons of the kings of England, as *Fitz-roy*; which is purely French, and signifies the "king's son."

FITZHERBERT (Sir Anthony), a very learned lawyer in the reign of king Henry VIII. was descended from an ancient family, and born at Norbury in Derbyshire. He was made one of the judges of the court of common-pleas in 1523; and distinguished himself by many valuable works, as well as by such an honourable discharge of the duties of his office, as made him esteemed an oracle of the law. His writings are, *The Grand Abridgment*; *The Office and Authority of Justices of Peace*; *The Office of Sheriffs, Bailiffs of Liberties, Escheators, Constables, Coroners, &c.*; *Of the Diversity of Courts*; *The New Natura Brevium*; *Of the Surveying of Lands*; and *The Book of Husbandry*. He died in 1538.

FITZ-STEPHEN (William), a learned monk of Canterbury, of Norman extraction, but born of respectable parents in the city of London. He lived in the 12th century; and being attached to the service of archbishop Becket, was present at the time of his murder. In the year 1174, he wrote in Latin, *The Life of St Thomas, archbishop and martyr*; in which, as Becket was a native of the metropolis, he introduces a description of the city of London, with a miscellaneous detail of the manners and usages of the citizens: this is deservedly considered as a great curiosity, being the earliest professed account of London extant. Fitz-Stephen died in 1191.

FIVES, or VIVES. See FARRIERY, sect. x. 10.

FIXATION, in chemistry, the rendering any volatile substance fixed, so as not to fly off upon being exposed to a great heat; hence,

FIXED BODIES, are those which bear a considerable degree of heat without evaporating, or losing any of their weight. Among the most fixed bodies are diamonds, gold, &c. See DIAMOND, GOLD, &c.

FIXED AIR. See AIR, and GAS.

FIXED STARS, are such as constantly retain the same position and distance with respect to each other*; by which they are contradistinguished from erratic or wandering stars, which are continually shifting their situa-

tion and distance. The fixed stars are what we properly and absolutely call *stars*: the rest have their peculiar denominations of *planet*, and *comet*. See ASTRONOMY, n° 40, 44, 46, &c.

FLACCUS (Caius Valerius), an ancient Latin poet, of whom we have very imperfect accounts remaining. He wrote a poem on the Argonautic expedition; of which, however, he did not live to finish the eighth book, dying at about 30 years of age. John Baptista Pius, an Italian poet, completed the eighth book of the Argonautics; and added two more, from the fourth of Apollonius; which supplement was first added to Aldus's edition in 1523.

FLAG or SLATE Stone, common in Northumberland and some of the neighbouring counties, is called by some the *Carlisle flag*. Its strata are very thick; but they sometimes separate into laminae of about half an inch thick, and the workmen seldom attempt to split it any thinner: the upper strata, however, grow gradually thinner. The bottom ones are so thick, that they cannot be made use of for slates; but are used for tanners vats, the pavements of floors, and cisterns for water.

FLAG, is also used for sedge, a kind of rush.

FLAGS, in the army, are small banners of distinction stuck in the baggage-waggons, to distinguish the baggage of one brigade from another, and of one battalion from another; that they may be marshalled by the wagon-master general according to the rank of their brigades, to avoid the confusion that might otherwise arise.

FLAG, in the marine, a certain banner or standard, by which an admiral is distinguished at sea from the inferior ships of his squadron; also the colours by which one nation is distinguished from another. See PLATE CIX.

In the British navy, flags are either red, white, or blue; and are displayed from the top of the main-mast, fore-mast, or mizen-mast, according to the rank of the admiral. When a flag is displayed from the flag-staff on the main-mast, the officer distinguished thereby is known to be an admiral; when from the fore-mast, a vice-admiral; and when from the mizen-mast, a rear-admiral.

The first flag in Great Britain is the royal standard, which is only to be hoisted when the king or queen are on board the vessel: the second is that of the anchor of hope, which characterizes the lord high admiral, or lords commissioners of the admiralty: and the third is the union-flag, in which the crosses of St George and St Andrew are blended. This last is appropriated to the admiral of the fleet, who is the first military officer under the lord high admiral.

The next flag after the union is that of the white squadron, at the main-mast head; and the last, which characterizes an admiral, is the blue, at the same mast-head.

For a vice-admiral, the first flag is the red, the second the white, the third the blue, at the flag-staff on the fore-mast.

The same order proceeds with regard to the rear-admirals, whose flags are hoisted on the top of the mizen-mast: the lowest flag in our navy is accordingly the blue on the mizen-mast.

To Lower or Strike the FLAG, in the marine, is to pull it down upon the cap, or to take it in, out of the

* See ASTRONOMY, n° 65, &c.



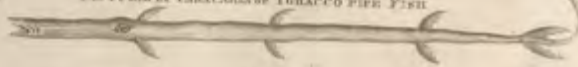
Fig. 1
Fagus LIXX



Fig. 3
Formica HERCULEANA
or LARGEST ANT



Fig. 2
PISTULAPHA TABACARIA or TOBACCO PIPE FISH



J. D. H. 1800

Flag
||
Frail.

the respect, or submission, due from all ships or fleets inferior to those any way justly their superiors. To lower or strike the flag in an engagement is a sign of yielding.

The way of leading a ship in triumph is to tie the flags to the shrouds, or the gallery, in the hind-part of the ship, and let them hang down towards the water, and to tow the vessels by the stern. Livy relates, that this was the way the Romans used those of Carthage.

To Heave out the FLAG, is to put out or put abroad the flag.

To Hang out the White FLAG, is to ask quarter; or it shews, when a vessel is arrived on a coast, that it has no hostile intention, but comes to trade, or the like. The red flag is a sign of defiance, and battle.

Corn-FLAG. See *GLADIOLUS*.

Sweet-scented FLAG. See *ACORUS*.

FLAG-Officers, those who command the several squadrons of a fleet; such are the admirals, vice-admirals, and rear-admirals.

The flag-officers in our pay, are the admiral, vice-admiral, and rear-admiral, of the white, red, and blue. See *ADMIRAL*, *FLAG*, and *FLEET*.

FLAG-Ship, a ship commanded by a general or flag-officer, who has a right to carry a flag, in contradistinction to the secondary vessels under the command thereof.

FLAGELLANTES, a sect of heretics, who chastised and disciplined themselves with whips, in public.

The sect of the Flagellantes had its rise at Perugia, in the year 1260. Its author was one Rainier, a hermit. It was in all probability no more than the effect of an indiscreet zeal. A great number of persons of all ages made processions, walking two by two, with their shoulders bare, which they whipped, till the blood ran down, in order to obtain mercy from God, and appease his indignation against the wickedness of the age. They were then called the *devout*: and having established a superior, he was called the *general of the devotion*.

Women did not appear in these public assemblies; though they practised the same severities; but it was in private, and in their own houses.

In the middle of the 14th century, the sect of the Flagellantes was restored, on occasion of a great mortality, and spread itself into all parts of Europe.

The bishops and magistrates at length found it necessary to put a stop to their excess. The writers and preachers disputed against it; but the Flagellantes remained unshaken against all they could say: so that of a number of, perhaps, innocent well-meaning zealots, pride, obstinacy and schism converted them into a dangerous sect. They held, that the blood thus spilt was mixed with that of Jesus Christ; and that by a flagellation of 24 days they gained the pardon of all their sins.

Clement VI. forbid all public flagellations. Gerfon wrote an express treatise against public flagellations.

FLAGEOLET, or *FLAJEOLET*, a little flute, used chiefly by shepherds and country-people. It is made of box or other hard wood, and sometimes of ivory; and has six holes besides that at the bottom, the mouth-piece, and that behind the neck.

FLAIL, an instrument for threshing corn. It consists of four VOL. IV.

fists of the following parts. 1. The hand-staff, or piece held in the threshers hand. 2. The swiple, or that part which strikes out the corn. 3. The caplins, or strong double leathers, made fast to the tops of the hand-staff and swiple. 4. The middle-band, being the leather thong, or fish skin, that ties the caplins together.

FLAMBEAU, a kind of large taper, made of hempen wicks, by pouring melted wax on their top, and letting it run down to the bottom. This done, they lay them to dry; after which they roll them on a table, and join four of them together by means of a red-hot iron; and then pour on more wax, till the flambeau is brought to the size required. Flambeaus are of different lengths, and made either of white or yellow wax. They serve to give light in the streets at night, or on occasion of illuminations.

FLAMBOROUGH-HEAD, in geography, a cape or promontory of Yorkshire, five miles east of Burlington. E. Long. 20°. N. Lat. 54. 15.

FLAME, is a general name for every kind of luminous vapour, provided the light it emits hath any considerable degree of intensity. The name *flame*, however, is most generally applied to such as are of a conical figure, like those arising from our common fires; without this, they are commonly called *luminous vapours*, or simply *lights*.

According to Sir Isaac Newton, flame is only *red-hot smoke*, or the vapour of any substance raised from it by fire and heated to such a degree as to emit light copiously. This definition seems to be the most accurate and expressive of any. It is certain, that bodies are capable of emitting flame only in proportion to the quantity of vapour that rises from them. Thus wood, coals, &c. which emit a great quantity of vapour, flame violently; while lead, tin, &c. which emit but a small fume, can scarce be perceived to flame at all.

This rule, however, is by no means to be depended upon in all cases. Some vapours *seem* to be in their own nature unflammable, and capable of extinguishing flame, as those of water, the mineral acids, sal-ammoniac, arsenic, &c. while others take fire on the slightest approach of a flaming substance, such as ether, spirit of wine, &c. These last mentioned substances also exhibit a remarkable phenomenon; namely, that they cannot be made to flame without the approach of some substance actually in flames beforehand. Thus, spirit of wine, poured on a red-hot iron, though instantly dissipated in vapour, will not flame; but if a burning candle touches its surface, the whole is set in a flame at once. The case is otherwise with oils, especially those of the grossier kind; for their vapours will readily be changed into flame by the mere increase of heat, without the approach of any flaming substance.

There is, however, no kind of vapour, perhaps, that is incapable of being converted into flame, provided it is exposed to a sufficient degree of heat. Thus the vapour of water, made to pass through burning coals, produces an exceedingly strong and bright flame.—It is remarkable, that this kind of vapour seems to be more powerful than almost any other in absorbing heat, and detaining it in a latent state. Dr Black hath shewn, that when any quantity of aqueous vapour is condensed, more heat will be separated from it than would have been sufficient to heat an equal bulk of iron

Flambeau
||
Flame.

red-hot.—It is most probably to this property which all vapours have of absorbing heat, and detaining it in a latent state, that we are to attribute the phenomena of flame, and also the exceeding great elasticity of steam. It is certain, that vapours, of water at least, have a much greater power of absorbing and retaining heat, than the water from which they are raised. In open vessels, water cannot be heated more than 212 degrees of Fahrenheit's thermometer; but in Papin's digester, where the vapour is forcibly confined, it has been heated to 400 of the same degrees; and, no doubt, might have been heated a great deal more, had the vessels been strong enough to bear the expansive force of the steam. On opening the vessels, however, the excess of heat was found to have refided entirely in the vapour; for the water in the vessel very soon sunk down to 212°, while the steam issued forth with great violence.

From these experiments it appears, that the steam of water, after it has absorbed as much heat in a latent state as it can contain, continues to absorb, or detain among its particles, an unlimited quantity of sensible heat; and if the steam could be confined till this quantity became great enough to be visible by its emission of light, there cannot be the least doubt that the vapour would then be converted into flame.

In what manner the heat is detained among the particles of steam, is perhaps impossible to be explained; but to this heat we must undoubtedly ascribe the violent expansive force of steam of every kind. It seems probable, that, when smoke is converted into flame, the latent heat with which the vapour had combined, or rather that which made an essential part of it, breaks forth, and adds to the quantity of sensible heat which is already present. This seems probable, from the sudden explosion with which all flames break out. If a vessel full of oil is set over the fire, a smoke or vapour begins to arise from it; which grows gradually thicker and thicker; and at last begins to shine in some places very near the surface of the oil, like an electric light, or sulphur just kindled. At this time the oil is very hot, as well as the steam which issues from it. But this last is continually giving off its sensible heat into the atmosphere; so that at the distance of an inch or two from the surface of the oil, the heat of the steam will not exceed 400 degrees of Fahrenheit, or perhaps may not be so much; but if a burning candle is held in the steam for a moment, the whole is immediately converted into flame, with something like an explosion; after which, the oil burns quietly until it is all consumed. The flame, as soon as it appears, is not only much hotter than the steam from whence it was produced, but even than the oil which lies below it. Whence, then, has this sudden and great increase of heat arisen? It could not be the *sensible* heat of the vapour, for that was greatly inferior; nor could it be communicated from the oil, for that could communicate no more than it had to itself. The candle, indeed, would communicate a quantity of heat to the vapour which touched its flame; but it is impossible that this quantity should extend permanently over a surface perhaps 100 times larger than the flame of the candle, in such a manner as to make every part of that surface equally hot with the flame of the candle itself; for this would be to suppose it to communicate 100 times more heat than really was in it. The heat therefore must

have originally resided in the vapour itself: and as, in the freezing of water, its latent heat is extricated and becomes sensible, and the water thereupon loses its fluidity; so, in the accension of vapour, the latent heat breaks forth with a bright flash, and the vapour is then totally decomposed, and converted into soot, ashes, or water, according to the different nature of the substances which produce it, or according to the intensity of the heat.—Several other hypotheses have been invented to solve the phenomena of burning and flaming bodies; for an account of which, see the articles IGNITION, PHLOGISTON, &c.

Flames are of different colours, according to the substances from which they are produced. Thus, the flame of sulphur and spirit of wine is blue; the flame of nitre and zinc, of a bright white; that of copper, of a greenish blue, &c.—These varieties afford an opportunity of making a number of agreeable representations in fire-works, which could not be done if the flame produced from every different substance was of the same colour. See PYROTECHNICS.

FLAMEN, in Roman antiquity, the name of an order of priests, instituted by Romulus or Numa; authors not being agreed on this head.

They were originally only three, viz. the flamen dialis, flamen martialis, and flamen quirinus. They were chosen by the people, and installed by the sovereign pontiff. Afterwards, their number was increased to 15; the three first of whom were senators, and called *flamines majores*; the other 12, taken from among the people, being denominated *flamines minores*.

The flamen dialis, or priest of Jupiter, was a considerable person at Rome; the flamen martialis, or priest of Mars, was the second in dignity; and the flamen quirinalis, was the next to him.

The greater flamen wore the robe edged with purple, like that of the great magistrates, had an ivory chair, and sat in the senate. They wore a little band of thread (*filamen*) about their head; from whence, according to Varro, they had their name. There were likewise *flaminicæ*, or priestesses, who were the wives of the *flamines diales*. These wore a flame-coloured habit, on which was painted the image of a thunderbolt; and above their head-dress they wore green oak-boughs. They are often mentioned in inscriptions.

FLAMINGO, in ornithology. See PHOENICOPTERUS.

FLAMINIUS, or FLAMINIO, (Mark Anthony), one of the best Latin poets in the 16th century, of Lomola in Italy, son and grandson of very learned men. The pope had chosen him secretary to the council in 1545; but he refused that employment, because, favouring the new opinions, he would not employ his pen in an assembly where he knew these opinions were to be condemned.—He paraphrased 30 of the psalms in Latin verse, and also wrote notes on the psalms; and some letters and poems which are esteemed. He died at Rome in 1550.

FLAMSTEED (John), an eminent English astronomer in the 17th century, born at Derby in 1646. He had early read a great deal of civil and ecclesiastical history; but happening to see John de Sacrobosco's book *de Sphæra*, this gave him a turn for astronomy, which

Flamsteed, which study he afterwards prosecuted with great vigour. His father, finding him in correspondence with several learned men, advised him to go to London, that he might be personally acquainted with them. In 1674, he wrote an ephemeris, in which he shewed the falsity of astrology; and gave a table of the moon's rising and setting, carefully calculated, together with the eclipses and appulses of the moon and planets to fixed stars. This fell into the hands of Sir Jonas More; for whom, at his request, he made a table of the moon's true southings. In 1674, Sir Jonas having informed him, that a true account of the tides would be highly acceptable to his majesty, he composed a small ephemeris for the king's use: and when Sir Jonas shewed the king and duke of York our author's telescopes and micrometer, and recommended him strongly, he procured him a warrant to be king's astronomer, with the salary of L. 100 *per annum*; on which occasion he was ordained. In 1675, the foundation of the royal observatory at Greenwich was laid, and during the building he lodged at Greenwich; his quadrant and telescopes being kept in the queen's house there.

His *Doctrine of the Sphere* was published in 1681, in a posthumous work of Sir Jonas More, intitled, *A new System of the Mathematics*. In 1684, he was presented to the living of Burfrow in Surry, which he enjoyed till he died in 1719. His *Historia celsitris Britannica*, was published at London in 1725, in 3 vols. Mr Flamsteed likewise composed the British Catalogue of the fixed stars, which contains twice the number that are in the catalogue of Hevelius; to each of which he annexed its longitude, latitude, right ascension, and distance from the pole, together with the variation of right ascension and declination, while the longitude increases a degree. This catalogue, together with most of his observations, were printed on a fine paper and character, at the expence of the late prince George of Denmark.

FLANDERS, a province of the Netherlands, bounded by the German sea and the United Provinces on the north; by the province of Brabant on the east; by Hainault and Artois on the south; and by another part of Artois and the German sea on the west; being about 60 miles long, and 50 broad, and divided between the Austrians, the French, and the Dutch.

Flanders is a perfectly champaign country, with not a rising ground or hill in it, and watered with many fine rivers and canals. Its chief commodities are fine lace, linen, and tapestry.

In this country some important arts were invented and improved. Weaving in general was greatly improved, and that of figures of all sorts in linen were invented; also the art of dying cloths and stuffs, and of oil-colours; the curing of herrings, &c. The manufactures of this country are not now in the flourishing state they were formerly; yet, silk, cotton, and woollen stuffs, brocades, camlets, tapestry, lace, and linen, are still manufactured here in great quantities. This province had counts of its own from the ninth century to the year 1369, when it went by marriage to the dukes of Burgundy; and afterwards from them, by marriage also, to the house of Austria. France, in 1667, seized the southern part, and the States-General obtained the northern, partly by the treaty of Munster,

and partly by the barrier-treaty of 1715.

FLANEL, or **FLANNEL**, a loose sort of woollen stuff, not crossed, and woven on a loom like bays.

FLATMAN (Thomas), an English poet of some repute, born at London about the year 1633. He studied at the Inner-Temple, and became a barrister, but it does not appear that he ever practised; for having a turn for the fine arts, he gave a loose to his inclination that way, and acquired reputation both as a poet and a painter. He published, in 1782, a third edition of his poems and songs, dedicated to the duke of Ormond, with a print of himself as a frontispiece: he also published a fatirical romance in prose, on Richard Cromwell, soon after the restoration; which took greatly at that turn of affairs. He died about 1688.

FLATS, in music. See **INTERVAL**.

FLATUS, **FLATULENCE**, in medicine; vapours generated in the stomach and intestines, chiefly occasioned by a weakness of these parts. They occasion distensions, uneasy sensation, and sickness, and often a considerable degree of pain. See (the *Index* subjoined to) **MEDICINE**.

FLAVEL (John), an eminent nonconformist minister, was educated at University-college, in Oxford; and became minister of Deptford, and afterwards of Dartmouth, in Devonshire, where he resided the greatest part of his life, and was admired for his preaching. Though he was generally respected at Dartmouth; yet, in 1685, several of the aldermen of that town, attended by the rabble, carried about a ridiculous effigy of him, to which were affixed the Bill of Exclusion and the Covenant. Upon this occasion, he thought it prudent to withdraw from the town; not knowing what treatment he might meet with from a riotous mob, headed by magistrates who were themselves among the lowest of mankind. Part of his Diary, printed with his Remains, must give the reader a high idea of his piety. He died in 1691, aged 61; and after his death, his works, which consisted of many pieces of practical divinity, were printed in two volumes folio. Among these, the most famous are his "Navigation spiritualized, or a new Compass for Seamen, consisting of 32 points of pleasant observations and serious reflections," of which there have been several editions in octavo; and his "Husbandry spiritualized, &c. with occasional meditations upon beasts, birds, trees, flowers, rivers, and several other objects," of which also there have been many editions in octavo.

FLAX, in botany. See **LINUM**.

The following particulars with regard to the manner of raising flax has been for some years past warmly recommended by the trustees for fisheries, manufactures, and improvements in Scotland.

Of the choice of the Soil, and preparing the Ground, for FLAX. A skilful flax-raiser always prefers a free open deep loam, and all grounds that produced the preceding year a good crop of turnip, cabbage, potatoes, barley, or broad clover; or have been formerly laid down rich, and kept for some years in pasture.

A clay soil, the second or third crop after being limed, will answer well for flax; provided, if the ground be still stiff, that it be brought to a proper mould, by tilling after harvest, to expose it to the winter frosts.

All new grounds produce a strong crop of flax, and pretty

pretty free of weeds. When a great many mole-heaps appear upon new ground, it answers the better for flax after one tilling.

Flax-feed ought never to be sown on grounds that are either too wet or dry; but on such as retain a natural moisture: and such grounds as are inclined to weeds ought to be avoided, unless prepared by a careful summer-fallow.

If the lintseed be sown early, and the flax not allowed to stand for seed, a crop of turnip may be got after the flax that very year; the second year a crop of bear or barley may be taken; and the third year, grafs-seeds are sometimes sown along with the lintseed. This is the method mostly practised in and about the counties of Lincoln and Somerset, where great quantities of flax and hemp are every year raised, and where these crops have long been capital articles. There, old ploughed grounds are never sown with lintseed, unless the soil be very rich and clean. A certain worm, called in Scotland the *coup-worm*, abounds in new-broke up grounds, which greatly hurts every crop but flax. In small inclosures surrounded with trees or high hedges, the flax, for want of free-air, is subject to fall before it be ripe, and the droppings of rain and dew from the trees prevent the flax within the reach of the trees from growing to any perfection.

Of preceding crops, potatoes and hemp are the best preparation for flax. In the fens of Lincoln, upon proper ground of old tillage, they sow hemp, dunging well the first year; the second year, hemp without dung; the third year, flax without dung; and that same year, a crop of turnip eat on the ground by sheep; the fourth year, hemp with a large coat of dung; and so on for ever.

If the ground be free and open, it should be but once ploughed; and that as shallow as possible, not deeper than 2½ inches. It should be laid flat, reduced to a fine garden-mould by much harrowing, and all stones and fods should be carried off.

Except a little pigeon's dung for cold or sour ground, no other dung should be used preparatory for flax; because it produces too many weeds, and throws up the flax thin and poor upon the stalk.

Before sowing, the bulky clods should be broken, or carried off the ground; and stones, quickenings, and every other thing that may hinder the growth of the flax, should be removed.

Of the choice of Lintseed. The brighter in colour, and heavier the seed is, so much the better; that which when bruised appears of a light or yellowish green, and fresh in the heart, oily and not dry, and smells and tastes sweet, and not stinky, may be depended upon.

Dutch seed of the preceding year's growth, for the most part, answers best; but it seldom succeeds if kept another year. It ripens sooner than any other foreign seed. Philadelphia-feed produces fine lint and few bolls, because sown thick, and answers best in wet cold soils. Riga-feed produces coarser lint, and the greatest quantity of seed. Scots-feed, when well winned and kept, and changed from one kind of soil to another, sometimes answers pretty well; but should be sown thick, as many of its grains are bad, and fail. It springs well, and its flax is sooner ripe than any other; but its produce afterwards is generally inferior to that from fo-

reign feed.

A kind has been lately imported, called *menmel-feed*; which looks well, is short and plump, but seldom grows above eight inches, and on that account ought not to be sown.

Of Sowing Lintseed. The quantity of lintseed sown, should be proportioned to the condition of the soil; for if the ground be in good heart, and the seed sown thick, the crop will be in danger of falling before it is ready for pulling. From 11 to 12 pecks Linlithgow measure of Dutch or Riga feed, is generally sufficient for one Scots acre; and about ten pecks of Philadelphia feed, which, being the smallest grained, goes farthest. Riga lintseed, and the next year's produce of it, is preferred in Lincolnshire.

The time for sowing lintseed is from the middle of March to the end of April, as the ground and season answers; but the earlier the seed is sown, the less the crop interferes with the corn-harvest.

Late sown lintseed may grow long, but the flax upon the stalk will be thin and poor.

After sowing, the ground ought to be harrowed till the seed is well covered, and then (supposing the soil, as before mentioned, to be free and reduced to a fine mould) it ought to be rolled.

When a farmer sows a large quantity of lintseed, he may find it proper to sow a part earlier and part later, that in the future operations of weeding, pulling, watering, and grafting, the work may be the easier and more conveniently gone about.

It ought always to be sown on a dry bed.

Of Weeding FLAX. It ought to be weeded when the crop is about four inches long. If longer deferred, the weeders will so much break and crook the stalks, that they will never perhaps recover their straightness again; and when the flax grows crooked, it is more liable to be hurt in the rippling and swingling.

Quicken-grafs should not be taken up; for, being strongly rooted, the pulling of it always loosens a deal of the lint.

If there is an appearance of a settled drought, it is better to defer the weeding, than by that operation to expose the tender roots of the flax to the drought.

How soon the weeds are got out, they ought to be carried off the field, instead of being laid in the furrows, where they often take root again, and at any rate obstruct the growth of the flax in the furrows.

Of Pulling FLAX. When the crop grows so short and branchy, as to appear more valuable for seed than flax, it ought not to be pulled before it be thoroughly ripe; but if it grows long and not branchy, the seed should be disregarded, and all the attention given to the flax. In the last case it ought to be pulled after the bloom has fallen, when the stalk begins to turn yellow, and before the leaves fall, and the bolls turn hard and sharp-pointed.

When the stalk is small, and carries few bolls, the flax is fine; but the stalk of coarse flax is gros, rank, branchy, and carries many bolls.

When the flax has fallen, and lies; such as lies ought to be immediately pulled, whether it has grown enough or not, as otherwise it will rot altogether.

When parts of the same field grow unequally, so that some parts are ready for pulling before other parts; only what is ready should be pulled, and the rest should

be suffered to stand till ready.

The flax-raiser ought to be at pains to pull, and keep by itself, each different kind of lint which he finds in his field; what is both long and fine, by itself; what is both long and coarse, by itself; what is both short and fine, by itself; what is both short and coarse, by itself; and in like manner every other kind by itself that is of the same size and quality. If the different kinds be not thus kept separate, the flax must be much damaged in the watering and the other succeeding operations.

What is commonly called under-growth may be neglected as useless.

Few persons that have seen pulled flax, are ignorant of the method of laying it in handfuls across each other; which gives the flax sufficient air, and keeps the handfuls separate and ready for the rippler.

Of Stacking up FLAX during the Winter, and Winning the Seed.

If the flax be more valuable than the seed, it ought by no means to be stacked up; for its own natural juice affords it greatly in the watering; whereas, if kept long unwatered, it loses that juice, and the harle adheres so much to the boon, that it requires longer time to water, and even the quality of the flax becomes thereby harsher and coarser. Besides, the flax stacked up over year, is in great danger from vermin and other accidents; the water in spring is not so soft and warm as in harvest; and near a year is thereby lost of the use of the lint: but if the flax be so short and branchy as to appear most valuable for seed, it ought, after pulling, to be stooked and dried upon the field, as is done with corn; then stacked up for winter, rippled in spring; and after shelling, the seed should be well cleaned from bad seeds, &c.

Of Rippling FLAX. After pulling, if the flax is to be regarded more than the seed, it should be allowed to lie some hours upon the ground to dry a little, and so gain some firmness, to prevent the skin or harle, which is the flax, from rubbing off in the rippling; an operation which ought by no means to be neglected, as the bolls, if put into the water along with the flax, breed vermin there, and otherwise spoil the water. The bolls also prove very inconvenient in the grassing and breaking.

In Lincolnshire and Ireland, they think that rippling hurts the flax; and therefore, in place of rippling, they strike the bolls against a stone.

The handfuls for rippling should not be great, as that endangers the lint in the rippling comb.

After rippling, the flax-raiser will perceive, that he is able to assort each size and quality of the flax by itself more exactly than he could before.

Of Watering FLAX. A running stream wastes the lint, makes it white, and frequently carries it away. Lochs, by the great quantity and motion of the water, also waste and whiten the flax, tho' not so much as running streams. Both rivers and lochs water the flax quicker than canals.

But all flax ought to be watered in canals, which should be digged in clay ground if possible, as that soil retains the water best: but if a firm retentive soil cannot be got, the bottom or sides of the canal, or both the bottom and sides, may be lined with clay; or, instead of lining the sides with clay, which might fall down, a ditch may be dug without the canal, and

filled with clay, which will prevent both extraneous water from entering, and the water within from running off.

A canal of 40 feet long, six broad, and four deep, will generally water the growth of an acre of flax.

It ought to be filled with fresh soft water from a river or brook, if possible two or three weeks before the flax is put in, and exposed all that time to the heat of the sun. The greater way the river or brook has run, the softer, and therefore the better, will the water be. Springs, or short-runs from hills, are too cold, unless the water is allowed to stand long in the canal. Water from coal or iron, is very bad for flax. A little of the powder of galls thrown into a glass of water, will immediately discover if it comes from minerals of that kind, by turning it into a dark colour, more or less tinged in proportion to the quantity of vitriol it contains.

The canal ought not to be under shade; which, besides keeping the sun from softening the water, might make part of the canal cooler than other parts, and so water the flax unequally.

The flax-raiser will observe, when the water is brought to a proper heat, that small plants will be rising quickly in it, numbers of small insects and reptiles will be generating there, and bubbles of air rising on the surface. If no such signs appear, the water must not be warm enough, or is otherwise unfit for flax.

Moss-holes, when neither too deep nor too shallow, frequently answer well for watering flax, when the water is proper, as before described.

The proper season for watering flax is, from the end of July to the end of August.

The advantage of watering flax as soon as possible after pulling, has been already mentioned.

The flax being sorted after rippling, as before mentioned, should next be put in beets, never larger than a man can grasp with both his hands, and tied very slack, with a band of a few stalks. Dried rushes answer exceedingly well for binding flax, as they do not rot in the water, and may be dried and kept for use again.

The beets should be put into the canals slope-ways, or half standing upon end, the root-end uppermost. Upon the crop-ends, when aftermolt, there frequently breeds a deal of vermin, destructive of the flax, which is effectually prevented by putting the crop-end down-molt.

The whole flax in the canal ought to be carefully covered from the sun with divots; the grassy side of which should be next the flax, to keep it clean. If it is not thus covered, the sun will discolour the flax, tho' quite covered with water. If the divots are not weighty enough to keep the flax entirely under water, a few stones may be laid above them. But the flax should not be pressed to the bottom.

When the flax is sufficiently watered, it feels soft to the grip, and the harle parts easily with the boon or straw, which last is then become brittle, and looks whitish. When these signs are found, the flax should be taken out of the water, beet after beet; each gently rinsed in the water, to cleanse it of the natins which has gathered about it in the canal; and as the lint is then very tender, and the beet slackly tied, it must be

care-

Flax.

Flax.

carefully and gently handled,

Great care ought to be taken that no part be overdone; and as the coarsest waters soonest, if different kinds be mixed together, a part will be rotted, when the rest is not sufficiently watered.

When lint taken out of the canal is not found sufficiently watered, it may be laid in a heap, for 12, 18, or 24 hours, which will have an effect like more watering; but this operation is nice, and may prove dangerous in unskilful hands.

After the flax is taken out of the canal, fresh lint should not be put a second time into it, until the former water be run off, and the canal cleaned, and supplied with fresh water.

Of Grafting FLAX. Short heath is the best field for grafting flax; as, when wet, it fastens to the heath, and is thereby prevented from being blown away by the wind. The heath also keeps it a little above the earth, and so exposes it the more equally to the weather. When such heath is not to be got, links, or clean old lea-ground is the next best. Long-grass grounds should be avoided, as the grass growing thro' the lint frequently spots, tenders, or rots it; and grounds exposed to violent winds should also be avoided.

The flax, when taken out of the water, must be spread very thin upon the ground; and being then very tender, it must be gently handled. The thinner it is spread the better, as it is then the more equally exposed to the weather. But it ought never to be spread during a heavy shower, as that would wash and waste the harle too much, which is then excessively tender, but soon after becomes firm enough to bear the rains, which, with the open air and sunshine, cleans, softens, and purifies the harle to the degree wanted, and makes it blither from the boon. In short, after the flax has got a little firmness by being a few hours spread in dry weather, the more rain and sunshine it gets the better.

Follows an Estimate of the Expence, Produce, and Profit of a Scots Acre of FLAX,—supposing the season favourable, that no accidental losses happen, and that the farmer is neither unskilful nor negligent.

	<i>A medium crop.</i>	<i>A great crop.</i>	<i>An extra. crop.</i>
Ground-rent, labouring the ground, and leading the flax	L. 2 10 0	L. 3 10 0	L. 5 0 0
Lintseed from L. 2 to L. 4 per hoghead, the medium			
3 s. 4 d. per peck	1 16 8	1 10 0	1 6 8
Clodding and sowing	for 11 pecks. 0 2 0	for 9 pecks. 0 2 0	for 8 pecks. 0 2 0
Weeding	0 12 0	0 8 0	nothing.
Pulling, ripling, putting in, and covering in the water	0 14 0	0 15 0	1 0 0
Taking out of the water, grafting, and flacking	0 8 0	0 12 0	0 18 0
Breaking and scutching, at 2 s. per stone	3 0 0	4 0 0	6 0 0
	for 30 stones.	for 40 stones.	for 60 stones.
Total expence	L. 9 2 8	L. 10 17 0	L. 14 6 8
Produce at 10 s. per stone	L. 15 0 0	L. 20 0 0	L. 30 0 0
Lintseed fold for oil at 1 s. per peck	for 30 stones. 0 16 0	for 40 stones. 0 18 0	for 60 stones. 1 0 0
The chaff of the bolls is well worth the expence of drying the seed; as it is good food, when boiled and mixed with beer, for horses.			
Total produce	L. 15 16 0	L. 20 18 0	L. 31 0 0
Balance for profit	L. 6 14 4	L. 10 1 0	L. 16 13 4

There

If there be little danger of high winds carrying off the flax, it will be much the better of being turned about once a-week. If it is not to be turned, it ought to be very thin spread. The spreading of flax and hemp, requires a deal of ground, and enriches it greatly.

The skilful flax-raiser spreads his first row of flax at the end of the field opposite to the point from whence the most violent wind commonly comes, placing the root-ends foremost; he makes the root-ends of every other row overlap the crop-ends of the former row three or four inches, and binds down the last row with a rope; by which means the wind does not easily get below the lint to blow it away: and as the crop-ends are seldom so fully watered as the root-ends, the aforesaid overlapping has an effect like giving the crop-ends more watering. Experience only can fully teach a person the signs of flax being sufficiently grafted: then it is of a clearer colour than formerly; the harle is blithered up, and easily parts with the boon, which is then become very brittle. The whole should be sufficiently grafted before any of it is lifted; for if a part be lifted sooner than the rest, that which remains is in great danger from the winds.

A dry day ought to be chosen for taking up the flax; and if there is no appearance of high wind, it should be loosed from the heath or grafs, and left loose for some hours, to make it thoroughly dry.

As a great quantity of flax can scarcely be all equally watered and grafted, and as the different qualities will best appear at lifting the flax off the grafs; therefore at that time each different kind should be gathered together, and kept by itself; that is, all of the same colour, length, and quality.

The smaller the beets lint is made up in the better for drying, and the more convenient for flacking, housing, &c. and in making up these beets, as in every other operation upon flax, it is of great consequence that the lint be laid together as it grew, the root-ends together, and the crop-ends together.

Flax.

There is nothing stated here as expense of the canal in which the flax is watered; because that varies much according to the conveniencies people have for making it; and a canal once made requires for after-years only to be repaired and cleansed.

It is a certain fact, that the greater the crop is, the better is the quality of the same kind of flax.

The advantage of having both a crop of flax and a crop of turnip the same year—or of sowing grafs-seeds along with the lintseed—and of reducing the ground to a fine garden mould, free of weeds, ought to be attended to.

For Cambrick and fine Laven. The ground must be a rich light soil, rather sandy, but cannot be too rich.

It ought to be ploughed in September, or the beginning of October, first putting a little hot rotten dung upon it. In January it ought to have a second ploughing, after a hard frost; and when you intend to sow it, plough it a third time, or rather hoe it, reducing the clods very fine; but make no furrows: the land must be made level like a garden; but never work the land when wet.

The seed should be sown the beginning of April, and about double the quantity that is generally sown by our farmers; if the land be very rich, it will require rather more than double.

As soon as sown (if the weather be dry) it will be necessary to roll the ground.

The lint must be weeded very clean when about three inches high; directly after which you must set forked sticks, of about one-and-half inch thick (which ought to be prepared before) every four or five feet, according to the length of the poles you are to lay upon them; they should be well fixed in the ground, the forked part to receive the poles about six or seven inches above the lint; each row of poles should be two, three, or four feet asunder, according to the length of the brushwood you are to lay upon them.

The poles ought to be from 10 to 15 feet long, and strong enough to support the brush across the poles; take the longest brushwood you can get, the more branchy the better, very thick, filling up the vacancies with smaller brush, and any of the branches that rise higher than 18 or 20 inches ought to be lopped off to make the brush lie as level as possible: any sort of brush will do except oak, as that tinges the lint.

Your lint must be pulled as soon as the seed is fully formed, which is a few days after it is out of the bloom before the lint turn yellow.

It must be pulled above the brushwood, and every handful laid upon it as soon as possible: if it is fine weather, leave it four or five hours in that manner; then carry it to a screen near a barn, to put it under cover in case of rain; there it must be spread four or five days, and always put in the barn at night, or when it appears to rain: the bundles must be opened in the barn, or made hollow, to prevent it from heating.

These operations must be performed until the lint is perfectly dry, and out of danger of heating; taking care all the time to keep the roots as even as possible, and if possible keep it from rain or wet: if you cannot prevent it from being wet, it will be better to leave it on the grafs till dry; because when once wet, the putting it under cover before dry, will make it turn black; a thing which must be prevented at all events.

Flax.

If any of the lint upon the border, or through the piece of ground, be coarser than another, it must be separated from the rest.

The utmost care must be taken to preserve the lint entire, or unbroken; for this reason they beat off the seed with a round mell or bittle.

The most proper ground is summer-fallow, or after potatoes, or lea; if possible near a wood, to prevent the expence of carrying brush.

As soon as the seed is off, if you intend to water it that season, it must be tied in bundles about as large as you can grasp with your two hands.

The water proper for it, is a very small rivulet or soft spring free of any metallic ore; taking care that no flood or foul water enters your pit; which must be at least five feet deep, about nine or ten broad at the top, and seven or eight at the bottom, the length will depend on the quantity of flax you have to water. A very small stripe of water, when clear, should always be running in and off from your pit when the lint is in it.

The pit ought to be made three or four months before it be used.

You must drive poles about four inches thick, with a hook inclining downwards, in this form 7, all along the sides of the pit, about five feet asunder. The hooks must be level with, or rather under, the surface of the water. A long pole, the whole length of the pit, must be fixed into these hooks on each side; and cross poles put under that, to keep the lint under water; but, the cross poles are not used till the lint is put in. You must order it so, that all the lint should be three or four inches under water. You next bring your lint to the sides of the pit; then put your sheaves head to head, causing each to overlap the other about one third, and take as many of these as make a bundle of two or two-and-a-half feet broad, laying the one above the other, till it is about four or four-and-a-half feet high; then you tie them together in the middle, and at each root-end: after this, you wrap your bundle in straw, and lay it in the water, putting the thin or broad side undermost, taking care that none of your lint touch the earth; after it is fully pressed under water, put in your cross poles to keep it under. The bundles ought to lie in the pit a foot separate from each other. This renders it easy to take out; for, if the bundles entangle, they will be too heavy to raise.

The time of watering depends so much upon the weather, and softness or hardness of the water, that it is impossible to fix any certain time. This must be left to the skill of the farmer. If the flax be intended for spinning yarn soft and fit for cambrick, it ought to be spread upon short grafs for four or five days before you put it into the water; but if for lawns, lace, or thread, it is best to dry it outright. In either case, avoid as much as possible to let it get rain; as much rain blanches and washes out the oil, which is necessary to preserve the strength.

The great property of this flax is to be fine and long. Thick sowing raises all plants fine and slender; and when the ground is very rich, it forces them to a great length. Pulling green prevents that coarse hardness which flax has when let stand till it be full ripe, and gives it the fine silky property. The brushwood, when the flax springs up, catches it by the middle,

Flax.

de, prevents it from lying down and rotting; infallible consequences of sowing thick upon rich ground. It likewise keeps it straight, moist, and soft at the roots; and by keeping it warm, and shaded from the sun, greatly promotes its length. The keeping it from rain, heating, taking proper care of your water, preserves the colour, and prevents those bars in cloth so much complained of by bleachers.

FLAX-DRESSING. For many ages it was the practice to separate the boon or core from the flax, which is the bark of the plant, by the following simple *hand methods*. First, for breaking the boon, the stalks in small parcels were beat with a mallet; or, more dexterously, the *break* (Plate CX. fig. 1. and 2.) was used thus: The flax being held in the left-hand a-crofs the three *under-teeth* or *swords* of the break (A, fig. 1. and a, fig. 2.), the *upper-teeth* (B, fig. 1. and b, fig. 2.) were with the right-hand quickly and often forced down upon the flax, which was artfully shifted and turned with the left-hand. Next, for clearing the flax of the broken boon: the workman with his left-hand held the flax over the *stock* (fig. 3. and 4.) while with his right-hand he struck or threshed the flax with the *scutcher* (fig. 5.).

These methods of breaking and scutching the flax being slow and very laborious, a *water-mill* was invented in Scotland about 40 years ago; which, with some late improvements, makes great dispatch, and in skilful and careful hands gives satisfaction. It has been generally constructed to break the boon by three dented rollers, placed one above the other. The middle one of which, being forced quickly round, takes the other two along with it, and one end of the handfuls of the flax being by the workman directed in between the upper and middle rollers, the flax is immediately drawn in by the rollers; a curved board or plate of tin behind the rollers directs the flax to return again between the middle and undermost rollers;—and thus the operation is repeated until the boon be sufficiently broke. Great weights of timber or stone at the ends of levers, press the upper and under rollers towards the middle one.

The scutching is next carried on by the mill in the following manner: Four arms, something like the hand-scutchers before described, project from a perpendicular axle; a box around the axle incloses these projecting scutchers; and this box is divided among the workmen, each having sufficient room to stand and handle his flax, which, through slits in the upper part and sides of the box, they hold in to the stroke of the scutchers; which, moving round horizontally, strike the flax a-crofs or at right angles, and so thresh out or clear it of the boon.

The breaking of the flax by *rollers* is scarcely subject to any objection, but that it is dangerous to workmen not sufficiently on their guard, who sometimes allow the rollers to take hold of their fingers, and thereby their whole arm is instantly drawn in: thus many have lost their arms. To avoid this danger, a break upon the general principles of the hand-break before described, has been lately adapted to water-machinery, and used in place of rollers. The horizontal stroke of the scutchers was long thought too severe, and wasteful of the flax; but very careful experiments have discovered that the waste complained

Flax.

of must be charged to the unskilfulness or negligence of the workmen, as in good hands the mill carries away nothing but what, if not so scutched off, must be taken off in the heckling with more loss both of time and flax. But to obviate this objection of the violence of the *horizontal scutchers*, an imitation of hand-scutching has lately been applied to water. The scutchers then project from an horizontal axle, and move like the arms of a check-reel, striking the flax neither across nor perpendicularly down, but sloping in upon the parcel exactly as the flax is struck by the hand-scutcher. This sloping stroke is got by raising the scutching-stock some inches higher than the centre of the axle; and by raising or lowering the stock, over which the flax is held, or screwing it nearer to or farther from the scutchers, the workman can temper or humour the stroke almost as he pleases.

A lint-mill with horizontal scutchers upon a perpendicular axle, requires a house of two stories, the rollers or break being placed in the ground story, and the scutchers in the loft above; but a mill with vertical scutchers on an horizontal axle, requires but one ground story for all the machinery.

Another method of breaking and scutching flax, more expeditious than the old hand-methods, and more gentle than water-mills, has also been lately invented in Scotland. It is much like the break and scutcher giving the sloping stroke last described, moved by the foot. The treddle is remarkably long, and the scutchers are fixed upon the rim of a fly-wheel. The foot-break is also assisted in its motion by a fly. These foot-machines are very useful where there are no water-mills, but they are far inferior to the mills in point of expedition.

The next operation that flax undergoes after scutching is heckling. The *heckle* (fig. 6.) is firmly fixed to a bench before the workman, who strikes the flax upon the teeth of the heckle, and draws it through the teeth. To persons unacquainted with that kind of work this may seem a very simple operation; but, in fact, it requires as much practice to acquire the slight of heckling well, and without wasting the flax, as any other operation in the whole manufacture of linen. They use coarser and wider toothed heckles, or finer, according to the quality of the flax; generally putting the flax thro' two heckles, a coarser one first, and next a fine one.

Flax for cambric and fine lawn, thread, and lace, is dressed in a manner somewhat different. It is not sketched so thoroughly as common flax; which from the sketch proceeds to the heckle, and from that to the spinner: whereas, this fine flax, after a rough sketching, is scraped and cleaned with a blunt knife upon the workman's knee covered with his leather-apron; from the knife it proceeds to the spinner, who, with a brush made for the purpose, straightens and dresses each parcel just before he begins to spin it.

FLAX made to resemble Cotton. In the Swedish transactions for the year 1747, a method is given of preparing flax in such a manner as to resemble cotton in whiteness and softness, as well as in coherence. For this purpose, a little sea-water is to be put into an iron pot or an untinned copper-kettle, and a mixture of equal parts of birch-ashes and quicklime strewed upon it: A small bundle of flax is to be opened

and

Fig. 1. Flax hand break

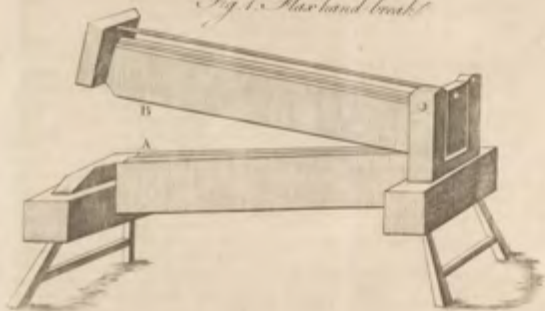
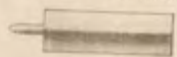


Fig. 2. Section of the Break



Fig. 5. Hand Skutcher



Skutching Stock

Fig. 3. Side view



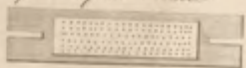
Fig. 4. Front view



Fig. 6. Heddle



Fig. 7. plan of the Heddle



and spread upon the surface, and covered with more of the mixture, and the stratification continued till the vessel is sufficiently filled. The whole is then to be boiled with sea-water for ten hours, fresh quantities of water being occasionally supplied in proportion to the evaporation, that the matter may never become dry. The boiled flax is to be immediately washed in the sea by a little at a time, in a basket, with a smooth stick: When grown cold enough to be borne by the hands, it must be well rubbed, washed with soap, laid to bleach, and turned and watered every day. Repetitions of the washing with soap expedite the bleaching; after which the flax is to be beat in again well washed; when dry, it is to be worked and carded in the same manner as common cotton, and pressed betwixt two boards for 48 hours. It is now fully prepared and fit for use. It loses in this process near one half its weight, which is abundantly compensated by the improvement made in its quality.

Earth-Flax. See AMIANTHUS.

New-Zealand Flax-Plant. See PHORMIUM.

Thread-Flax. See LINARIA.

FLEA, in zoology. See PULEX,

FLEA-Bane, in botany. See CONYZA.

FLEA-Bitten, that colour of a horse, which is white or grey, spotted all over with dark reddish spots.

FLEAM, in surgery and farriery, an instrument for letting blood of a man or horse. A case of fleams, as it is called by farriers, comprehends six sorts of instruments; two hooked ones, called *drawers*, and used for cleaning wounds; a pen-knife; a sharp-pointed lancet, for making incisions; and two fleams, one sharp and the other broad pointed. These last are somewhat like the point of a lancet, fixed in a flat handle, and no longer than is just necessary to open the vein.

FLECHIER (Efpit), bishop of Nîmes, one of the most celebrated preachers of his age, and the publisher of many panegyrics and funeral orations, was born at Perne in Avignon, in 1632. He was nominated to the bishoprick of Lavaur in 1685, and translated to Nîmes in 1687. At this latter place he founded an academy, and took the presidentship upon himself: his own palace was indeed a kind of academy, where he applied himself to train up orators and writers, who might serve the church, and do honour to the nation. He published, besides his panegyrics and funeral orations, 1. An history of the emperor Theodosius, that of cardinal Ximenes, and that of cardinal Commendon. 2. Several sermons. 3. Miscellaneous works. 4. Letters, &c. He died in 1710.

FLECKNOE (Richard), an English poet in the reign of Charles II. more remarkable for Mr Dryden's satire on him, than for any works of his own. He is said to have been originally a jesuit, and to have had good English connexions in the Catholic interest. When Dryden lost the place of poet-laureat on the revolution, its being conferred on Flecknoe, for whom he had a settled aversion, gave occasion to his poem intitled *Mac Flecknoe*, one of the best-written satires in our language, and from which Pope seems to have taken the hint for his Dunciad. Flecknoe wrote some plays; but could never get more than one of them acted, and that was damned.

FLEECE, the covering of gold shorn off the bodies of sheep. See WOOL.

VOL. IV.

GOLDEN FLEECE. See GOLDEN FLEECE.

FLEET, commonly implies a company of ships of war, belonging to any prince or state: but sometimes it denotes any number of trading ships, employed in a particular branch of commerce.

The admirals of his Britannic majesty's fleet are divided into three squadrons, viz. the red, the white, and the blue. When any of these officers are invested with the command of a squadron or detachment of men of war, the particular ships are distinguished by the colours of their respective squadron: that is to say, the ships of the red squadron wear an ensign whose union is displayed on a red field; the ensigns of the white squadron have a white field; and those of the blue squadron, a blue field; the union being common to all three. The ships of war therefore are occasionally annexed to any of the three squadrons, or shifted from one to another.

Of whatsoever number a fleet of ships of war is composed, it is usually divided into three squadrons; and these, if numerous, are again separated into divisions. The admiral, or principal officer, commands the centre; the vice-admiral, or second in command, superintends the van-guard; and the operations of the rear are directed by the rear-admiral, or the officer next in rank. See the article DIVISION.

The disposition of a fleet, while proceeding on a voyage, will in some measure depend on particular circumstances; as the difficulty of the navigation; the necessity of dispatch, according to the urgency or importance of the expedition; or the expectation of an enemy in the passage. The most convenient order is probably to range it into three lines or columns, each of which is parallel to a line close-hauled according to the tack on which the line of battle is designed to be formed. This arrangement is more useful than any, because it contains the advantages of every other form, without their inconveniences. The fleet being thus more inclosed will more readily observe the signals, and with greater facility form itself into the line of battle; a circumstance which should be kept in view in every order of sailing. See NAVAL TACTICS.

FLEET, is also a noted prison in London, where persons are committed for contempt of the king and his laws, particularly of his courts of justice: or for debt, where any person will not or is unable to pay his creditors.

There are large rules and a warden belonging to the fleet prison; which had its name from the float or fleet of the river or ditch, on the side whereof it stands.

FLEETWOOD (William), a very learned English bishop in the beginning of the 18th century, of an ancient family in Lancashire. He distinguished himself during king William's reign, by his *Inscriptionum Antiquarum Sylloge*, by several sermons he preached on public occasions, and by his *Essay on Miracles*. He was designed by king William to a canonry of Windsor: the grant did not pass the seals before the king's death, but the queen gave it him, and he was installed in 1702. In 1703, he took a resolution to retire; and in 1707, published, without his name, his *Chronicon Pretiosum*. In 1708, he was nominated by the queen to the see of St Asaph. The change of the queen's ministry gave him much regret. In 1715, he published a pamphlet intitled "The 13th chapter of the Ro-

Flemish
Fleur.

Flexible
Flintshire.

mans vindicated from the abusive senses put upon it." In 1714, he was translated to the bishopric of Ely; and died in 1723, aged 67. He published several other sermons and tracts, and was a man of great learning and exemplary piety.

FLEMISH, or the **FLEMISH TONGUE**, is that which we otherwise call *low Dutch*, to distinguish it from the *German*, whereof it is a corruption and a kind of dialect. See **GERMAN**.

It differs from the *Walloon*, which is a corruption of the French language. The *Flemish* is used thro' all the provinces of the Netherlands.

FLEMISH-Bricks, a neat, strong, yellow kind of bricks, brought from Flanders, and commonly used in paving yards, stables, &c. being preferable for such purposes to the common bricks. See the article **BRICK**.

FLESH, in anatomy, a similar, fibrous part of an animal body, soft and bloody, being that whereof most of the other parts are composed, and whereby they are connected together: or more properly, it is such parts of the body where the blood-vessels are so small, as only to retain blood enough to preserve their colour red.

FLETA, the name given to an unknown writer who lived about the end of the reign of Edward II. and beginning of Edward III. and who being a prisoner in the Fleet, wrote there an excellent treatise on the common law of England.

FLETCHER. See **BRAUMONT** and *Fletcher*.

FLETEWOOD (William), an eminent English lawyer and recorder of London, in the reign of queen Elizabeth. He was very zealous in suppressing mas-houses, and committing Popish priests: but once rushing in upon mas at the Portuguese ambassador's house, he was committed to the Fleet for breach of privilege, but soon released. Mr Wood says, "He was a learned man, and a good antiquary, but of a marvellous merriness and pleasant conceit." "He was a good popular speaker, and wrote well upon subjects of government. His principal works are, 1. *Annalium tan regum Edwardi V. Richardi III. & Henrici VII. quam Henrici VIII.* 2. A table of the reports of Edmund Plowden. 3. The office of a justice of peace. He died about the year 1593.

FLEURI (Claude), one of the best French critics and historians of his age, was born at Paris in 1640. He applied himself to the law, was made advocate for the parliament of Paris, and attended the bar nine years; he then entered into orders, and was made preceptor to the princes of Conti. In 1689, the king made him sub-preceptor to the dukes of Burgundy, Anjou, and Berry; and in 1706, when the education of these young princes was completed, the king gave him the priory of Argenteville belonging to the Benedictines in the diocese of Paris. In 1716, he was chosen counsellor to Lewis XV. and died in 1723. He was the author of a great number of esteemed French works, the principal of which are, 1. An ecclesiastical history, in 20 volumes, the last of which ends with the year 1414. 2. The manners of the Israelites and Christians. 3. Institutions of ecclesiastical law. 4. An historical catechism. 5. On the choice and method of study. 6. The duties of masters and servants, &c.

FLEURI (Andrew Hercules de), bishop of Frejus,

preceptor to Lewis XV. grand almoner to the queen, cardinal, and minister of state, was born in 1653, and died in 1743. He was an able negotiator; and distinguished himself during his ministry by his probity, his zeal for the happiness of his country, and his pacific disposition.

FLEXIBLE, in physics, a term applied to bodies capable of being bent or diverted from their natural figure or direction.

FLEXOR, in anatomy, a name applied to several muscles, which are so called from their office, which is to bend the parts to which they belong; in opposition to the *extensor*, which open or stretch them. See **ANATOMY**, n° 83, p. o, p, q.

FLINT, in natural history, a kind of semi-transparent, or quite opaque stones; generally of a roundish form, and covered with white crust; of a smooth, uniform, shining texture; so hard, that they will strike fire with steel; calcinable by fire, after which they become white, friable, and, according to Hemckel, heavier than before, and soluble by acids; vitrifiable only by the very violent heat of the largest speculums, such as that of Villette, and not even by the focus of one of Tschirnhausen's lenses, according to an experiment of Neumann. They are found generally in beds of chalk and of sand; but never forming entire strata of rock as Jasper does. By long exposure to air and the sun, they seem to decay, to lose their lustre, their firmness of texture, and to be changed to a white calcareous earth or chalk. Hence they are almost always found covered with a white chalky crust. They are also convertible into a calcareous earth by fusion, or vitrification with so much fixed alkali, that they shall resolve into a liquid mass called the *liquamen* or *oil of flint*, and by precipitation from the fixed alkali by means of acids. See **CHEMISTRY**, n° 338.

FLINTS are of the class of earths called *vitrifiable*, because these earths are generally employed, together with fixed alkali, as materials in the making of glass. See **GLASS**.

Breaking of FLINTS. The art of cutting, or rather breaking, flint-stones into uniform figures, is by some supposed to be one of the arts now lost. That it was known formerly, appears from the ancient Bridewell at Norwich, from the gate of the Augustin friars at Canterbury, that of St John's Abbey at Colchester, and the gate near Whitehall Westminster. But that the art is not lost, and that the French know it, appears from the platform on the top of the royal observatory at Paris; which, instead of being leaded, is paved with flint cut or broke into regular figures. But we know not that this art hath been any where described.

FLINTSHIRE, a county of Wales, bounded on the north by the Irish sea and the river Dee, on the east by Cheshire, and every where else by Denbighshire and Shropshire. It is the least of all the counties of Wales, extending in length between 20 and 30 miles, and in breadth about eight. It is divided into five hundreds; and contains about 28 parishes, and 32,000 inhabitants. The air is healthful, but pretty sharp; the soil is tolerably fertile, especially in the valleys, producing plenty of wheat, barley, oats, and rye. A considerable number of cattle are reared in this county, but they are of a small size. There is plenty of honey, of which the inhabitants make mead, theglin,

Float
Floralia.

theelin, a drink much used in Wales. Here are also pit-coal, lead-ore, mill-stones, fish and fowl, but little wood or fruit.

FLOAT, a certain quantity of timber bound together with rafters athwart, and put into a river to be conveyed down the stream; and even sometimes to carry burdens down a river with the stream.

FLOAT-Boards, those boards fixed to water-wheels of under-shot mills, serving to receive the impulse of the stream, whereby the wheel is carried round. See the articles **WHEEL** and **MILL**.

It is no advantage to have too great a number of float-boards; because, when they are all struck by the water in the best manner that it can be brought to come against them, the sum of all the impulses will be but equal to the impulse made against one float-board at right angles, by all the water coming out of the penstock through the opening, so as to take place on the float-board. The best rule in this case is, to have just so many, that each of them may come out of the water as soon as possible, after it has received and acted with its full impulse. As to the length of the float-board, it may be regulated according to the breadth of the mill. See the article **MILL**.

FLOATS for Fishing. See **FISHING-Floats**.

FLOATAGES, all things floating on the surface of the sea or any water; a word much used in the commissions of water-bailiffs.

FLOATING-Bridge. See **BRIDGE**.

FLOOD. See **DELUGE**.

Deucalion's Flood. See **DEUCALION**.

FLOOKING, among miners, a term used to express a peculiarity in the load of a mine. The load, or quantity of ore is frequently intercepted in its course by the crossing of a vein of earth or stone, or some different metallic substance; in which case the load is moved to one side, and this transient part of the land is called a *flooking*.

FLORA, the goddess of flowers, was, according to the poets, the wife of Zephyrus, and was first honoured among the Sabines; but, according to Lactantius, she was a lady of pleasure, who, having gained large sums of money by prostituting herself, made the Roman people her heir, on condition that certain games, called *Floralia*, might be annually celebrated on her birth-day. Her image in the temple of Castor and Pollux was dressed in a close habit, and she held in her hands the flowers of pease and beans: but the modern poets and painters have been more lavish in setting off her charms, considering that no parts of nature offered such innocent and exquisite entertainment to the sight and smell, as the beautiful variety which adorns, and the odour which embalms, the floral creation.

FLORALIA, in Roman antiquity, a festival in honour of Flora, observed on the 29th of April, or the fifth of the calends of May, at which time games were celebrated in the Campus Martius, which were proclaimed by sound of trumpet. These games were celebrated in a very scandalous manner: and were in some sense the festival of the courtizans. To hide the shameful origin of this festival, the senate made the people believe Flora was a goddess, who presided over flowers; and that, in order to have a good crop, it was necessary to honour that goddess every year.

Floor,
Florence.

FLOOR, in architecture, the under side of a room, or that part we walk on.—Floors are of several sorts; some of earth, some of brick, some of stone, and some of wood. See **ARCHITECTURE**, n° 116. and **PAVING**.

Floor of a Ship, as much of her bottom as the keels upon which she rests on the ground.—Such ships as have long and broad floors, lie on the ground with most security; and those that are narrow in the floor cannot be grounded without danger either of being overfet, or at least of hurting their sides.

FLORENCE, one of the states of Tuscany in Italy; a most celebrated republic, to which Europe is in the highest degree indebted for the revival of the arts and sciences after they had been long lost.

The ancient history of Florence is comprehended under that of **ETRURIA** and **ROME**. Its modern history commences most properly at the time of *Alboino*, king of the Lombards, who made himself master of Tuscany, and almost all Italy. Those people continued to enjoy their dominion for 204 years, when they were driven out by Charles the Great. He was crowned and confirmed king of Italy by the pope about the year 773; after which, the governments of the several states of that country began to recover some degree of regularity and consistency. The original families of Italy, and the descendants of the various clans of barbarians who had inhabited it, were now blended into one common mass; and the feudal laws, which were of Gothic original, and then prevailed over all Italy, gave the leading men or magistrates of each state a degree of authority very little inferior to that of the king. All that Charles required, was the payment of certain tributes, or what we call *reddendos*, as marks of his sovereignty; and he left them in other respects to make the most of their situation and natural powers. Of these states, the most eminent were Florence, Pisa, Perugia, and Sienna, each of which had a particular manner of cultivating its interest. The Pisans applied themselves to maritime affairs, being the only maritime city of Tuscany that was left standing. The Perugians applied themselves to agriculture, to which they were encouraged by the fertility of their soil. The Siennese had a rich nobility, who maintained them in affluence: but the Florentines were distinguished over all the other inhabitants of Tuscany, by their industry, their knowledge of the civil arts, and their uncommon strength of genius.

For some time those states lived together in great harmony; but this was soon interrupted by the disputes between the popes and the emperors of Germany. In these contentions, Florence was subdued by the emperor Frederic II. He governed in so tyrannical a manner, that, after his death, the Florentines conceived such an insuperable aversion against monarchical government, that from thenceforth Florence became a republic. The people took the direction of affairs upon themselves; and the wisdom, spirit, and steadiness, with which they proceeded upon their new model, are almost incredible. They first recalled, and reinstated in their former honours, the noblemen whom Frederic had banished. They next made choice of 12 magistrates, whom they called *antiani*. They divided their city into six wards, from which their magistrates and all public officers were to be elected. They instituted a militia out of these wards, properly regulated; in or-

der to oppose all factious designs of their nobles at home, and to repel all attacks from abroad. Every one of the magistrates was a patriot; and Florence soon began to distinguish itself among the states of Italy, as formerly Athens did among those of Greece.

It is natural to think, that a small state, so circumstanced and regulated, would soon be involved in wars both foreign and domestic. This indeed actually happened. The Florentines were engaged in almost perpetual wars with their neighbours; and when these ceased, internal dissensions generally supplied their place. Though greatly celebrated by historians for their valour, these republicans never could make any permanent conquest over their neighbours, or extend their territories in any considerable degree. Nay, they were often in the utmost danger of being totally destroyed, had not some lucky accidents seasonably intervened. In these endless wars, they were supported by the very extensive commerce they carried on, and by which they acquired incredible wealth. But, after commerce had begun more generally to diffuse itself, the Florentines began to lose very considerably of the importance among other nations which they had till then maintained. In 1531, they were compelled to submit to the troops of the emperor Charles V. after a severe siege; and at this time ended the republican government of the city. Alexander de Medici, after marrying the natural daughter of Charles V. was by him made sovereign of Florence. He pretended to govern by the advice of a council of Florentine citizens; but, in fact, behaved so tyrannically, that he was murdered in a short time; and succeeded by Cosmo, son of John de Medici, who had become extremely popular on account of the bravery he had shown in the French and Spanish service. He first obtained the title of *Grand Duke of Tuscany*; and, as such, was crowned at Rome by pope Pius V. who bestowed the title upon him. He married Eleanora de Toledo, daughter to the duke of Naples; by which connection he established his authority so well, that the Florentines never thought of throwing off the yoke. He attached himself to the interest of the Imperialists; under whose protection he and his successors lived securely, till the time of Cosmo III. who embraced the French interest. This prince, in his youth, had paid a visit to the English court in the time of Charles II. and always professed a great deal of friendship for the family of Stuart. We do not find, however, that he was very liberal in contributing towards the efforts made for replacing king James on the throne of Britain, though often applied to for that purpose. He affected, however, to be the head and patron of all the Roman Catholics in Great Britain, and he exerted all his interest with foreign courts in their behalf. Being a complete politician, his success in this was incredible; and it was primarily owing to him, that the papists met with such indulgences as they did, even after the accession of king George I. He was a great patron of learning and learned men; and his favourite study was chemistry, nor could his friends oblige him more than by sending for medicines prepared in his laboratory by himself. He was courted by all the princes of Europe; and could be called unhappy only in the prospect of his race being extinct with his son, who had no hopes of issue, and was the last of the family. This consideration probably rendered him in-

different to all the stipulations preceding the Quadruple Alliance in 1718; by the fifth article of which, the duchies of Tuscany, Parma, and Placentia, were to be accounted for ever as male-heirs of the empire, and were to descend, in default of male-heirs, to the queen of Spain's eldest son. To alleviate, however, any chagrin which might be conceived at this article, it was also stipulated, that, during the lives of the possessors of Tuscany and Parma, no forces of any country whatsoever, whether their own or hired, should, by the emperor, the kings of France and Spain, or even by the prince appointed to the succession, be introduced into any garrison, city, port, or town, of those duchies. Yet, notwithstanding this article, it was resolved, that, for the security of the succession, 6000 Swiss were to be put into Leghorn, Porto Ferraro, Parma, and Placentia.—Cosmo did not long survive this definition of his dominions; but died, the most aged prince in Christendom, in 1723. He was succeeded by his son Gaston, whose character and manner of life greatly resembled those of his father. He presented memorials against the Quadruple Alliance at the Congress at Cambray. King George I. declined the sole mediation at this congress which was offered him; upon which the emperor, without the consent of the empire, granted the investiture of the duchies of Tuscany, Parma, and Placentia, to the queen of Spain's eldest son, in case these dukedoms should be vacant for want of heirs. These stipulations were enforced by the treaty of Seville in 1728; by which, also, great numbers of foreign troops were to be introduced into different cities within these duchies. This treaty was guaranteed by Spain, Great Britain, France, and the States-General; but was complained of by the court of Vienna as a breach of an article in the Quadruple Alliance. In the year 1731, however, the great duke, who had conceived an invincible aversion against the house of Austria, not only ratified all the stipulations with regard to the succession, but, in consequence of a new treaty, invited Don Carlos, the apparent successor, over to Florence to be educated.—In a few years, however, the emperor lost Naples and Sicily; and his son-in-law, the duke of Lorraine, was named to the succession of Tuscany, while his duchy of Lorraine was annexed to the crown of France. Duke Gaston, in the mean time, was so much decayed in person and intellects, that he took little or no concern about these proceedings; nor did he even make any remonstrances against the Imperial court, who ordered a body of troops to move towards his dominions, in order to drive out the Spaniards, which they accordingly did. He died in July 1737; and the duke of Lorraine instantly seized on his dominions. The queen of Spain could not bear the thoughts of having such a noble acquisition as the duchy of Tuscany torn from her family, and therefore endeavoured to engage the court of Great Britain to assist her in recovering it. To this end she promised, that her husband should renounce all pretensions to Gibraltar and Portmahon, and that the differences subsisting with regard to America should be adjudged. This proposal, however, was rejected; and a war ensued between Great Britain and Spain, and the duke of Lorraine (late emperor of Germany) was suffered to possess the duchy of Tuscany without opposition. Since that time the Florentines have made no figure in history, nor are they

likely

Florence
Florida.

likely to do so for a long time to come. In the year 1753 it was resolved, that the whole military force of the great duchy should consist only of three regiments of foot, and one of dragoons, of 500 men each. To support this establishment, a French company offered to farm the revenues of the duchy; but his imperial majesty rejected the proposal, and fixed upon another company composed of his own subjects, to manage the revenues under the direction of M. Richard, a gentleman of Lorraine. By this new institution, the finances of the duchy were divided into 20 shares, one half of which his imperial majesty reserved to himself. By those, and other frugal measures, the emperor was enabled to erect a college for the improvement of agriculture at Florence; a science to which the Florentines are peculiarly adapted. In the year 1755, he raised another regiment of dragoons, and regimented his militia. The duchy is now governed by a council of regency, a military board, and other officers of state; who have made a number of excellent regulations, by which, during the late war, his imperial majesty was enabled to draw many useful recruits from the grand duchy of Tuscany, who did him great service in his armies.

FLORENCE, the capital of the duchy of Tuscany, and one of the finest cities in Italy. It is divided into two by the river Arno, over which are built several magnificent bridges. It is surrounded on all sides but one with high hills, which rise insensibly, and at last join with the lofty mountains called the *Appennines*. Towards Pisa, there is a vast plain of 40 miles in length; which is so filled with villages and pleasure-houses, that they seem to be a continuation of the suburbs of the city. The circumference about the walls is near six English liatute-miles; and it contains about 9000 houses, great part of which are built uniformly of stone, and many of them surprisingly large and beautiful. According to some, the palaces of Florence are the best built of any in Italy. E. Long. 12. 24. N. Lat. 43. 34.

FLORENCE, an ancient piece of English gold coin. Every pound weight of standard-gold was to be coined into 50 Florences to be current at six shillings each; all which made in tale 15 pounds; or into a proportionate number of half-Florences or quarter-pieces, by indenture of the mint: 18 Ed. III.

FLORENTINE MARBLE. See CITADENESCA.

FLORESCENTIA, (from *floresco*, "to flourish or bloom;") the act of flowering, which Linnæus and the sexualists compare to the act of generation in animals; as the ripening of the fruit in their opinion resembles the birth. See FLOWER.

FLORID STYLE, is that too much enriched with figures and flowers of rhetoric.

FLORIDA, the most southerly province of the British empire in America, bounded on the south by the Gulf of Mexico, on the north by the Apalachian mountains, on the east by the province of Georgia, and on the west by the river Mississippi. It was first discovered, in 1497, by Sebastian Cabot, a Venetian, then in the English service; whence a right to the country was claimed by the kings of England; and this province, as well as Georgia, were included in the charter granted by Charles II. to Carolina. In 1512, however, Florida was more fully discovered by Ponce de Leon, an able Spanish navigator, but who

undertook his voyage from the most absurd motives that can be well imagined.—The Indians of the Caribbee islands had among them a tradition, that somewhere on the continent there was a fountain whose waters had the property of restoring youth to all old men who tasted them. The romantic imaginations of the Spaniards were delighted with this idea. Many embarked in voyages to find out this imaginary fountain, who were never afterwards heard of. Their superstitious countrymen never imagined that these people had perished. They concluded that they did not return, only because they had drunk of the immortalizing liquor, and had discovered a spot so delightful, that they did not choose to leave it.—Ponce de Leon set out with this extravagant view as well as others, and fully persuaded of the existence of a third world, the conquest of which was to immortalize his name. In the attempt to discover this country, he rediscovered Florida; but returned to the place from whence he came, visibly more advanced in years than when he set out.—For some time this country was neglected by the Spaniards, and some Frenchmen settled in it. But, the new colony being neglected by the ministry, and Philip II. of Spain having accustomed himself to think that he was the sole proprietor of America, fitted out a fleet at Cadiz to destroy them. His orders were executed with barbarity. The French entrenchments were forced, and most of the people killed. The prisoners were hanged on trees; with this inscription, "Not as Frenchmen, but as Heretics."

This cruelty was soon after revenged by Dominic de Gourgues, a skilful and intrepid seaman of Gascony, an enemy to the Spaniards, and passionately fond of hazardous expeditions and of glory. He held his estate; built some ships; and with a select band of adventurers like himself, embarked for Florida. He drove the Spaniards from all their posts with incredible valour and activity; defeated them in every encounter; and, by way of retaliation, hung the prisoners on trees, with this inscription, "Not as Spaniards, but as Assassins." This expedition was attended with no other consequences: Gourgues blew up the forts he had taken, and returned home, where no notice was taken of him. It was conquered in 1539, by the Spaniards under Ferdinand de Soto, not without a great deal of bloodshed; as the natives were very warlike, and made a vigorous resistance. The settlement, however, was not fully established till the year 1665; when the town of St Augustine, the capital of the colony while it remained in the hands of the Spaniards, was founded. In 1586, this place was taken and pillaged by Sir Francis Drake. It met with the same fate in 1665, being taken and plundered by Captain Davis and a body of bucaners. In 1702, an attempt was made upon it by colonel More, governor of Carolina. He set out with 500 English, and 700 Indians; and having reached St Augustine, he besieged it for three months; at the expiration of which, the Spaniards having sent some ships to the relief of the place, he was obliged to retire. In 1740, another attempt was made by general Oglethorpe: but he being outwitted by the Spanish governor, was forced to raise the siege with loss; and Florida continued in the hands of the Spaniards till the year 1763, when it was ceded by treaty to Great Britain.—The province

Florida.

Florin
Florion.

vince is now divided into two governments, the East and West Florida; but concerning these there are very few accounts which can be depended upon as authentic. According to some, the air is extremely pure and healthy; while others report, that it is to the last degree noxious. As little can be depended on what is said concerning the soil: some affirming that it is exceedingly fertile, and productive of all the necessaries of life; while others tell us that it is quite barren and sandy. It was at first thought that silk, cochineal, and wine, might have been plentifully produced in this province; but whether any of these commodities have yet been produced in any part of Florida in such abundance as to give hopes of at last supplying the demands of Great Britain from that quarter, is as yet by no means ascertained.

FLORIN, is sometimes used for a coin, and sometimes for a money of account.

Florin, as a coin, is of different values, according to the different metals and different countries where it is struck. The gold florins are most of them of a very coarse alloy, some of them not exceeding thirteen or fourteen carats, and none of them seventeen and a half. See MONEY-Table.

Florin, as a money of account, is used by the Italian, Dutch, and German merchants and bankers, but admits of different divisions in different places. *Ibid.*

FLORIST, a person well skilled in flowers, their kinds and cultivation.

FLORUS (Lucius Annæus), a Latin historian, of the same family with Seneca and Lucan. He flourished in the reigns of Trajan and Adrian; and wrote, in an elegant style, an Abridgment of the Roman History, of which there have been many editions. The best are, *Ad Usum Delphini*, 4^{to}; and, *Cum notis variorum et Dukeri*, 8vo.

FLORY, Floway, or Fleury, in heraldry, a cross that has the flowers at the end circumscribed and turning down; differing from the *potence*, in as much as the latter stretches out more like that which is called *pattee*.

FLOS, FLOWER, in botany. See FLOWER.

Femineus Flos, a female flower. By this name Linnæus and the sexualists denominate a flower which is furnished with the pointal or female organs of generation, but wants the stamina or male organ. Female flowers may be produced apart from the male, either on the same root or on distinct plants. Birch and mulberry are examples of the first case; willow and poplar of the second.

Flos, in chemistry, the most subtle part of bodies separated from the more gross parts by sublimation in a dry form.

FLOTA, or FLOTTA, *Fleet*, a name which the Spaniards give particularly to the ships that are annually sent from Cadiz to the port of Vera Cruz, to fetch thence the merchandizes gathered in Mexico for Spain. This fleet consists of the captains, admiral, and patch or pinnace, which goes on the king's account; and about 16 ships from 400 to 1000 tons belonging to particular persons. They set out from Cadiz about the month of August, and return in about 18 or 20 months.

FLOTSON, or FLOSTOM, goods that by shipwreck are lost, and floating upon the sea; which,

with jetson and lagan, are generally given to the lord admiral: but this is the case only where the owners of such goods are not known. And here it is to be observed, that *jetson* signifies any thing that is cast out of a ship when in danger, and afterwards is beat on the shore by the water, notwithstanding which the ship perishes. *Lagan* is where heavy goods are thrown overboard, before the wreck of the ship, and sink to the bottom of the sea.

FLOUNDER, FLUKE, or *Bat*, in ichthyology. See PLEURONECTES.

Flounders may be fished for all day long, either in a swift stream, or in the still deep water; but best in the stream, in the months of April, May, June, and July: the most proper baits are all sorts of worms, walps, and gentles.

FLOUR, the meal of wheat-corn, finely ground and sifted. See MEAL.

The grain itself is not only subject to be eaten by insects in that state; but, when ground into flour, it gives birth to another race of destroyers, who eat it unmercifully, and increase so fast in it, that it is not long before they wholly destroy the substance. The finest flour is most liable to breed these, especially when stale or ill prepared. In this case, if it be examined in a good light, it will be observed to be in continual motion, and on a nicer inspection there will be found in it a great number of little animals of the colour of the flour, and very nimble. If a little of this flour is laid on the plate of the double microscope, the insects are very distinctly seen in great numbers, very brisk and lively, continually crawling over one another's backs, and playing a thousand antic tricks together; whether in diversion, or in search of food, is not easy to be determined. These animals are of an oblong and slender form; their heads are furnished with a kind of trunk or hollow tube, by means of which they take in their food, and their body is composed of several rings. They do vast mischief among magazines of flour laid up for armies and other public uses. When they have once taken possession of a parcel of this valuable commodity, it is impossible to drive them out; and they increase so fast, that the only method of preventing the total loss of the parcel is to make it up into bread as soon as can be done. The way to prevent their breeding in the flour is to preserve it from damp: nothing gets more injury by being put up in damp than flour; and yet nothing is more frequently put up so. It should be always carefully and thoroughly dried before it is put up; and the barrels also dried into which it is to be put; then, if they are placed in a room tolerably warm and dry, they will keep it well. Too dry a place never does flour any hurt, though one too moist almost always spoils it.

Flour, when carefully analyzed, is found to be composed of three very different substances. The first and most abundant is pure *starch*, or white fecule, insoluble in cold but soluble in hot water, and of the nature of mucous substances; which, when dissolved, form water-glues. The second is the *gluten*, most of whose properties have been described under the article BREAD. The third is of a mild nature, perfectly soluble in cold water, of the nature of *saccharine* extractive mucous matters. It is susceptible of the spirituous

Flounder,
Flour.

rituous fermentation, and is found but in small quantity in the flour of wheat. See BREAD, GLUTEN, STARCH, and SUGAR.

FLOWER, Flos, among botanists and gardeners, the most beautiful part of trees and plants, containing the organs or parts of fructification,

Though no parts of plants are more generally known than their flowers, yet the definitions given by different authors of this word are very various, and necessary to be explained in order to the understanding of their works. Jungius defines it to be the most tender part of a plant, remarkable for its colour or form, or for both, and cohering with the fruit. But this author himself acknowledges his definition to be too limited, as there are several plants whose flowers are produced remote from their fruit. Mr Ray, says the flowers cohere for the most part with the rudiments of the fruit; which is likewise a phraseology too inaccurate to be admitted in definitions. Tournefort defines the flower to be a part of a plant very often remarkable for its peculiar colours, for the most part adhering to the young fruit, to which it seems to afford the first nourishment, in order to explicate its most tender parts: but this is still a more indeterminate definition than the former.—Poneder defines a flower to be a part of a plant, unlike the rest in form and nature. If the flower has a tube, it adheres to or is fixed very near the embryo, to the use of which it is subservient; but if the flower has no tube, then its base does not adhere to the embryo. This definition is scarce intelligible, except to expert botanists. Jussieu defines a flower to be composed of chives and a pistillum, and to be of use in the generation of the plant: but this definition is too imperfect, as there are many plants in which the pistillum are found at a great distance from the chives, many flowers which have no pistillum, and many which have no chives. Vaillant has been happier in his definition. He says, that flowers are the organs which constitute the sexes of plants, which are sometimes found naked, and without any covering; and that the petals which most of them have, are noway essential to their use, but serve, and are intended, merely as covers for them: but yet, as these coats or coverings are the most conspicuous and most beautiful parts of the flowers, these are to be called *flowers*, be they of whatever form or structure or colour; and whether they contain the organs of both sexes in each individual, or only of one, or even but of some part of one, provided they are not of the same figure and colour with the leaves of the plant. The shortest and most express definition, however, seems to be that of Martin; which is, that flowers are the organs of generation of both sexes, adhering to a common placenta, together with their common covering; or of either sex separately with its proper coverings if it have any.

The parts of flowers are, 1. The pistillum or ovary, which is the rudiment of the fruit, and is therefore properly the organ of generation. 2. The style, which is a body accompanying the ovary; either arising from the middle of it, or standing as an axis in the middle, with the embryos of the seeds round it. 3. The summits, called also *apices*, and *anthers*, which are those bodies that contain the prolific powder analogous to the male sperm of animals, and generally hung upon sen-

der threads which are called the *chives*. 4. The petals, commonly called the *flower-leaves*, which are those tender fine-coloured leaves that are generally the most conspicuous parts of a flower. 5. The empalcment or calyx, which is formed of these tender leaves that cover the outer parts of the flower. Flowers, according to the number of their leaves or petals, are called *monopetalous*, or one-leaved; *dipetalous*, or two-leaved, &c.

The structure of different flowers is very various; but Dr Grew has observed that the far greater number of them have the empalcment, foliation, chives, &c. Mr Ray accounts that every perfect flower has the petals, stamina or chives, apices or summits, and the style or pistil; and such as want any of these he calls imperfect flowers. The greater number of plants have a flower-cup; which is of a firmer structure than their leaves, and serves for their support.

Flowers, designed for medicinal use, should be plucked when they are moderately blown, and on a clear day before noon: for conserves, roses must be taken in the bud.

Eternal Flower. See XERANTHEMUM.

Everlasting Flower. See GNAPHALIUM.

Flower-Fence. See POINCIANA.

Sun-Flower. See HELIANTHUS.

Sultan-Flower. See CYANUS.

Trumpet-Flower. See BIGNONIA.

Wind Flower. See ANEMONE.

Flower-de-Luce. See IRIS.

FLOWERS, in heraldry. They are much used in coats of arms; and in general signify hope, or denote human frailty and momentary prosperity. See ROSE, &c.

FLOWERS, in chemistry. By this name are generally understood bodies reduced into very fine parts, either spontaneously, or by some operation of art; but the term is chiefly applied to volatile solid substances, reduced into very fine parts, or into a kind of meal by sublimation.—Some flowers are nothing else than the bodies themselves, which are sublimed entire, without suffering any alteration or decomposition; and other flowers are some of the constituent parts of the body subjected to sublimation.

Colours of FLOWERS. See the article COLOUR of Plants.

Colours extracted from FLOWERS. See COLOUR-Making, n^o 34, 38.

Preserving of FLOWERS. The method of preserving flowers in their natural beauty through the whole year has been much sought after by many people. Some have attempted it by gathering them when dry and not too much opened, and burying them in dry sand; but this, though it preserves their figure well, takes off from the liveliness of their colour. Muntingius prefers the following method to all others. Gather roses, or other flowers, when they are not yet thoroughly open, in the middle of a dry day: put them into a good earthen vessel glazed within; fill the vessel up to the top with them; and when full sprinkle them over with some good French wine, with a little salt in it; then let them be in a cellar, tying down the mouths of the pot. After this they may be taken out at pleasure; and, on setting them in the sun, or within reach of the fire, they will open as if growing natural-ly.

ly; and not only the colour, but the smell also will be preserved.

The flowers of plants are by much the most difficult parts of them to preserve in any tolerable degree of perfection; of which we have instances in all the collections of dried plants, or *herbæ feci*. In these the leaves, stalks, roots, and seeds of the plants appear very well preserved; the strong texture of these parts making them always retain their natural form, and the colours in many species naturally remaining. But where these fade, the plant is little the worse for use as to the knowing the species by it. But it is very much otherwise in regard to flowers: these are naturally by much the most beautiful parts of the plants to which they belong; but they are so much injured in the common way of drying, that they not only lose, but change their colours one into another, by which means they give a handle to many errors; and they usually also wither up, so as to lose their very form and natural shape. The primrose and cowslip kinds are very eminent instances of the change of colours in the flowers of dried specimens: for those of this class of plants easily dry in their natural shape; but they lose their yellow, and, instead of it, acquire a fine green colour much superior to that of the leaves in their most perfect state. The flowers of all the violet kind lose their beautiful blue, and become of a dead white; so that in dried specimens there is no difference between the blue-flowered violet, and the white-flowered kinds.

Sir Robert Southwell has communicated to the world a method of dying plants, by which this defect is proposed to be in a great measure remedied, and all flowers preserved in their natural shape, and many in their natural colours.—For this purpose two plates of iron are to be prepared of the size of a large half-sheet of paper, or larger, for particular occasions: these plates must be made so thick as not to be apt to bend; and there must be a hole made near every corner for the receiving a screw to fasten them close together. When these plates are prepared, lay in readiness several sheets of paper, and then gather the plants with their flowers when they are quite perfect. Let this be always done in the middle of a dry day; and then lay the plant and its flower on one of the sheets of paper doubled in half, spreading out all the leaves and petals as nicely as possible. If the stalk is thick, it must be pared or cut in half, so that it may lie flat; and if it is woody, it may be peeled, and only the bark left. When the plant is thus expanded, lay round about it some loose leaves and petals of the flower, which may serve to complete any part that is deficient. When all is thus prepared, lay several sheets of paper over the plant, and as many under it; then put the whole between the iron plates, laying the papers smoothly on one, and laying the other evenly over them: screw them close, and put them into an oven after the bread is drawn, and let them lie there two hours. After that, make a mixture of equal parts of aquafortis and common brandy; shake these well together, and when the flowers are taken out of the pressure of the plates, rub them lightly over with a camel's-hair pencil dipped in this liquor; then lay them upon fresh brown paper, and covering them with some other sheets, press them between this and other papers with a handkerchief, till the wet of these liquors is dried wholly away. When

the plant is thus far prepared, take the bulk of a nutmeg of gum-dragon; put this into a pint of fair water cold, and let it stand 24 hours; it will in this time be wholly dissolved: then dip a fine hair-pencil in this liquor, and with it daub over the back sides of the leaves, and lay them carefully down on a half-sheet of white paper fairly expanded, and press them down with some more papers over these. When the gum-water is fixed, let the pressure and papers be removed, and the whole work is finished. The leaves retain their verdure in this case, and the flowers usually keep their natural colours. Some care, however, must be taken, that the heat of the oven be not too great. When the flowers are thick and bulky, some art may be used to pare off their backs, and dispose the petals in a due order; and after this, if any of them are wanting, their places may be supplied with some of the superfluous ones dried on purpose; and if any of them are only faded, it will be prudent to take them away, and lay down others in their stead: the leaves may be also disposed and mended in the same manner.

Another method of preserving both flowers and fruit found throughout the whole year is also given by the same author. Take salt-petre one pound; armenian bole, two pounds; clean common sand, three pounds. Mix all well together: then gather fruit of any kind that is not fully ripe, with the stalk to each; put these in, one by one, into a wide-mouthed glass, laying them in good order. Tie over the top with an oil-cloth, and carry them into a dry cellar, and set the whole upon a bed of the prepared matter of four inches thick in a box. Fill up the remainder of the box with the same preparation; and let it be four inches thick all over the top of the glass, and all round its sides. Flowers are to be preserved in the same sort of glasses, and in the same manner; and they may be taken up after a whole year as plump and fair as when they were buried.

Flower de lis, or *Flower de luce*, in heraldry, a bearing representing the lily, called the *queen of flowers*, and the true hieroglyphic of royal majesty; but of late it is become more common, being borne in some coats one, in others three, in others five, and in some *femee* or spread all over the escutcheon in great numbers.

The arms of France are, three flower de lis or, in a field azure.

FLOWERING of Bulbous PLANTS. These plants will grow and flower in water alone, without any earth, and make a very elegant appearance. We daily see this practised in single roots; but there is a method of doing it with several roots in the same vessel. Take a common small garden-pot; stop the hole at the bottom with a cork, and lute in the cork with putty, that no water can get through; then fit a board to the top of the pot, and bore six or seven holes in it at equal distances, to place the bulbs in; and as many smaller ones near them to receive sticks, which will serve to tie up the flowers. Then fill up the pot with water to the board; and place tulips, jonquils, narcissus's, and the like plants in the root upon the holes, so that the bottom of the roots may touch the water: thus will they all flower early in the season, and be much more beautiful than any pot of gathered flowers, and will last many weeks in their full perfection. After the season

Flowers,
Flowering.

Flowering. of flowering is over, the roots will gradually shrink through the holes of the board, and get loose into the water: but, instead of being spoiled there, they will soon increase in size; so that they cannot return thro' the holes, and will produce several off sets. It is natural to try from this the consequence of keeping the roots under water during the whole time of their blowing; and in this way they have been found to succeed very well, and flower even stronger and more beautifully than when in the ground. They may thus, also, with proper care in the degree of heat in the room, be kept flowering from before Christmas till March or April. It is not easy, in this last manner, to manage the keeping the boards under water; for which reason, it is better to procure some sheet-lead of about four pounds to the foot, and cut this to the size of the mouth of the pot. In this there should be bored holes for the bulbs, and other holes for the sticks: and, in order to keep the sticks quite firm, it is proper to have another plate of lead shaped to the bottom of the pot, with holes in it, answering to those of the upper plate made for the sticks. The sticks will by this means be always kept perfectly steady; and the roots, being kept under water by the upper plate of lead, will flower in the most vigorous and beautiful manner imaginable.—Some have thought of adding to the virtues of the water by putting in nitre in small quantities, and others have added earth and sand at the bottom; but it has always been found to succeed better without any addition.

It may be more agreeable to some to use glass-jars in this last method with the leads, instead of earthen pots. The bulbs succeed full as well in these; and there is this advantage, that the progress of the roots is seen all the while, and they are managed better as to the supply of water.

By repeated experiments in this way on dried bulbs, and on those taken fresh out of the ground, the former have been found to succeed the best. For those taken fresh out of the ground being full of moisture, will not so soon, upon changing their element, be nourished fully by a new one; and the fibres which they had struck in the ground, always rot when put into the water, and new ones must be formed in their places; so that it requires more time for them to come to flowering. The bulbs themselves will not rot in this manner; but they will never be so strong as those which were put into the water dry, which gradually fill themselves with moisture from it, and regularly plump up. The best method of managing the whole process is this: Place the bulbs at first only on the surface of the water; for thus they will strike out their fibres most strongly. When they have stood thus six weeks, pour in the water so high as to cover them entirely, and keep them thus till they have done flowering.

Sometimes the roots will become mouldy in several parts while they stand above the water, and the cleaning them of it is to no purpose; for it will eat and spread the farther, and frequently eat through two or three of their coats. In this case they must be immediately covered with water; when the mould will be stopped, and the roots become sound, and flower as well as those which never had any such distemper. If the roots are suffered to remain in water all the year, they will not decay; but will flower again at their proper season,

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and that as vigorously as those which have been taken out and dried. The old fibres of those roots never rot till they are ready to push forth new ones. It is found by experience, that the hyacinth, and many other plants, grow to a greater degree of perfection when thus in water, than when in the ground. There is a peculiar species of hyacinth called *Keyser's jewel*; this never, or very rarely, produces seed-vessels in the common way of flowering, in the ground; but it will often produce some pods when blown in water.

Mr Miller has intimated, in the Philosophical Transactions, that bulbs set in glasses grow weaker, and should be renewed every other year: but it is found, that, when managed in this manner, and kept under water, at the time of taking them up, they are as large, and some of them larger, than when planted; and if these be dried at a proper season, they will flower, year after year, as well as fresh ones.

Ranunculus and anemone roots have been found to shoot up their stalks very well in this way; but the flowers are usually blasted, which seems to arise from want of free air. Pinks will flower very well in this manner; auriculas also may, with care, be brought to flower, but not strongly. Roses, jessamines, and honeysuckles, may also be made to flower this way, and will thrive and send out suckers; the best pieces to plant, are suckers cut off about three inches under ground, without any fibres. The succulent plants may also be raised this way; for instance, the opuntia or Indian fig. If a fragment of a leaf of this plant be cut, and laid by to dry for a month till it is an absolute skin, as soon as it is put in this manner into water, it begins to plump up, and soon sends out fibrous roots, and produces new leaves as quickly as it would do in the ground.

This is the more singular in these sort of plants, because, in their natural state in the ground, they cannot bear much water. This method of growing in water is not peculiar to the bulbous-rooted ones, but others may even be raised from seed by it. A bean, or pea, set in this manner, will grow up to its proper standard, and will flower and produce pods which will ripen their seed. The smaller seeds may be also raised in this manner, by the help of wool to support them.

No vegetable transplanted out of the earth into water will thrive kindly; but any plant, whether raised from the root or seed in water, may be transplanted to the earth, and will succeed very well. It may be possible, therefore, from this method of raising plants in water, to come at a better way than is usually practised of raising some roots in the earth which are subject to rot there; such as anemones, ranunculus's, and hyacinths. A bulb dropped by chance upon the ground, will strike out both stronger and more numerous fibres than those which are planted in the usual way in the ground. On this principle, it may be proper to take out the earth of the bed where the bulbs are to stand at the time of planting them, to such a depth as they are to be placed under it when set for flowering. The bulbs are then to be set in their places, on the surface of this low ground; and to stand there till they have shot out their fibres and their head: then the earth is to be added over them by degrees, till they are covered as high above the head as they are in the usual manner of planting them: thus they would be preserved from the danger

Flowering,
Fludd.

of rotting; and their fibres would be much stronger, and consequently they would draw more nourishment, and flower better, than in the common way. The common method of planting these roots renders them liable to be destroyed by either extreme of a wet or a dry season. In the first case, they immediately rot, by the abundant moisture they receive; and, in the second, they become dry as a stick, and mouldy; so that they are infallibly rotted by the first rain that falls afterwards.

The directions necessary to the success of the bulbs planted in water are these. When the leaden false bottoms are fixed down tight within two or three inches of the bottom of the vessel (which is only designed to hold the sticks steady which are to support the leaves and stalks), then lay on the lead upon which the bulbs are to rest, placing the notched part opposite to that in the false bottom, as near as the sticks, when placed, will suffer it; then place the bulbs one in each hole, and fill up with water to the upper lead. The bottom of the bulb will then touch the water; and as the water diminishes in quantity, keep it supplied with more up to the same height for a month or six weeks; in which time the bulbs will have shot strong fibres. Then fill up the water about half an inch above the surface of the lead; and, by degrees, as the fibres strengthen, and the plume shoots from the head, keep the water higher and higher, till at length the whole bulb is covered. The water is to be kept at this standard till the season for drying them returns.—At the time of planting the bulbs, they must be carefully cleaned from any foulness at the bottom, by scraping them with the point of a knife till the found part of the bulb appears; clear them likewise from any loose skins, and even take off their brown skin till they appear white; otherwise this brown skin will tinge the water, and the growth will not succeed so well.

The notches in the side of each lead are intended to give easy passage to the water, that, if there should be any foulness or sediment in it, on shaking it a little it may all run through, and fresh water be put in its place. But this shifting the water need not be done more than once or twice in a winter, as there may be occasion from the foulness; and when this is done, the sides of the vessel should be cleaned with a painter's brush, and rinsed out again, and the bulbs themselves washed, by pouring water on them at a little distance.

At any time when the outer skins of the bulbs dry, they are to be peeled off, that they may not occasion foulness in the water; and if any dust or foul matter be at any time observed swimming on the surface, the method is to fill up the pot or vessel to the rim, and let it run over: this will carry off that light foulness, and the water may afterwards be poured away to the proper standard.

Bulbs of equal bigness should be planted together in the same pot, that they may all have the same benefit of the water. Narcissus's and hyacinths do well together; as also tulips and jonquils, and crocuses and snow-drops.

FLUDD (Robert), a famous philosopher, born in 1447. He was fellow of the college of physicians in London, and became a most voluminous writer: he dated greatly on the wonders of chemistry; was a zealous brother of the Rosicrucian order; and his books,

which are mostly in Latin, are as dark and mysterious in their language as in their matter. He died in 1657.

FLUDDER. See **COLYMBUS**.

FLUID, an appellation given to all bodies whose particles easily yield to the least partial pressure, or force impressed. For the

Laws and Properties of FLUIDS. See **HYDRO-STATICS**.

There are various kinds of animalcules to be discerned in different fluids by the microscope. Of many remarkable kinds of these, a description is given under the article **ANIMALCULE**. All of these little creatures are easily destroyed by separating them from their natural element. Naturalists have even fallen upon shorter methods. A needle point, dipped in spirit of vitriol, and then immersed into a drop of pepper-water, readily kills all the animalcules; which, though before frisking about with great liveliness and activity, no sooner come within the influence of the acid particles, than they spread themselves, and tumble down to all appearance dead. The like may be done by a solution of salt; only with this difference, that, by the latter application, they seem to grow vertiginous, turning round and round, till they fall down. Tincture of salt of tartar, used in the same manner, kills them still more readily; yet not so, but there will be apparent marks of their being first sick and convulsed. Inks destroy them as fast as spirit of vitriol, and human blood produces the same effect. Urine, sack, and sugar, all destroy them, though not so fast; besides, that there is some diversity in their figures and appearances, as they receive their deaths from this poison or that. The point of a pin dipped in spittle, presently killed all the kinds of animalcules in puddle-water, as Mr Harris supposes it will other animalcules of this kind.

All who are acquainted with microscopic observations, know very well, that in water, in which the best glasses can discover no particle of animated matter, after a few grains of pepper, or a fragment of a plant of almost any kind, has been some time in it, animals full of life and motion are produced; and those in such numbers, as to equal the fluid itself in quantity.—When we see a numerous brood of young fishes in a pond, we make no doubt of their having owed their origin to the spawn, that is, to the eggs of the parents of the same species. What are we then to think of these? If we will consider the progress of nature in the insect-tribes in general, and especially in such of them as are most analogous to these, we shall find it less difficult to give an account of their origin than might have been imagined.

A small quantity of water taken from any ditch in the summer-months, is found to be full of little worms, seeming in nothing so much as in size to differ from the microscopic animalcules. Nay, water, without these, exposed in open vessels to the heat of the weather, will be always found to abound with multitudes of them, visible to the naked eye, and full of life and motion. These we know, by their future changes, are the fly-worms of the different species of gnats, and multitudes of other fly-species; and we can easily determine, that they have owed their origin only to the eggs of the parent-fly there deposited. Nay, a closer observation will at any time give ocular proof of this,

Fludder,
Fluid.

Fluid.

this; as the flies may be seen laying their eggs there, and the eggs may be followed through all their changes to the fly again. Why then are we to doubt but that the air abounds with other flies and animalcules as minute as the worms in those fluids; and that these last are only the fly-worms of the former, which, after a proper time spent in that state, will suffer changes like those of the larger kinds, and become flies like those to whose eggs they owed their origin? *Vid. Reaumur. Hist. Insect. vol. iv. p. 431.*

The differently medicated liquors made by infusions of different plants, afford a proper matter for the worms of different species of these small flies: and there is no reason to doubt, but that among these some are viviparous, others oviparous; and to this may be, in a great measure, owing the different time taken up for the production of these insects in different fluids. Those which are a proper matter for the worms of the viviparous fly, may be soonest found full of them; as, probably, the liquor is no sooner in a state to afford them proper nourishment, than their parents place them there: whereas those produced from the eggs of the little oviparous flies, must, after the liquor is in a proper state, and they are deposited in it in the form of eggs, have a proper time to be hatched, before they can appear alive.

It is easy to prove, that the animals we find in these vegetable infusions were brought thither from elsewhere. It is not less easy to prove, that they could not be in the matter infused any more than in the water in which it is infused.

Notwithstanding the fabulous accounts of salamanders, it is now well known, that no animal, large or small, can bear the force of fire for any considerable time; and, by parity of reason, we are not to believe, that any insect, or embryo insect, in any state, can bear the heat of boiling water for many minutes. To proceed to inquiries on this foundation: If several tubes filled with water, with a small quantity of vegetable matter, such as pepper, oak-bark, truffles, &c. in which, after a time, insects will be discovered by the microscope; and other like tubes be filled with simple water boiled, with water and pepper boiled together, and with water with the two other ingredients, all separately boiled in it; when all these liquors come to a proper time for the observation of the microscope, all, as well those which have been boiled, as those which have not, will be found equally to abound with insects; and those of the same kind, in infusions of the same kind, whether boiled or not boiled. Those in the infusions which had sustained a heat capable of destroying animal-life, must therefore not have subsisted either in the water, or in the matters put into it, but must have been brought thither after the boiling; and it seems by no way so probably, as by means of some little winged inhabitants of the air depositing their eggs or worms in these fluids.

On this it is natural to ask, how it comes to pass, that while we see myriads of the progeny of these winged insects in water, we never see themselves? The answer is equally easy, viz. because we can always place a drop of this water immediately before the focus of the microscope, and keep it there while we are at leisure to examine its contents; but that is not the case with regard to the air inhabited by the parent-flies of these

worms, which is an immense extent in proportion to the water proper for nourishing these worms; and consequently, while the latter are clustered together in heaps, the former may be dispersed and scattered. Nor do we want instances of this, even in insects of a larger kind. In many of our gardens, we frequently find vessels of water filled with worms of the gnat kind, as plentifully, in proportion to their size, as those of other fluids are with animalcules. Every cubic inch of water in these vessels contains many hundreds of animals; yet we see many cubic inches of air in the garden not affording one of the parent flies.

But neither are we positively to declare that the parent flies of these animalcules are in all states wholly invisible to us: if not singly to be seen, there are some strong reasons to imagine that they may in great clusters. Every one has seen in a clear day, when looking stedfastly at the sky, that the air is in many places disturbed by motious and convolutions in certain spots. These cannot be the effects of imagination, or of faults in our eyes, because they appear the same to all; and if we consider what would be the case to an eye formed in such a manner as to see nothing smaller than an ox, on viewing the air on a marsh fully peopled with gnats, we must be sensible, that the clouds of these insects, though to us distinctly enough visible, would appear to such an eye merely as the moving parcels of air in the former instance do to us: and surely it is thence no rash conclusion to infer, that the case may be the same, and that myriads of flying insects, too small to be singly the objects of our view, yet are to us what the clouds of gnats would be in the former case.

Nervous Fluid. See *NERVOUS Fluid.*

Elastic Fluids. See *AIR, GAS, VAPOUR, &c.*

FLUIDITY, is by Sir Isaac Newton defined to be, that property of bodies by which they yield to any force impressed, and which have their parts very easily moved among one another.

To this definition some have added, that the parts of a fluid are in a continual motion. This opinion is supported by the solution of salts, and the formation of tinctures. If a small bit of saffron is thrown into a vial full of water, a yellow tincture will soon be communicated to the water to a considerable height; the vial is allowed to remain at rest; which indicates a motion in those parts of the fluid which touch the saffron, by which its colouring matter is carried up.

With regard to water, this can scarce be denied; the constant exhalations from its surface shew, that there must be a perpetual motion in its parts from the ascent of the steam through it. In mercury, where insensible evaporation does not take place, it might be doubted; and accordingly the Newtonian philosophers in general have been of opinion, that there are some substances essentially fluid, from the spherical figure of their constituent particles. The congelation of mercury, however, by an extreme degree of cold*, demonstrates that fluidity is not essentially inherent in mercury more than in other bodies.

That fluids have vacuities in their substance is evident, because they may be made to dissolve certain bodies without sensibly increasing their bulk. For example, water will dissolve a certain quantity of salt; after

Fluid.
Fluidity.

* See *Cand. gelation.*

Fluidity.

Fluke
||
Fluor.

after which it will receive a little sugar, and after that a little alum, without increasing its first dimensions. Here we can scarce suppose any thing else than that the saline particles were interposed between those of the fluid; and as, by the mixture of salt and water, a considerable degree of cold is produced, we may thence easily see why the fluid receives these substances without any increase of bulk. All substances are expanded by heat, and reduced into less dimensions by cold; therefore, if any substance is added to a fluid, which tends to make it cold, the expansion by the bulk of the substance added, will not be so much perceived as if this effect had not happened; and if the quantity added be small, the fluid will contract as much, perhaps more, from the cold produced by the mixture, than it will be expanded from the bulk of the salt. This also may let us know with what these interfaces between the particles of the fluid were filled up; namely, the element of fire, or heat. The saline particles, upon their solution in the fluid, have occupied these spaces; and now the liquor, being deprived of a quantity of this element equal in bulk to the salt added, feels sensibly colder.

As, therefore, there is scarce any body to be found, but what may become solid by a sufficient degree of cold; and none but what a certain degree of heat will render fluid; the opinion naturally arises, that fire is the cause of fluidity in all bodies, and that this element is the only essentially fluid substance in nature. Hence we may conclude, that those substances which we call *fluids*, are not essentially so, but only assume that appearance in consequence of an intimate union with the element of fire; just as gums assume a fluid appearance on being dissolved in spirit of wine, or salts in water.

Upon these principles Dr Black mentions fluidity as an effect of heat. The different degrees of heat which are required to bring different bodies into a state of fluidity, he supposes to depend on some particulars in the mixture and composition of the bodies themselves: which becomes extremely probable, from considering that we change the natural state of bodies in this respect, by certain mixtures; thus, if two metals are compounded, the mixture is usually more fusible than either of them separately. See CHEMISTRY, n° 56.

It is certain, however, that water becomes warmer by being converted into ice*; which may seem contradictory to this opinion. To this, however, the Doctor replies, that fluidity does not consist in the degree of sensible heat contained in bodies, which will affect the hand, or a thermometer; but in a certain quantity which remains in a *latent state*†. This opinion he supports from the great length of time required to melt ice; and to ascertain the degree of heat requisite to keep water in a fluid state, he put 5 ounces of water into a Florence flask, and converted it into ice by means of a freezing mixture put round the flask. Into another flask of the same kind he put an equal quantity of water cooled down nearly to the freezing point, by mixing it with snow, and then pouring it off. In this he placed a very delicate thermometer; and found, that it acquired heat from the air of the room in which it was placed: seven degrees of heat were gained the first half-hour. The ice being exposed

to the same degree of heat, namely, the air of a large room without fire, it cannot be doubted that it received heat from the air as fast as the water which was not frozen: but, to prevent all possibility of deception, he put his hand under the flask containing the ice, and found a stream of cold air very sensibly descending from it, even at a considerable distance from the flask; which undeniably proved, that the ice was all that time absorbing heat from the air. Nevertheless, it was not till 11 hours, that the ice was half-melted, tho' in that time it had absorbed so much heat as ought to have raised the thermometer to 140°; and even after it was melted, the temperature of the water was found scarce above the freezing point: so that, as the heat which entered could not be found in the melted ice, he concluded that it remained concealed in the water, as an essential ingredient of its composition*.

* See Congelation.

FLUKE, or FLOUNDER, in ichthyology. See PLEURORECTES.

FLUMMERY, a wholesome sort of jelly made of oat-meal.

The manner of preparing it is as follows. Put three large handfuls of finely ground oat-meal to steep, for 24 hours, in two quarts of fair water: then pour off the clear water, and put two quarts of fresh water to it: strain it thro' a fine hair-sieve, putting in two spoonfuls of orange-flower water, and a spoonful of sugar: boil it till it is as thick as a hasty-pudding, stirring it continually while it is boiling, that it may be very smooth.

FLUOR, in physics, a fluid; or, more properly, the state of a body that was before hard or solid, but is now reduced by fusion, or fire, into a state of fluidity.

FLUOR, in mineralogy, a certain kind of stone which facilitates fusion. They are of different colours, purple, green, yellow, &c. more or less transparent, which are commonly found in veins of ores, and serve as the matrix to the minerals which they envelop. Most of them affect a cubical form, but others are found in lumps which have no determinate shape. They may be distinguished from other stones by the following properties.

1. They are not sufficiently hard to strike fire with steel. By this property they are distinguished from the coloured quartz-crystals, called *false emeralds*, *false rubies*, &c. which names have also been improperly applied to the cubical coloured fluors.

2. They are not soluble by acids, and thus are distinguishable from calcareous spars.

3. When calcined without addition, and mixed with water, they do not form plaster; and when calcined with addition of inflammable matter, they cannot be formed into the Bolognian phosphorus. Hence they may be distinguished from the gypseous phosphoric spars and stones.

4. They are fusible by fire without addition, according to M. Engestrom and M. D'Arcet.

5. They greatly facilitate the fusion of calcareous and argillaceous earths; and also of the topaz, according to Mr Pott. They are much employed in the smelting of ores, as they promote the fusion of the adhering earths.

6. When exposed to fire till they become red-hot, they emit some lucid rays in the dark: but their light

* See Congelation.

* See Evaporation.

Fluor is very weak, and afterwards they crackle and break into small pieces; whereas the pyreous phosphoric spars exposed to the same heat emit a vivid light, and then break afunder into pieces not so pulverable as those of the heated fluors.

M. Margraaf has made experiments in order to discover the nature of these stones. He ascertained the above-mentioned distinctions between them and the pyreous spars; and therefore infers, that they are not compounded of vitriolic acid with calcareous earth. He observed singular appearances on mixing them with vitriolic and other acids, and subjecting the mixtures to distillation,

Eight ounces of the powder of a green fluor, being mixed with an equal weight of pure oil of vitriol, and distilled together with a graduated heat, yielded, after the watery part of the acid had passed, a fine white sublimate, which arose and adhered to the neck of the retort, and even passed into the receiver. The first parts of this sublimate which arose, appeared like butter of antimony; and, like this butter, they melted by the heat of a live coal, brought near the neck of the retort: but the parts which arose towards the end of the operation, with the greatest degree of heat, could not be melted by that heat. The retort being broken, a residuum was found weighing 12 oz. Hence 4 oz. of oil of vitriol remained united with the spar. The bottom of the retort was observed to be pierced with holes. Lastly, the liquor, which had passed into the receiver, and the white sublimate, had very sensibly a sulphureous smell. The sublimate, triturated a long time in a mortar with hot distilled water, dissolved, and passed thro' a filter. To the filtrated liquor some fixed alkali being added, a precipitate was formed; which being well washed and dried, was readily melted by fire into a mass resembling porcelaina. The same excellent and accurate chemist produced the same effects upon this stone, by substituting, instead of the vitriolic acid, the nitrous, marine, phosphoric, or the concentrated acetic acids.

FLUOR Acid. See CHEMISTRY, n° 263.

FLUOR Albus, or Whites. See (the *Index* subjoined to) MEDICINE.

FLUSHING, an handsome, strong, and considerable town of the United Provinces, in Zeland, and in the island of Walcheren, with a very good harbour, and a great foreign trade. It was put into the hands of queen Elizabeth for a pledge of their fidelity, and as a security for the money she advanced. It is one of the three places which Charles V. advised Philip II. to preserve with care. E. Long. 3. 32. N. Lat. 51. 26.

FLUTE, an instrument of music, the simplest of all those of the wind-kind. It is played on by blowing it with the mouth; and the tones or notes are changed by stopping and opening the holes disposed for that purpose along its side.

This is a very ancient instrument. It was at first called the flute à bec, from *bec* an old Gaulish word signifying the beak of a bird or fowl, but more especially of a cock: the term *flute à bec* must therefore signify the beaked flute; which appears very proper, on comparing it with the traverse or German flute. The word *flute* is derived from *fluta*, the Latin for a lamprey or small eel taken in the Sicilian seas, having seven holes im-

mediately below the gills on each side, the precise number of those in the front of the flute.

By Merlennus this instrument is called the *flûta dulcis, seu Anglicæ*; the lowest note, according to him, for the treble flute, is *C fa ut*, and the compass of the instrument 15 notes. There is, however, a flute known by the name of the *concert-flute*, the lowest note of which is F. Indeed, ever since the introduction of the flute into concerts, the lowest note of the instrument, of what size soever it is, has been called F; when in truth its pitch is determinable only by its correspondence in respect of acuteness or gravity with one or other of the chords in the *scala maxima* or great system.

Besides the true concert-flute, others of a less size were soon introduced into concerts of violins; in which case the method was to write the flute-part in a key correspondent to its pitch. This practice was introduced in 1710 by one Woodcock, a celebrated performer on this instrument, and William Babel organist of the church of All-hallows, Bread-Street, London. They failed, however, in procuring for the flute a reception into concerts of various instruments; for which reason, one Thomas Stanesby, a very curious maker of flutes and other instruments of the like kind, about the year 1732, adverting to the scale of Merfennus, in which the lowest note was C, invented what he called the *new system*; in which, by making the flute of such a size as to be a fifth above concert-pitch, the lowest note became *C sol fa ut*. By this contrivance the necessity of transposing the flute-part was taken away; for a flute of this size, adjusted to the system above-mentioned, became an octave to the violin. To further this invention of Stanesby, one Lewis Mercier, an excellent performer on the flute, published, about the year 1735, six solos for this instrument, three of which are said to be accommodated to Mr Stanesby's new system; but the German flute was now become a favourite instrument, and Stanesby's ingenuity failed of its effect.—One great objection indeed lies against this instrument, which, however, equally affects all perforated pipes; namely, that they are never perfectly in tune, or cannot be made to play all their notes with equal exactness. The utmost that the makers of them can do is to tune them to some one key; as the hautboy to C, the German flute to D, and the English flute to F, and to effect this truly is a matter of no small difficulty. The English flutes made by the younger Stanesby come the nearest of any to perfection; but those of Bressan, though excellent in their tone, are all too flat in the upper octave. For these reasons some are induced to think, that the utmost degree of proficiency on any of those instruments is not worth the labour of attaining it.

German FLUTE, is an instrument entirely different from the common flute. It is not, like that, put into the mouth to be played; but the end is stoped with a stopper or plug, and the lower lip is applied to a hole about two inches and a half or three inches distant from the end. This instrument is usually about a foot and a half long; rather bigger at the upper end than the lower; and perforated with holes, besides that for the mouth, the lowest of which is stoped and opened by the little finger's pressing on a brass or sometimes a silver key, like those in hautboys, bassoons, &c.

Its

FLUX. Its found is exceeding sweet and agreeable; and serves as a treble in a concert.

FLUX, in metallurgy, is sometimes used synonymously with *fusion*. For instance, an ore, or other matter, is said to be in liquid flux, when it is completely fused.

But the word *flux* is generally used to signify certain saline matters, which facilitates the fusion of ores, and other matters which are difficultly fusible in effays and reductions of ores. Fixed alkalis, nitre, borax, tartar, and common salt, are the saline matters of which fluxes are generally composed. But the word *flux* is more particularly applied to mixtures of different proportions of only nitre and tartar; and these fluxes are called by particular names, according to the proportions of these ingredients, as in the following articles.

White Flux, is made with equal parts of nitre and of tartar detonated together, by which they are alkalisied. The residuum of this detonation is an alkali composed of the alkalis of the nitre and of the tartar, both which are absolutely of the same nature. As the proportion of nitre in this mixture is more than is sufficient to consume entirely all the inflammable matter of the tartar, the alkali remaining after the detonation is perfectly white, and is therefore called *white flux*; and as this alkali is made very quickly, it is also called *extemporaneous alkali*. When a small quantity only of white flux is made, as a few ounces for instance, some nitre always remains undecomposed, and a little of the inflammable principle of the tartar, which gives a red or even a black colour to some part of the flux: but this does not happen when a large quantity of white is made flux; because then the heat is much greater. This small quantity of undecomposed nitre and tartar which remains in white flux is not hurtful in most of the metallic fusions in which this flux is employed: but if the flux be required perfectly pure, it might easily be disengaged from those extraneous matters by a long and strong calcination, without fusion.

Crude Flux. By crude flux is meant the mixture of nitre and tartar in any proportions, without detonation. Thus the mixture of equal parts of the two salts used in the preparation of the white flux, or the mixture of one part of nitre and two parts of tartar for the preparation of the black flux, are each of them a *crude flux* before detonation. It has also been called *white flux*, from its colour; but this might occasion it to be confounded with the white flux above described. The name, therefore, of crude flux is more convenient.

Crude flux is detonated and alkalisied during the reductions and fusions in which it is employed; and is then changed into white or black flux, according to the proportions of which it is composed. This detonation produces good effects in these fusions and reductions, if the swelling and extravasation of the detonating matters be guarded against. Accordingly, crude flux may be employed successfully in many operations; as, for instance, in the ordinary operation for procuring the regulus of antimony.

Black Flux. Black flux is produced from the mixture of two parts of tartar and one part of nitre detonated together. As the quantity of nitre which enters into the composition of this flux is not sufficient to consume all the inflammable matter of the tartar, the alkali which remains after the detonation contains much black matter, of the nature of coal, and is therefore called *black flux*.

This flux is designedly so prepared, that it shall contain a certain quantity of inflammable matter; for it is thereby capable, not only of facilitating the fusion of metallic earths like the white flux, but also of reviving these metals by its phlogiston. From this property it is also called *reducing flux*; the black flux, therefore, or crude flux made with such proportions of the ingredients as to be convertible into black flux, ought always to be used when metallic matters are at once to be fused and reduced, or even when destructive metals are to be fused, as these require a continual supply of phlogiston to prevent their calcination.

F L U X I O N S;

A METHOD of calculation which greatly facilitates computations in the higher parts of mathematics. Sir Isaac Newton and Mr Leibnitz contended for the honour of inventing it. It is probable they had both made progress in the same discovery, unknown to each other, before there was any publication on the subject.

In this branch of mathematics, magnitudes of every kind are supposed generated by motion; a line by the motion of a point, a surface by the motion of a line, and a solid by the motion of a surface. And some part of a figure is supposed generated by an uniform motion; in consequence of which, the other parts may increase uniformly or with an accelerated or retarded motion, or may decrease in any of these ways; and the computations are made by tracing the comparative velocities with which the parts flow.

Fig. 1. If the parallelogram ABCD be generated by an uniform motion of the line AB toward CD while it moves from FE towards *fe*, while the line BF receives the increment *Ff*, and the figure will be increased

by the parallelogram *Ff*; the line FE in this case undergoes no variation.

The fluxion of any magnitude at any point is the increment that it would receive in any given time, supposing it to increase uniformly from that point; and as the measures will be the same, whatever the time be, we are at liberty to suppose it less than any assigned time.

The first letters in the alphabet are used to represent invariable quantities; the letters *x, y, z*, variable quantities; and the same letters with points over them *ẋ, ẏ, ż*, represent their fluxions.

Therefore if AB=*a*, and BF=*x*; *Ff*, the fluxion of BF, will be =*ẋ*, and *Fz*, the fluxion of AF, =*aẋ*.

If the rectangle be supposed generated by the uniform motion of FG towards CD, at the same time that HG moves uniformly towards AD, the point G keeping always on the diagonal, the lines FG HG will flow uniformly; for while Bf receives the increment *Ff*, and HB the increment HK, FG will receive the increment

ment hg , and HG the increment hg , and they will receive equal increments in equal successive times. But the parallelogram will flow with an accelerated motion; for while F flows to f , and H to K , it is increased by the gnomon KGf ; but while F and H flow through the equal spaces fm KL , it is increased by the gnomon Lgm greater than KGf ; consequently when fluxions of the sides of a parallelogram are uniform, the fluxion of the parallelogram increases continually.

The fluxion of the parallelogram $BHGF$ is the two parallelograms KG and Gf ; for though the parameter receives an increment of the gnomon KGf , while its sides flow to f and K , the part gG is owing to the additional velocity wherewith the parallelogram flows during that time; and therefore is no part of the measure of the fluxion, which must be computed by supposing the parameter to flow uniformly as it did at the beginning, without any acceleration.

Therefore if the sides of a parallelogram be x and y , their fluxions will be \dot{x} and \dot{y} ; and the fluxion of the parallelogram $xy + y\dot{x}$; and if $x=y$, that is, if the figure be a square, the fluxion of x^2 will be $2x\dot{x}$.

Fig. 2. Let the triangle ABC be described by the uniform motion of DE from A towards B , the point E moving in the line DF , so as always to touch the lines AC , CB ; while D moves from A to F , DE is uniformly increased, and the increase of the triangle is uniformly accelerated. When DE is in the position FC , it is a maximum. As D moves from F to B , the line FC decreases, and the triangle increases, but with a motion uniformly retarded.

Fig. 3. If the semicircle AFB be generated by the uniform motion of CD from A towards B , while C moves from A to G , the line CD will increase, but with a retarded motion; the circumference also increases with a retarded motion, and the circular space increases with an accelerated motion, but not uniformly, the degrees of acceleration growing less as CD approaches to the position GF . When C moves from G to B , it decreases with a motion continually accelerated, the circumference increases with a motion continually accelerated, and the area increases with a motion continually retarded, and more quickly retarded as CD approaches to B .

The fluxion of a quantity which decreases is to be considered as negative.

When a quantity does not flow uniformly, its fluxion may be represented by a variable quantity, or a line of a variable length; the fluxion of such a line is called the *second fluxion of the quantity whose fluxion that line is*: and if it be variable, a third fluxion may be deduced from it, and higher orders from these in the same manner: the second fluxion is represented by two points, as \ddot{x} .

The increment a quantity receives by flowing for any given time, contains measures of all the different orders of fluxions; for if it increases uniformly, the whole increment is the first fluxion; and it has no second fluxion. If it increases with a motion uniformly accelerated, the part of the increment occasioned by the first motion measures the first fluxion, and the part occasioned by the acceleration measures the second fluxion. If the motion be not only accelerated, but the degree of acceleration continually increased, the two first flux-

ions are measured as before; and the part of the increment occasioned by the additional degree of acceleration measures the third; and so on. These measures require to be corrected, and are only mentioned here to illustrate the subject.

DIRECT METHOD.

Any flowing quantity being given, to find its fluxion.

RULE I. To find the fluxion of any power of a quantity, multiply the fluxion of the root by the exponent of the power, and the product by a power of the same root less by unity than the given exponent.

The fluxion of x^3 is $3x^2\dot{x}$, of x^n $nx^{n-1}\dot{x}$; for the root of x^n is x , whose fluxion is \dot{x} ; which multiplied by the exponent n , and by a power of x less by unity than n , gives the above fluxion.

If x receive the increment x , it becomes $x+\dot{x}$; raise both to the power of n , and x^n becomes $x^n + nx^{n-1}\dot{x} + \frac{n(n-1)}{2}x^{n-2}\dot{x}^2 + \&c.$; but all the parts of the increment, except the first term, are owing to the accelerated increase of x^n , and form measures of the higher fluxions. The first term only measures the first fluxion; the

fluxion of $x^2 + \dot{x}^2$ is $\frac{1}{2} \times 2xz \times \dot{x} + \dot{x}^2$; for put $x = a^2 + z^2$, we have $x = zzz$; and the fluxion of x^2 , which is equal to the proposed fluent, is $\frac{1}{2} \times \dot{x}^2$; for which substituting the values of z and x , we have the above fluxion.

RULE II. To find the fluxion of the product of several variable quantities multiplied together, multiply the fluxion of each by the product of the rest of the quantities, and the sum of the products thus arising will be the fluxion sought.

Thus the fluxion of xy , is $\dot{x}y + y\dot{x}$; that of xyz , is $xy\dot{z} + xz\dot{y} + yz\dot{x}$; and that of $xyzw$, is $xyz\dot{w} + xwz\dot{y} + xwy\dot{z} + zw\dot{x}$.

RULE III. To find the fluxion of a fraction.—From the fluxion of the numerator multiplied by the denominator, subtract the fluxion of the denominator multiplied by the numerator, and divide the remainder by the square of the denominator.

Thus, the fluxion of $\frac{x}{y}$ is $\frac{y\dot{x} - x\dot{y}}{y^2}$; that of $\frac{x}{x+y}$ is $\frac{x\dot{x} + y\dot{x} - x\dot{y} - y\dot{x}}{(x+y)^2} = \frac{y\dot{x} - x\dot{y}}{(x+y)^2}$.

RULE IV. In complex cases, let the particulars be collected from the simple rules, and combined together.

The fluxion of $\frac{x^2y^2}{z}$ is $\frac{2x\dot{x}y^2 + 2y\dot{y}xx - x^2y\dot{z}}{z^2}$; for

the fluxion of x^2 is $2x\dot{x}$, and of y^2 is $2y\dot{y}$, by Rule I. and therefore the fluxion of x^2y^2 (by Rule II.) $2x\dot{x}y^2 + 2y\dot{y}xx$; from which, multiplied by z , (by Rule III.) and subtracting from it the fluxion of the denominator z , multiplied by the numerator, and dividing the whole by the square of the denominator, gives the above fluxion.

RULE IV. The second fluxion is derived from the first.

first, in the same manner as the first from the flowing quantity.

Thus the fluxion of x^3 , $3x^2\dot{x}$; its second, $6x\dot{x}^2 + 3x^2\ddot{x}$ (by Rule II.); and so on: but if \dot{x} be invariable, $\ddot{x} = 0$, and the second fluxion of $x^3 = 6x\dot{x}^2$.

PROB. I. To determine maxima and minima.

When a quantity increases, its fluxion is positive; when it decreases, it is negative; therefore, when it is just betwixt increasing and decreasing, its fluxion is $= 0$.

RULE. Find the fluxion, make it $= 0$, whence an equation will result that will give an answer to the question.

EXAMP. To determine the dimensions of a cylindric measure ABCD, (fig. 4.) open at the top, which shall contain a given quantity (of liquor, grain, &c.) under the least internal superficies possible.

Let the diameter $AB = x$, and the altitude $AD = y$; moreover, let p (3, 14159, &c.) denote the periphery of the circle whose diameter is unity, and let c be the given content of the cylinder. Then it will be $1 : p :: x : (px)$ the circumference of the base; which, multiplied by the altitude y , gives pxy for the concave superficies of the cylinder. In like manner, the area of the base, by multiplying the same expression into $\frac{1}{4}$ of the diameter x , will be found $= \frac{px^2}{4}$; which drawn

into the altitude y , gives $\frac{px^2y}{4}$ for the solid content of the cylinder; which being made $= c$, the concave surface pxy will be found $= \frac{4c}{x}$, and consequently the whole surface $= \frac{4c}{x} + \frac{px^2}{4}$: Whereof the fluxion, which is $-\frac{4cx}{x^2} + \frac{pxx}{2}$ being put $= 0$, we shall get $-8c \times px^3 = 0$;

and therefore $x = 2\sqrt{\frac{c}{p}}$: further, because $px^3 = 8c$, and $px^2y = 4c$, it follows, that $x = 2y$; whence y is also known, and from which it appears that the diameter of the base must be just the double of the altitude.

Fig. 7. To find the longest and shortest ordinates of any curve, DEF, whose equation or the relation which the ordinates bear to the abscissas is known.

Make AC the abscissa x , and CE the ordinate y ; take a value y in terms of x , and find its fluxion; which making $= 0$, an equation will result whose roots give the value of x when y is a maximum or a minimum.

To determine when it is a maximum and when a minimum, take the value of y , when x is a little more than the root of the equation so found, and it may be perceived whether it increases or decreases.

If the equation has an even number of equal roots, y will be neither a maximum nor minimum when its fluxion is $= 0$.

PROB. II. To draw a tangent to any curve.

Fig. 5. When the abscissa CS of a curve moves uniformly from A to B, the motion of the curve will be retarded if it be concave, and accelerated if convex towards AB; for a straight line TC is described by a uniform motion, and the fluxion of the curve at any

point is the same as the fluxion of the tangent, because it would describe the tangent if it continued to move equally from that point. Now if S or Ce be the fluxion of the base, Cd will be the fluxion of the tangent, and de of the ordinate. And because the triangles TSC, Ced, are equiangular, $de : ce :: CS : ST$, wherefore,

RULE. Find a fourth proportional to the fluxion of the ordinate valued in terms of the abscissa, the fluxion of the abscissa, and the ordinate, and it determines the line ST, which is called the *semi-tangent*, and TC joined is a tangent to the curve.

EXAMP. To draw a right line CT, (fig. 6.) to touch a given circle BCA in a given point C.

Let CS be perpendicular to the diameter AB, and put $AB = a$, $BS = x$, and $SC = y$; then, by the property of the circle, y^2 (CS^2) $= BS \times AS$ ($= x \times a - x$) $= ax - x^2$; whereof the fluxion being taken, in order to determine the ratio of x and y , we get $2y\dot{y} = a\dot{x} - 2x\dot{x}$; consequently $\frac{\dot{y}}{y} = \frac{2y}{a - 2x} = \frac{\dot{y}}{\frac{1}{2}a - x}$; which multiplied by y , gives $\frac{y\dot{y}}{\frac{1}{2}a - x} =$ the subtangent ST. Whence (O being sup-

posed the centre) we have OS ($\frac{1}{2}a - x$) : CS (y) :: CS (y) : ST ; which we also know from other principles.

PROB. III. To determine points of contrary flexure in curves.

FIG. 7. Supposing C to move uniformly from A to B, the curve DEF will be convex towards AB when the celerity of E increases, and concave when it decreases; therefore at the point where it ceases to be convex and begins to be concave, or the opposite way, the celerity of E will be uniform, that is, CE will have no second fluxion. Therefore,

RULE. Find the second fluxion of the ordinate in terms of the abscissa, and make it $= 0$; and from the equation that arises you get a value of the abscissa, which determines the point of contrary flexure.

Ex. Let the nature of the curve ARS be defined by the equation $ay = a^{\frac{1}{2}}x^{\frac{1}{2}} + xx$, (the abscissa AF and the ordinate FG being, as usual, represented by x and y respectively). Then y , expressing the celerity of the

point r , in the line FH, will be equal to $\frac{\frac{1}{2}a \times \dot{x} + 2x\dot{x}}{a}$;

Whose fluxion, or that of $\frac{1}{2}a \times \dot{x}^{-\frac{1}{2}} + 2x$ (because a and \dot{x} are constant) must be equal to nothing; that is,

$-\frac{1}{4}a^{\frac{1}{2}}x^{-\frac{3}{2}} + 2\dot{x} = 0$: Whence $a^{\frac{1}{2}}x^{-\frac{3}{2}} = 8$, $\frac{a^{\frac{1}{2}}}{a^{\frac{1}{2}}x^{\frac{3}{2}}} = 8x^{\frac{1}{2}}$
 $64x^3 = a^3$, and $x = \frac{1}{4}a = AF$; therefore FG ($= \frac{a^{\frac{1}{2}}x^{\frac{1}{2}} + xx}{a}$)
 $= \frac{9}{16}a$: From which the position of the point G is given.

PROB. IV. To find the radii of curvature.

THE curvature of a circle is uniform in every point, that of every other curve continually varying: and it is measured at any point by that of a circle whose radius is of such a length as to coincide with it in curvature at that point.

All curves that have the same tangent have the same first fluxion, because the fluxion of a curve and its tangent

gent are the same. If it moved uniformly on from the point of contact, it would describe the tangent. And the deflection from the tangent is owing to the acceleration or retardation of its motion, which is measured by its second fluxion: and consequently two curves which have not only the same tangent, but the same curvature at the point of contact, will have both their first and second fluxions equal. It is easily proven from thence, that the radius of curvature is

$$= \frac{z^3}{-xy},$$
 where x, y , and z represent the abscissa, ordinate, and curve respectively.

EXAMP. Let the given curve be the common parabola, whose equation is $y = a^{\frac{1}{2}} x^{\frac{1}{2}}$. Then will $y = \frac{1}{2} a^{\frac{1}{2}} x^{-\frac{1}{2}}$ and (making x constant) $y = -\frac{1}{2} a^{\frac{1}{2}} x^{-\frac{1}{2}}$ and $\frac{a^{\frac{1}{2}} x}{2x^{\frac{3}{2}}}$: Whence $z = \sqrt{x^2 + y^2} = \frac{x}{2} \sqrt{\frac{4x+a}{x}}$, and

the radius of curvature $\left(\frac{z^3}{-xy} \right) = \frac{a+4}{2\sqrt{a}}$: Which at the vertex, where $x=0$, will be $=\frac{1}{2}a$.

INVERSE METHOD.

From a given fluxion to find a fluent.

THIS is done by tracing back the steps of the direct method. The fluxion of x is \dot{x} ; and therefore the fluent of x is x : but as there is no direct method of finding fluents, this branch of the art is imperfect. We can assign the fluxion of every fluent; but we cannot assign the fluent of a fluxion, unless it be such a one as may be produced by some rule in the direct method from a known fluent.

GENERAL RULE. Divide by the fluxion of the root, add unity to the exponent of the power, and divide by the exponent so increased.

For, dividing the fluxion $n x^{n-1} \dot{x}$ by \dot{x} (the fluxion of the root x) it becomes $n x^{n-1}$; and, adding 1 to the exponent $(n-1)$ we have $n x^n$; which, divided by n , gives x^n , the true fluent of $n x^{n-1} \dot{x}$.

Hence (by the same rule) the

Fluent of $3x^2 \dot{x}$ will be $= x^3$;

That of $8x^{\frac{3}{2}} \dot{x} = \frac{8x^{\frac{5}{2}}}{\frac{5}{2}}$;

That of $2x^{\frac{1}{2}} \dot{x} = \frac{x^{\frac{3}{2}}}{\frac{3}{2}}$;

That of $y^{\frac{1}{2}} \dot{y} = \frac{2}{3} y^{\frac{3}{2}}$.

Sometimes the fluent so found requires to be corrected. The fluxion of x is \dot{x} , and the fluxion of $a+x$ is also \dot{x} , because a is invariable, and has therefore no fluxion.

Now when the fluent of \dot{x} is required, it must be determined, from the nature of the problem, whether

any invariable part, as a , must be added to the variable part x .

When fluents cannot be exactly found, they can be approximated by infinite series.

Ex. Let it be required to approximate the fluent of

$$\frac{a^2 - x^2}{c^2 - x^2} \dot{x} \text{ in an infinite series.}$$

The value of $\frac{a^2 - x^2}{c^2 - x^2}$, expressed in a series, is $\frac{a}{c} +$

$$\frac{a}{2c^3} \frac{1}{2ac} x^2 + \frac{3a}{8c^5} \frac{1}{4ac^3} x^4 + \frac{5a}{16c^7} \frac{1}{16ac^5} x^6 + \dots$$

Which value being therefore multiplied by $x \dot{x}$, and the fluent taken (by the common method) we get $\frac{ax^{n+1}}{n+1 \times c} + \frac{a}{2c^3} \frac{1}{2ac} \times \frac{x^{n+3}}{n+3} + \frac{3a}{8c^5} \frac{1}{4ac^3} \times \frac{x^{n+5}}{n+5} + \frac{5a}{16c^7} \frac{1}{16ac^5} \times \frac{x^{n+7}}{n+7} + \dots$

PROB. I. To find the area of any curve.

RULE. Multiply the ordinate by the fluxion of the abscissa, and the product gives the fluxion of the figure, whose fluent is the area of the figure.

EXAMP. 1. Fig. 8. Let the curve ARMH, whose area you will find, be the common parabola. Let u represent the area, and \dot{u} its fluxion.

In which case the relation of $AB(x)$ and $BR(y)$ being expressed by $y^2 = ax$ where a is the parameter) we thence get $y = a^{\frac{1}{2}} x^{\frac{1}{2}}$; and therefore $\dot{u} = RmHB (= x \dot{y}) = a^{\frac{1}{2}} x^{\frac{1}{2}} \dot{x}$: whence $u = \frac{2}{3} a^{\frac{1}{2}} x^{\frac{3}{2}} = \frac{2}{3} a^{\frac{1}{2}} x^{\frac{1}{2}} \times x = \frac{2}{3} xy$ (because $a^{\frac{1}{2}} x^{\frac{1}{2}} = y$) $= \frac{2}{3} \times AB \times BR$: hence a parabola is $\frac{2}{3}$ of a rectangle of the same base and altitude.

EXAMP. 2. Let the proposed curve CSDR (fig. 9.) be of such a nature, that (supposing AB unity) the sum of the areas CSTBC and CDGBC answering to any two proposed abscissas AT and AG , shall be equal to the area CRNBC, whose corresponding abscissa AN is equal to $AT \times AG$, the product of the measures of the two former abscissas.

First, in order to determine the equation of the curve, (which must be known before the area can be found), let the ordinates GD and NR move parallel to themselves towards HF ; and then having put $GD=y$, $NR=z$, $AT=a$, $AG=c$, and $AN=u$, the fluxion of the area $CDGB$ will be represented by $y \dot{y}$, and that of the area $CRNB$ by $z \dot{z}$: which two expressions must, by the nature of the problem, be equal to each other; because the latter area $CRNB$ exceeds the former $CDGB$ by the area $CSTB$, which is here considered as a constant quantity: and it is evident, that two expressions, that differ only by a constant quantity, must always have equal fluxions.

Since, therefore, $y \dot{y} = z \dot{z}$, and $u = at$, by hypothesis, it follows, that $u = az$, and that the first equation (by substituting for \dot{u}) will become $y \dot{y} = az \dot{z}$, or $y \dot{y} = az$, or lastly $y \dot{y} = za \dot{a}$, that is, $GD \times AG = NR \times AN$: there-

fore,

fore, $GD : NR :: AN : AG$; whence it appears, that every ordinate of the curve is reciprocally as its corresponding abscissa.

Now, to find the area of the curve so determined, put $AB=t$, $BC=b$, and $BG=x$; then, since $AG(1+x) : AB(1) :: BC(b) : GD(y)$ we have $y = \frac{b}{1+x}$,

consequently $\dot{u} (=y\dot{x}) = \frac{b\dot{x}}{1+x} = b \times \dot{x} - x\dot{x} + x^2\dot{x} - n^3x + x^4 - \&c.$ Whence, $BGDC$, the area itself will be $b \times x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \frac{x^5}{5}$, &c. which was to be found.

Hence it appears, that as these areas have the same properties as logarithms, this series gives an easy method of computing logarithms; and the fluent may be found by means of a table of logarithms, without the trouble of an infinite series; and every fluxion whose fluent agrees with any known logarithmic expression, may be found the same way. Hence the fluents of fluxions of the following forms are deduced.

The fluent of $\frac{\dot{x}}{\sqrt{x^2 \pm a^2}} = \text{hyp. log. of } x + \sqrt{x^2 \pm a^2}$;

of $\frac{\dot{x}}{\sqrt{2ax + x^2}} = \text{hyp. log. } a\sqrt{x} + \sqrt{2ax + x^2}$;

of $\frac{2a\dot{x}}{a^2 - x^2} = \text{hyp. log. of } \frac{a+x}{a-x}$;

and of $\frac{2a\dot{x}}{x\sqrt{a^2 - x^2}} = \text{hyp. log. } \frac{a - \sqrt{a^2 - x^2}}{a + \sqrt{a^2 - x^2}}$

PROB. 2. To determine the length of curves.

Fig. 5. Because Cde is a right-angled triangle, $Cd^2 = Ce^2 + de^2$; wherefore the fluxions of the abscissa and ordinate being taken in the same terms and squared, their sum gives the square of the fluxion of the curve; whose root being extracted, and the fluent taken, gives the length of the curve.

EXAMP. To find the length of a circle from its tangent. Make the radius AO (fig. 5) $=a$, the tangent of $AC=t$, and its secant $=s$, the curve $=z$, and its fluxion $=\dot{z}$; because the triangles OTC , OCS , are similar, $OT : OC :: OC :: OS$; whence $OS = \frac{a^2}{s}$, and $SA = a - \frac{a^2}{s} = a - \frac{a^2}{\sqrt{a^2 + t^2}}$; whose

fluxion is $\frac{a^2 \dot{t}}{a^2 + t^2}$; and because the triangles OTC ,

aCt are similar, $TC (=t) : TO (= \sqrt{a^2 + t^2}) :: Ce = \left(\frac{a^2 \dot{t}}{a^2 + t^2} \right) : Cd = \frac{a^2 \dot{t}}{a^2 + t^2} = \text{fluxion of the curve.}$

Now by converting this into an infinite series, we have the

fluxion of the curve $= \dot{z} = \frac{t^2 \dot{t}}{a^2} + \frac{t^4 \dot{t}}{a^4} + \frac{t^6 \dot{t}}{a^6}$, &c. and consequently

sequently $z = -\frac{t^3}{3a^2} + \frac{t^5}{5a^4} - \frac{t^7}{7a^6} + \frac{t^9}{9a^8}$, &c. $= AR$.

Where, if (for example) take AR be supposed an arch of 36 degrees, and AO (to render the operation more easy) be put $=$ unity, we shall have $t = \sqrt{\frac{1}{2}} = .5773502$ (because $Ob\sqrt{\frac{1}{2}} : bR (\frac{1}{2}) :: OA(1) : AT(t) = \sqrt{\frac{1}{2}}$)

Whence,

$$t^3 (=t \times t^2 = t \times \frac{1}{2}) = .1924500$$

$$t^5 (=t^2 \times t^2 = \frac{t^3}{2}) = .0641500$$

$$t^7 (=t^5 \times t^2 = \frac{t^3}{3}) = .0213833$$

$$t^9 (=t^7 \times t^2 = \frac{t^3}{9}) = .0071277$$

$$t^{11} (=t^9 \times t^2 = \frac{t^3}{27}) = .0023759$$

$$t^{13} (=t^{11} \times t^2 = \frac{t^3}{81}) = .0007919$$

$$t^{15} (=t^{13} \times t^2 = \frac{t^3}{243}) = .0002639$$

&c.

And therefore $AR = .5773502 - \frac{.1924500}{3} + \frac{.0641500}{5} - \frac{.0213833}{7} + \frac{.0091277}{9} - \frac{.0023759}{11} + \frac{.0007919}{13} - \frac{.0002639}{15} + \frac{.0000879}{17} - \frac{.0000293}{19} + \frac{.0000097}{21} - \frac{.0000032}{23} = .5235987$; for the length of

an arch of 30 degrees, which multiplied by 6 gives 3.141592 + for the length of the semi-periphery of the circle whose radius is unity.

Other series may be deduced from the versed sine, sine and secant; and these are of use for finding fluents which cannot be expressed in finite terms.

The fluent of	$\left\{ \begin{array}{l} \frac{\dot{v}}{\sqrt{2av - v^2}} \\ \frac{\dot{v}}{\sqrt{a^2 - v^2}} \\ \frac{\dot{v}}{a^2 + v^2} \\ \frac{\dot{v}}{av\sqrt{v^2 - a^2}} \end{array} \right\}$	$\left\{ \begin{array}{l} \text{to the arch whole} \\ \text{to the right whole} \\ \text{to the tangent} \\ \text{to the secant} \end{array} \right\}$	$\left\{ \begin{array}{l} \text{Versed sine} \\ \text{Right sine} \\ \text{Tangent} \\ \text{Secant} \end{array} \right\}$	$\left\{ \begin{array}{l} \text{is } \frac{v}{a}, \text{ and} \\ \text{Radius Unity.} \end{array} \right\}$

PROB. 3. To find the contents of a solid.

LET the surface of the generating plane be multiplied by the space it passes through in any time, the product will give a solid which is the fluxion of the solid required: the surface must therefore be computed in terms of x , which represents the line or axis on which it moves, and by its motion on which the fluxion is to be measured, and the fluent found will give the contents of the solid.

EXAMP. Let it be proposed to find the content of a cone ABC , fig. 10.

Put the given altitude (AD) of the cone $=a$, and the semi-diameter (BD) of its base $=b$, the solid $=s$, its fluxion $=\dot{s}$, and the area of a circle, whose radius is unity, $=p$: then the distance (AF) of the circle EG , from the vertex A , being denoted by x , we have, by similar triangles, as $a : b :: x : EF(y)$

$= \frac{bx}{a}$. Whence in this case, $\dot{s} (=p\dot{y} \dot{x}) = \frac{pb^2 x \dot{x}}{a^2}$; and consequently $s = \frac{pb^2 x^2}{3a^2}$; which, when $x=a$ ($=AD$)

gives.

gives $\frac{p^2 a}{3}$ ($= p \times BD^2 \times \frac{1}{3} AD$) for the content of the whole cone ABC: which appears from hence to be just $\frac{1}{3}$ of a cylinder of the same base and altitude.

PROB. 4. To compute the surface of any solid body.

THE fluxion of the surface of the solid is equal to the periphery of the surface, by whose motion the solid is generated, multiplied by its velocity on the edge of the solid, and the computation is made as in the foregoing.

EXAMP. Let it be proposed to determine the convex superficies of a cone ABC, fig. 11.

Then, the semi-diameter of the base (BD, or CD) being put $= b$, the slanting line or hypotenuse AC $= c$, and FH (parallel to DC) $= y$, AG $= z$, the surface $= w$, its fluxion $= \dot{w}$, and p = the periphery of a circle whose diameter is unity, we shall, from the simi-

larity of the triangles ADC and Hmb, have $b : c :: y : mb$; whence $\dot{w} (2 p y \dot{z}) = \frac{2 p c y \dot{y}}{b}$; and consequently $\dot{w} = \frac{p c y^2}{b}$. This, when $y = b$, becomes

$\dot{w} = p c b = p \times DC \times AC$ = the convex superficies of the whole cone ABC: which therefore is equal to a rectangle under half the circumference of the base and the slanting line.

The method of fluxions is also applied to find the centres of gravities, and oscillation of different bodies; to determine the paths described by projectiles and bodies acted on by central forces, with the laws of centripetal force in different curves, the retardates given to motions performed in resisting media, the attractions of bodies under different forms, the direction of wind which has the greatest effect on an engine, and to solve many other curious and useful problems.

F L Y

Fly.

FLY, in zoology, a large order of insects, the distinguishing characteristic of which is, that their wings are transparent. By this they are distinguished from beetles, butterflies, grasshoppers, &c. See SCARABÆUS, GRYLLUS, &c.

Flies are subdivided into those which have four, and those which have two wings.

Of those with four wings there are several genera or kinds; as the ant, apis, ichneumon, &c. See ARIS, FORMICA, &c.

Of those with two wings, there are likewise several kinds, as the gad-fly, gnat, &c. See GAD-FLY, &c.

Those who desire a more particular account of the anatomy, generation, structure, and manifold subdivisions of flies, may consult Reaumur's History of Insects, tom. 4.

FLY, in mechanics, a cross with leaden weights at its ends; or rather, a heavy wheel at right angles to the axis of a windlass, jack, or the like; by means of which, the force of the power, whatever it is, is not only preserved, but equally distributed in all parts of the revolution of the machine. See MECHANICS.

FLIES for Fishing. See FISHING-FLY.

Vegetable FLY, a very curious natural production chiefly found in the West Indies. "Excepting that it has no wings, it resembles the drone both in size and colour more than any other British insect. In the month of May it buries itself in the earth, and begins to vegetate. By the latter end of July the tree is arrived at its full growth, and resembles a coral branch; and is about three inches high, and bears several little pods, which dropping off become worms, and from thence flies, like the British caterpillar."

Such was the account originally given of this extraordinary production. But several boxes of these flies having been sent to Dr Hill for examination, his report was this: "There is in Martinique a fungus of the clavaria kind, different in species from those hitherto known. It produces sboles from its sides, I call it therefore *clavaria sbolesifera*. It grows on putrid animal bodies, as our fungus *ex pede equino* from the dead horse's hoof.

"The cicada is common in Martinique, and in its

F L Y

Fly.

nympha state, in which the old authors call it *tettigometra*: it buries itself under dead leaves to wait its change; and, when the season is unfavourable, many perish. The seeds of the clavaria find a proper bed on this dead insect, and grow.

"The *tettigometra* is among the cicadæ in the British museum; the clavaria is just now known.

"This is the fact, and all the fact; though the untaught inhabitants suppose a fly to vegetate, and though there is a Spanish drawing of the plant's growing into a trifoliate tree, and it has been figured with the creature flying with this tree upon its back."

The ingenious Mr Edwards has taken notice of this extraordinary production in his Gleanings of Natural History, from which the figures on Plate CV. are taken.

FLY-Boat, or Flight, a large flat-bottomed Dutch vessel, whose burden is generally from 400 to 600 tons. It is distinguished by a stern remarkably high, resembling a Gothic turret, and by very broad buttocks below.

FLY-Catcher, in zoology. See MUSCICAPA.

FLY-Trap, in botany, a newly discovered sensitive plant. See *DIONEÆ Muscipula*.

FLY-Tree, in natural history, a name given by the common people of America to a tree, whose leaves, they say, at a certain time of the year produce flies. On examining these leaves about the middle of summer, the time at which the flies use to be produced, there are found on them a sort of bags of a tough matter, of about the size of a filbert, and of a dusky greenish colour. On opening one of these bags with a knife, there is usually found a single full-grown fly, of the gnat kind, and a number of small worms, which in a day or two more have wings and flee away in the form of their parent. The tree is of the mulberry kind, and its leaves are usually very largely stocked with these insect-bags; and the generality of them are found to contain the insects in their worm-state; when they become winged, they soon make their way out. The bags begin to appear when the leaves are young, and afterwards grow with them; but they never rumple the leaf, or injure its shape. They are of the kind of leaf-galls, and partake in all respects,

Flying. except size, of a species we have frequent on the large maple, or, as it is called, the *ycamore*.

The fly-tree is found in many parts of France, where it grows in great abundance, and is there said to bear fruit which give origin to a vast number of flies. The truth of the matter is this. The tree is a species of turpentine tree, and frequently produces or gives origin to certain tubercles, which, in the common turpentine tree, are called its *horns*. These are a sort of long bladders, of the length and thickness of a finger; which arise, not from the stalks, as fruits do, but from the surface of the leaves, and are only a kind of leaf-galls formed of an elongation of its outer membranes, occasioned by the punctures of a number of insects contained within it, which occasion a derivation of fresh juices to the part. These insects are not flies of the common kind, but are the pucerons so well known for feeding on the leaves and tender stalks of trees; and some few of these only are winged, the others being destitute of them.—The origin of these tubercles or bladders is this. The female puceron, as soon as produced from the parent, makes a way under the membrane that covers the leaf, by means of a hole bored in it with the trunk. This hole soon heals up after she is in; and the young ones, which she afterwards produces, by their wounding and sucking the sides of the lodgment in which they find themselves placed, occasion all the swelling and growth of the tubercle.

FLYING, the progressive motion of a bird, or other winged animal, in the air.

The parts of birds chiefly concerned in flying are the wings, by which they are sustained or wafted along. The tail, Messrs Willoughby, Ray, and many others, imagine to be principally employed in steering and turning the body in the air, as a rudder: but Borelli has put it beyond all doubt, that this is the least use of it, which is chiefly to assist the bird in its ascent and descent in the air, and to obviate the vacillations of the body and wings: for, as to turning to this or that side, it is performed by the wings and inclination of the body, and but very little by the help of the tail. The flying of a bird, in effect, is quite a different thing from the rowing of a vessel. Birds do not vibrate their wings towards the tail, as oars are struck towards the stern, but waft them downwards; nor does the tail of the bird cut the air at right angles, as the rudder does the water; but is disposed horizontally, and preserves the same situation what way soever the bird turns.

In effect, as a vessel is turned about on its centre of gravity to the right, by a brisk application of the oars to the left; so a bird, in beating the air with its right wing alone, towards the tail, will turn its fore-part to the left. Thus pigeons changing their course to the left, would labour it with their right wing, keeping the other almost at rest. Birds of a long neck alter their course by the inclination of their head and neck; which altering the course of gravity, the bird will proceed in a new direction.

The manner of FLYING is thus: The bird first bends his legs, and springs with a violent leap from the ground; then opens and expands the joints of his wings, so as to make a right line perpendicular to the sides of his body: thus the wings, with all the feathers therein, constitute one continued lamina. Being now

raised a little above the horizon, and vibrating the wings with great force and velocity perpendicularly against the subject air, that fluid resists those successions, both from its natural inactivity and elasticity, by means of which the whole body of the bird is protruded. The resistance the air makes to the withdrawing of the wings, and consequently the progress of the bird, will be so much the greater, as the waft or stroke of the fan of the wing is longer: but as the force of the wing is continually diminished by this resistance, when the two forces continue to be in *equilibrium*, the bird will remain suspended in the same place; for the bird only ascends so long as the arch of air the wing describes makes a resistance equal to the excess of the specific gravity of the bird above the air. If the air, therefore, be so rare as to give way with the same velocity as it is struck withal, there will be no resistance, and consequently the bird can never mount. Birds never fly upwards in a perpendicular line, but always in a parabola. In a direct ascent, the natural and artificial tendency would oppose and destroy each other, so that the progress would be very slow. In a direct descent they would aid one another, so that the fall would be too precipitate.

Artificial FLYING, that attempted by men, by the assistance of mechanics.

The art of flying has been attempted by several persons in all ages. The Leucadians, out of superstition, are reported to have had a custom of precipitating a man from a high cliff into the sea, first fixing feathers, variously expanded, round his body, in order to break the fall.

Friar Bacon, who lived near 500 years ago, not only affirms the art of flying possible, but assures us, that he himself knew how to make an engine wherein a man fitting might be able to convey himself through the air like a bird; and further adds, that there was then one who had tried it with success. The secret consisted in a couple of large thin hollow copper-globes, exhausted of air; which being much lighter than air, would sustain a chair, whereon a person might sit. Fa. Francisco Lana, in his *Prodromo*, proposes the same thing, as his own thought. He computes, that a round vessel of plate-brass, 14 foot in diameter, weighing three ounces the square foot, will only weigh 1848 ounces; whereas a quantity of air of the same bulk, will weigh 2155 ounces; so that the globe will not only be sustained in the air, but will carry with it a weight of 3733 ounces; and by increasing the bulk of the globe, without increasing the thickness of the metal, he adds, a vessel might be made to carry a much greater weight.—But the fallacy is obvious: a globe of the dimensions he describes, Dr Hook shews, would not sustain the pressure of the air, but be crushed inwards. Beside, in whatever ratio the bulk of the globe were increased, in the same must the thickness of the metal, and consequently the weight, be increased: so that there would be no advantage in such augmentation.

The same author describes an engine for flying, invented by the Sieur Besnier, a smith of Sable, in the county of Maine. *Vid. Philosoph. Collect. N° 1.*

The philosophers of king Charles the second's reign were mightily abused about this art. The famous bishop Wilkins was so confident of success in it, that he

says,

Flying
Factor.

says, he does not question but, in future ages, it will be as usual to hear a man call for his wings, when he is going a journey, as it is now to call for his boots.

FLYING Bridge. See BRIDGE.

FLYING Fish, a name given by the English writers to several species of fish, which, by means of their long fins, have a method of keeping themselves out of water a long time. See EXOCOETUS.

FLYING Pinion, is part of a clock, having a fly, or fan, whereby to gather air, and so bridle the rapidity of the clock's motion, when the weight descends in the striking part.

FO, or FOE; an idol of the Chinese. He was originally worshipped in the Indies, and transported from thence into China, together with the fables with which the Indian books were filled. He is said to have performed most wonderful things, which the Chinese have described in several volumes, and represented by cuts.

Self of Fo. See CHINA, n° 61.

FOAL, or COLT and FILLY; the young of the horse kind. The word *colt*, among dealers, is understood of the male, as *filly* is of the female. See COLT.

FOCUS, in geometry and conic sections, is applied to certain points in the parabola, ellipsis, and hyperbola, where the rays reflected from all parts of these curves concur and meet. See CONIC SECTIONS.

FOCUS, in optics; a point in which any number of rays, after being reflected or refracted, meet.

FODDER, any kind of meat for horses or other cattle. In some places, hay and straw, mingled together, is peculiarly denominated *fodder*.

FODDER, in the civil law, is used for a prerogative that the prince has, to be provided of corn and other meats for his horses, by the subjects, in his warlike expeditions.

FODDER, in mining; a measure containing 22 hundred and an half weight, though in London but 20 hundred weight.

FOENUGREEK, in botany. See TRIGONELLA.

FOENUS NAUTICUM. Where money was lent to a merchant, to be employed in a beneficial trade, with condition to be repaid, with extraordinary interest, in case such voyage was safely performed, the agreement was sometimes called *fenus nauticum*, sometimes *usura maritima*. But as this gave an opening for usurious and gaming contracts, 19 Geo. II. c. 37. enacts, that all money lent on bottomry, or at *respondentia*, on vessels bound to or from the East Indies, shall be expressly lent only upon the ship or merchandise; the lender to have the benefit of salvage, &c. Blackst. Com. II. 459. Mol. de Jur. Mar. 361.

FOESIUS (Annius), a very learned and celebrated physician of the faculty of Paris, born at Metz in 1528. He translated into Latin the whole works of Hippocrates, judiciously correcting the Greek text as he went along; and composed a kind of dictionary to him, intitled *Oeconomia Hippocratis*. He translated, besides, the Commentaries of Galen upon the second book of Hippocrates; and was the author of some other works. After practising physic a long time with great success and reputation, at Lorrain and other places, he died in 1596.

FOETOR, in medicine, stinking or foetid effluvia arising from the body or any part thereof.

Foetus,
Fog.

FOETUS, the young of all viviparous animals whilst in the womb, and of oviparous animals before being hatched: the name is transferred by botanists to the embryos of vegetables.

In the human fetus are several peculiarities not to be found in the adult; some of them are as follows.

1. The arteries of the navel-string, which are continuations of the hypogastrics, are, after the birth, shrivelled up, and form the ligamenta umbilic. infer.
2. The veins of the navel-string are formed by the union of all the venous-branches in the placenta, and passing into the abdomen become the falciform ligament of the liver.
3. The lungs, before being inflated with air, are compact and heavy; but after one inspiration they become light, and as it were spongy; and it may be noted here, that the notion of the lungs sinking in water before the child breathes, and of their swimming after the reception of air, are no certain proofs that the child had or had not breathed, much less that it was murdered: for the inflated lungs become specifically lighter than water as soon as any degree of putrefaction takes place in them; and this soon happens after the death of the child: besides, where the utmost care hath been taken to preserve the child, it hath breathed once or twice, and then died.
6. The thymus gland is very large in the fetus, but dwindles away in proportion as years advance.
7. The foramen ovale in the heart of a fetus, is generally closed in an adult.

For an account of the different opinions concerning the formation and growth of the fetus. See GENERATION.

FOG, or MIST, a meteor, consisting of gross vapours, floating near the surface of the earth.

Mists, according to lord Bacon, are imperfect condensations of the air, consisting of a large proportion of the air, and a small one of the aqueous vapour: and these happen in the winter, about the change of the weather from frost to thaw, or from thaw to frost; but in the summer, and in the spring, from the expansion of the dew.

If the vapours, which are raised plentifully from the earth and waters, either by the solar or subterraneous heat, do, at their first entrance into the atmosphere, meet with cold enough to condense them to a considerable degree, their specific gravity is by that means increased; and so they will be stopped from ascending, and either return back, in form of dew or of drizzling rain; or remain suspended some time in the form of a fog. Vapours may be seen on the high grounds as well as the low, but more especially about marshy places: they are easily dissipated by the wind, as also by the heat of the sun: they continue longest in the lowest grounds, because these places contain most moisture, and are least exposed to the action of the wind.

Hence we may easily conceive, that fogs are only low clouds, or clouds in the lowest region of the air; as clouds are no other than fogs raised on high. See CLOUD.

When fogs stink, then the vapours are mixed with sulphureous exhalations, which smell so. Objects viewed through fogs, appear larger and more remote than through the common air. Mr Boyle observes, that upon the coast of Coromandel, and most maritime

parts.

Fogage
Foil.

Fokien
Folcmote.

parts of the East-Indies, there are, notwithstanding the heat of the climate, annual fogs so thick, as to occasion people of other nations who reside there, and even the natives, to keep their houses close shut up.

Fogs are commonly pretty strongly electrified, as appears from Mr Cavallo's observations upon them. See ELECTRICITY, n° 69.

FOGAGE, in the forest-law, is rank grass, not eaten up in summer.

FOGLIETA (Oberto or Hubert), a Genoese priest, and one of the most learned writers of the 16th century. He had a share in the disturbances that were raised at Genoa; for which he was banished, and died at Rome in 1581, aged 63. He wrote a history of Genoa in Italian, which is highly esteemed; and many works in Latin.

FOGO, or FUEGO, a small island in the Atlantic Ocean, and one of the Cape de Verda. It is remarkable for a mountain that vomits fire and flames, like Mount Vesuvius. It sometimes throws out large stones, with a noise like thunder. The few inhabitants that are here, live at the foot of this mountain. W. Long. 24. 47. N. Lat. 15. 20.

FOHL. See FE; and CHINA, n° 7.

FOIBLE, a French term, frequently used also in our language. It literally signifies weak; and in that sense is applied to the body of animals, and the parts thereof; as, *foible reins*, *foible sight*, &c. being derived from the Italian *fiavole*, of the Latin *fibiles*, to be "lame, aged."

But it is chiefly used with us substantively, to denote a defect or flaw in a person or thing. Thus we say, Every person has his foible; and the great secret consists in hiding it artfully: Princes are gained by flattery, that is their foible: The foible of young people is pleasure; the foible of old men is avarice; the foible of the great and learned is vanity; the foible of women and girls, coquetry, or an affectation of having gallants: You should know the forte and the foible of a man, before you employ him: We should not let people perceive that we know their foible.

FOIL, among glass-grinders, a sheet of tin, with quicksilver, or the like, laid on the backside of a looking-glass, to make it reflect. See FOLIATING.

FOIL, among jewellers, a thin leaf of metal placed under a precious stone, in order to make it look transparent, and give it an agreeable different colour, either deep or pale: thus, if you want a stone to be of a pale colour, put a foil of that colour under it; or, if you would have it deep, lay a dark one under it.

These foils are made either of copper, gold, or gold and silver together. The copper foils are commonly known by the name of *Nuremberg* or *German foils*; and are prepared as follows: Procure the thinnest copper-plates you can get: beat these plates gently upon a well-polished anvil, with a polished hammer, as thin as possible; and placing them between two iron plates as thin as writing-paper, heat them in the fire; then boil the foil, in a pipkin, with equal quantities of tartar and salt, constantly stirring them till by boiling they become white; after which, taking them out, and drying them, give them another hammering, till they are made fit for your purpose: however, care must be taken not to give the foils too much heat, for fear of

melting; nor must they be too long boiled, for fear of attracting too much salt.

The manner of polishing these foils is as follows. Take a plate of the best copper, one foot long and about five or six inches wide, polished to the greatest perfection; bend this to a long convex, fasten it upon a half roll, and fix it to a bench or table; then take some chalk, washed as clean as possible, and sifted through a fine linen-cloth, till it be as fine as you can make it; and, having laid some thereof on the roll, and wetted the copper all over, lay your foils on it, and with a polishing stone and the chalk, polish your foils till they are as bright as a looking-glass; after which they must be dried, and laid up secure from dust.

FOKIEN, a province of China in Asia, commodiously situated for navigation and commerce, part of it bordering on the sea, in which they catch large quantities of fish, which they send salted to other parts of the empire. Its shores are very uneven, by reason of the number and variety of its bays; and there are many forts built thereon to guard the coast. The air is hot, but pure and wholesome.

The mountains are almost every where disposed into a kind of amphitheatres, by the labour of the inhabitants, with terraces placed one above another. The fields are watered with rivers and springs, which issue out of the mountains, and which the husbandmen conduct in such a manner as to overflow the fields of rice when they please, because it thrives best in watery ground. They make use of pipes of bamboo for this purpose.

They have all commodities in common with the rest of China; but more particularly mulk, precious stones, quicksilver, silk, hempen-cloth, callico, iron, and all sorts of utensils wrought to the greatest perfection. From other countries they have cloves, cinnamon, pepper, sandal-wood, amber, coral, and many other things. The capital city is Foutcheou Fou; or, as others would have it written, Fucherosu. But as for Fokien, which most geographers make the capital, there is no such place.

FOLC-LANDS, (Sax.) copy-hold lands so called in the time of the Saxons, as charter-lands were called *hoc-lands*, Kitch. 174. *Folkland* was *terra vulgi*, or *popularis*; the land of the vulgar people, who had no certain estate therein, but held the same, under the rents and services accustomed or agreed, at the will only of their lord the thane; and it was therefore not put in writing, but accounted *prædium rusticum & ignobile*. Spelm. of Fends, c. 5.

FOLCMOTE, or FOLKMOTE, (Sax. *Folgemot*, i. e. *conventus populi*), is compounded of *folk*, *popularis*, and *mote*, or *gemote*, *convener*; and signified originally, as Somner in his Saxon Dictionary informs us, a general assembly of the people, to consider of and order matters of the commonwealth. And Sir Henry Spelman says, the *folcmote* was a sort of annual parliament, or convention of the bishops, thanes, aldermen, and freemen, upon every May-day yearly; where the laymen were sworn to defend one another and the king, and to preserve the laws of the kingdom; and then consulted of the common safety. But Dr Brady infers from the laws of the Saxon kings of England, that it was an inferior court, held before the king's *reeve* or steward, every month, to do *folk* right, or compose.

pope smaller differences, from whence there lay appeal to the superior courts; *Gloss.* p. 48. Squire seems to think the *folcmote* not distinct from the *shiremote*, or common general meeting of the county. See his *Angl. Sax. Gov.* 155. n.

Manwood mentions *folcmote* as a court holden in London, wherein all the *folk* and people of the city did complain of the mayor and aldermen, for misgovernment within the said city; and this word is still in use among the Londoners, and denotes *celebrem ex tota civitate conventum*. *Stow's Survey*. According to Kennet, the *folcmote* was a common-council of all the inhabitants of a city, town, or borough, convened often by sound of bell, to the *Mote Hall* or *House*; or it was applied to a larger congress of all the freemen within a county, called the *shire-mote*, where formerly all knights and military tenants did fealty to the king, and elected the annual sheriff on the 1st of October; till this popular election, to avoid tumults and riots, devolved to the king's nomination, *anno* 1315, 3 Edw. 1. After which the city *folcmote* was swallowed up in a select committee or common-council, and the county *folcmote* in the sheriff's tourn and assizes.

The word *folcmote* was also used for any kind of popular or public meeting; as of all the tenants at the *court-leet*, or *court-baron*, in which signification it was of a less extent. *Paroch. Antiq.* 120.

FOLENGIO (Theophilus), of Mantua, known also by the title of *Merlin Cocayne*, an Italian poet, remarkable for giving to a poem a name which has been adopted ever since for all trifling performances of the same species, consisting of buffoonry, puns, anagrams, wit without wisdom, and humour without good-sense. His poem was called *The Macaroni*, from an Italian cake of the same name, which is sweet to the taste, but has not the least alimentary virtue, on the contrary palls the appetite and clogs the stomach. These idle poems, however, became the reigning taste in Italy and in France: they gave birth to macaroni academies; and, reaching England, to macaroni clubs; till, in the end, every thing insipid, contemptible, and ridiculous, in the character, dress, or behaviour, of both men and women, is now summed up in the despicable appellation of a *macaroni*. Folengio died in 1544.

FOLIA, among botanists, particularly signify the leaves of plants; those of flowers being expressed by the word *PETALS*. See *LEAF*.

FOLIAGE, a cluster or assemblage of flowers, leaves, branches, &c.

FOLIAGE, is particularly used for the representations of such flowers, leaves, branches, rinds, &c. whether natural or artificial, as are used for enrichments on capitals, friezes, pediments, &c.

FOLIATING OF LOOKING-GLASSES, the spreading the plates over, after they are polished, with quicksilver, &c. in order to reflect the image. It is performed thus: A thin blotting paper is spread on the table, and sprinkled with fine chalk; and then a fine lamina or leaf of tin, called *foil*, is laid over the paper; upon this is poured mercury, which is to be distributed equally over the leaf with a hare's-foot or cotton: over this is laid a clean paper, and over that the glass-plate, which is pressed down with the right-hand, and the paper drawn gently out with the left: this being done, the plate is covered with a thicker paper, and loaded

with a greater weight, that the superfluous mercury may be driven out and the tin adhere more closely to the glass. When it is dried, the weight is removed, and the looking-glass is complete.

Some add an ounce of marcasite, melted by the fire; and, lest the mercury should evaporate in smoke, they pour it into cold water; and when cooled, squeeze through a cloth, or through leather.

Some add a quarter of an ounce of tin and lead to the marcasite, that the glass may dry the sooner.

FOLIATING OF *Globe Looking-glasses*, is done as follows: Take five ounces of quicksilver, and one ounce of bismuth; of lead and tin, half an ounce each: first put the lead and tin into fusion, then put in the bismuth; and when you perceive that in fusion too, let it stand till it is almost cold, and pour the quicksilver into it: after this, take the glass-globe, which must be very clean, and the inside free from dust: make a paper-funnel, which put into the hole of the globe, as near the glass as you can, so that the amalgam, when you pour it in, may not splash, and cause the glass to be full of spots; pour it in gently, and move it about, so that the amalgam may touch every where: if you find the amalgam begin to be curdly and fixed, then hold it over a gentle fire, and it will easily flow again; and if you find the amalgam too thin, add a little more lead, tin, and bismuth to it. The finer and clearer your globe is, the better will the looking-glass be.

Dr Shaw observes, that this operation has considerable advantages, as being performable in the cold; and that it is not attended with the danger of poisonous fumes from arsenic, or other unwholesome matters, usually employed for this purpose: besides, how far it is applicable to the more commodious foliating of the common looking-glasses, and other speculums, he thinks, may deserve to be considered.

FOLIO, in merchants books, denotes a page, or rather both the right and left hand pages, these being expressed by the same figure, and corresponding to each other. See *BOOK-KEEPING*.

FOLIO, among printers and booksellers, the largest form of books, when each sheet is so printed that it may be bound up in two leaves only.

FOLIUM, or LEAF, in botany. See *LEAF*.

FOLKLAND, and FOLKMOLE. See *FOLCLAND*. FOLLICULUS, (from *folli*, a bag), a species of seed-vessel first mentioned by Linnæus in his *Delineatio plantæ*, generally consisting of one valve, which opens from bottom to top on one side, and has no future for fattening or attaching the seeds within it.

FOLLICULI are likewise defined by the same author to be small glandular vessels distended with air, which appear on the surface of some plants; as at the root of water-milfoil, and on the leaves of alderovanda. In the former, the vessels in question are roundish, and furnished with an appearance like two horns; in the latter, pot-shaped and semi-circular.

FOMAHANT, in astronomy, a star of the first magnitude in the constellation AQUARIUS.

FOMENTATION, in medicine, is a fluid externally applied, usually as warm as the patient can bear it, and in the following manner. Two flannel cloths are dipped into the heated liquor, one of which is wrung as dry as the necessary speed will admit, then immediately applied to the part affected; it lies on un-

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til the heat begins to go off, and the other is in readiness to apply at the instant in which the first is removed: thus these flannels are alternately applied, so as to keep the affected part constantly supplied with them warm. This is continued 15 or 20 minutes, and repeated two or three times a-day.

Every intention of relaxing and soothing by fomentations, may be answered as well by warm water alone as when the whole tribe of emollients are boiled in it; but when discutients or antiseptics are required, such ingredients must be called in as are adapted to that end.

The degree of heat should never exceed that of producing a pleasing sensation; great heat produces effects very opposite to that intended by the use of fomentations.

FONT, among ecclesiastical writers, a large basin, in which water is kept for the baptizing of infants or other persons.

FONTAINE (John), the celebrated French poet, and one of the first-rate geniuses of his age, was born at Chateau-Thierry in Champagne, the 8th of July 1621, of a good extraction. At the age of 19 he entered amongst the Oratorians, but quitted that order 18 months after. He was 22 years of age before he knew his own talents for poetry; but hearing an ode of Malherbe read, upon the assassination of Henry IV. he was so taken with admiration of it, that the poetical fire, which had before lain dormant within him, seemed to be enkindled from that of the other great poet. He applied himself to read, to meditate, to repeat, in fine, to imitate, the works of Malherbe. The first essays of his pen he confined to one of his relations, who made him read the best Latin authors, Horace, Virgil, Terence, Quintilian, &c. and then the best compositions in French and Italian. He applied himself likewise to the study of the Greek authors, particularly Plato and Plutarch. Some time afterwards his parents made him marry a daughter of a lieutenant-general, a relation of the great Racine. This young lady, besides her very great beauty, was remarkable for the delicacy of her wit, and Fontaine never composed any work without consulting her. But, as her temper was none of the best, to avoid discussion, he separated himself from her company as often as he well could. The famous duchess of Bouillon, niece to cardinal Mazarine, being exiled to Chateau-Thierry, took particular notice of Fontaine. Upon her recall he followed her to Paris; where, by the interest of one of his relations, he got a pension settled upon him. He met with great friends and protectors amongst the most distinguished persons of the court, but madame de La Sabliere was the most particular. She took him to live at her house; and it was then that Fontaine, divested of domestic concerns, led a life conformable to his disposition, and cultivated an acquaintance with all the great men of the age. It was his custom, after he was fixed at Paris, to go every year, during the month of September, to his native place of Chateau-Thierry, and pay a visit to his wife, carrying with him Racine, Despreaux, Chapelle, or some other celebrated writers. When he has sometimes gone thither alone by himself, he has come away without remembering even to call upon her; but seldom omitted selling some part of his lands, by which means he squandered away a consider-

able fortune. After the death of madame de La Sabliere, he was invited into England, particularly by madame Mazarin, and by St Evremont, who promised him all the sweets and comforts of life; but the difficulty of learning the English language, and the liberality of the duke of Burgundy, prevented his voyage.

About the end of the year 1692 he fell dangerously ill; and, as is customary upon these occasions in the Romish church, he made a general confession of his whole life to P. Pogue, an oratorian; and, before he received the sacrament, he sent for the gentlemen of the French academy, and in their presence declared his sincere compunction for having composed his Tales; a work he could not reflect upon without the greatest repentance and detestation; promising, that if it should please God to restore his health, he would employ his talents only in writing upon matters of morality or piety. He survived this illness two years, living in the most exemplary and edifying manner, and died the 13th of March 1695, being 74 years of age. When they stripped his body, they found, next his skin, a hair-shirt; which gave room for the following expression of the younger Racine:

Et l'Auteur de Jacoupe est arme d'un Cilice.

Fontaine's character is remarkable for a simplicity, candour, and probity, seldom to be met with. He was of an obliging disposition; cultivating a real friendship with his brother poets and authors; and, what is very rare, beloved and esteemed by them all. His conversation was neither gay nor brilliant, especially when he was not among his intimate friends.

One day being invited to dinner at a farmer-general's, he eat a great deal, but did not speak. Rising up from table very early, under pretext of going to the academy, one of the company represented to him that it was not yet a proper time: "Well, (says he,) if it is not, I will stay a little longer." He had one son by his wife in the year 1660. At the age of 14, he put him into the hands of M. de Harley, the first president, recommending to him his education and fortune. It is said, that having been a long time without seeing him, he happened to meet him one day visiting, without recollecting him again, and mentioned to the company that he thought that young man had a good deal of wit and understanding. When they told him it was his own son, he answered in the most tranquil manner, "Ah! then I am very well contented with him." An indifference, or rather an absence of mind, influenced his whole conduct, and rendered him often insensible to the inclemency of the weather. Madame de Bouillon going one morning to Versailles, saw him, abstracted in thought, sitting in an arbour; returning at night, she found him in the same place, and the same attitude, although it was very cold and had rained almost the whole day. He carried this simplicity so far, that he was scarce sensible of the bad effects some of his writings might occasion, particularly his Tales. In a great sickness, his confessor exhorting him to prayer and alms-deeds: "As for alms-deeds, (replied Fontaine,) I am not able, having nothing to give; but they are about publishing a new edition of my Tales, and the bookseller owes me a hundred copies; you shall have them to sell, and distribute their amount amongst the poor." Another time P. Pogue exhorting him

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him to repent of his faults, " If he has committed any, (cried the nurse), I am sure it is more from ignorance than malice, for he has as much simplicity as an infant."

One time having composed a tale, wherein he made a profane application of those words of the gospel, " Lord, five talents thou didst deliver to me," he dedicated it, by a most ingenious prologue, to the celebrated Arnould, telling him, it was to shew to posterity the great esteem he had for the learned doctor. He was not sensible of the indecency of the dedication, and the profane application of the text, till Boileau and Racine represented it to him. He addressed another, by a dedication in the same manner, to the archbishop of Paris. His Fables are an immortal work, exceeding every thing in that kind, both ancient and modern, in the opinion of the learned. People of taste, the oftener they read them, will find continually new beauties and charms, not to be met with elsewhere. The descendants of this great poet are exempted in France from all taxes and impositions, a privilege which the intendants of Soissons to this day think it an honour to confer them to.

FONTAINEBLEAU, a town in the Isle of France, and in the Gatinois, remarkable for its fine palace, which has been the place where the kings of France used to lodge when they went a-hunting. It was first embellished by Francis I. and all the successive kings have added something thereto; inasmuch that it may now be called the finest pleasure-house in the world. It stands in the middle of a forest, consisting of 26.424 arpents of land, each containing 100 square perches, and each perch 18 feet. E. Long. 2. 33. N. Lat. 40. 22.

FONTARABIA, a sea-port town of Spain in Biscay, and in the territory of Guipuscoa, seated on a peninsula on the sea-shore, and on the river Bidassoa. It is small, but well fortified, both by nature and art; and has a good harbour, tho' dry at low-water. It is built in the form of an amphitheatre, on the declivity of an hill, and surrounded on the land-side by the high Pyrenean mountains. It is a very important place, being accounted the key of Spain on that side. W. Long. 1. 43. N. Lat. 43. 23.

FONTENAY (John Baptist Blain de), a very famous painter of fruit and flowers, was born at Caen in 1654. Lewis XIV. gave him a pension, and an apartment in the galleries of the Louvre; and he was nominated counsellor of the Academy of Painting. His fruit and flowers have all the freshness and beauty of nature; the very dew seems to trickle down their stalks, with all the lustre and transparency of the diamond, while the insects upon them seem perfectly alive and animated. This ingenious painter died at Paris, in 1715.

FONTENELLE (Bernard de), a celebrated French author, was born in 1657, and died in 1756, when he was near 100 years old. He discharged the trust of perpetual secretary to the Academy of Sciences above 40 years with universal applause; and his *History of the Academy of Sciences* throws a great light upon their memoirs, which are very obscure. The eloges which he pronounced on the deceased members of the academy, have this peculiar merit, that they excite a respect for the sciences as well as for the author. In his poetical performances, and the *Dialogues of the dead*,

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the spirit of Voiture was discernible, though more extended and more philosophical. His *Plurality of Worlds*, is a work singular in its kind; the design of which was to present that part of philosophy to view in a gay and pleasing dress. In his more advanced years, he published comedies, which, tho' they shewed the elegance of Fontenelle, were little fitted for the stage; and *An apology for Des Cartes's Vortices*. M. de Voltaire, who declares him to have been the most universal genius the age of Lewis XIV. produced, says, " We must excuse his comedies, on account of his great age; and his Cartesian opinions, as they were those of his youth, when they were universally received all over Europe."

FONTENOY, a town or village of the Austrian Netherlands, in the province of Hainault, and on the borders of Flanders; remarkable for a battle fought there between the allies and the French on the first of May 1745. The French were commanded by Mareschal Saxe, and the Allies by the Duke of Cumberland. The latter behaved with great bravery; but through the superiority of the numbers of the French army, and likewise the superior generalship of their commander, the Allies were defeated with great slaughter. The British troops behaved with astonishing intrepidity, as their enemies themselves avow. It is even said, that the battle was lost through the cowardice of the Dutch, who failed in their attack on the village of Fontenoy, on which the event of the day depended. E. Long. 2. 20. N. Lat. 50. 35.

FONTENOY, a village of France, in the duchy of Burgundy, remarkable for a bloody battle fought there in 841, between the Germans and the French, in which were killed above 100,000 men; and the Germans were defeated. E. Long. 3. 48. N. Lat. 47. 28.

FONTEVRAUD, or *Order of FONTEVRAUD*, a religious order instituted about the latter end of the 11th century. By the rules of this order, the nuns were to keep silence for ever, and their faces to be always covered with their veils; and the monks wore a leathern girdle, at which hung a knife and sheath.

FONTICULUS, or FONTANELLA, in surgery, an issue, seton, or small ulcer, made in various parts of the body, in order to eliminate the latent corruption out of it.

FONTALIS, WATER-MOSS; a genus of the cryptogamia musci class. There are four species, all of them natives of Britain. They grow on the brinks of rivulets, and on the trunks of trees. The most remarkable is the antipyretica, with purple stalks. The Scandinavians line the insides of their chimneys with this moss, to defend them against the fire; for, contrary to the nature of all other moss, this is scarcely capable of burning.

FOOD, in the most extensive signification of the word, implies whatever aliments are taken into the body, whether solid or fluid; but, in common language, it is generally used to signify only the solid part of our aliment.

The most remarkable distinction of foods is into those which are already assimilated into the animal nature, and such as are not. Of the first kind are animal substances in general; which if not entirely similar, are nearly so, to our nature. The second comprehends vegetables, which are much more difficultly assimilated.

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ted. But, as the nourishment of all animals, even those which live on other animals, can be traced originally to the vegetable kingdom, it is plain, that the principle of all nourishment is in vegetables.

Cullen on the
Mat. Med.

Though there is, perhaps, no vegetable which does not afford nourishment to some species of animals or others; yet, with regard to mankind, a very considerable distinction is to be made. Those vegetables which are of a mild, bland, agreeable taste, are proper nourishment; while those of an acrid, bitter, and nauseous nature, are improper. We use, indeed, several acrid substances as food; but the mild, the bland, and agreeable, are in the largest proportion in almost every vegetable. Such as are very acrid, and at the same time of an aromatic nature, are not used as food, but as spices or condiments, which answer the purposes of medicine rather than any thing else. Sometimes, indeed, acrid and bitter vegetables seem to be admitted as food. Thus celeri and endive are used in common food, though both are substances of considerable acrimony; but it must be observed, that, when we use them, they are previously blanched, which almost totally destroys their acrimony. Or if we employ other acrid substances, we generally, in a great measure, deprive them of their acrimony by boiling. In different countries the same plants grow with different degrees of acrimony. Thus, garlic here seldom enters our food; but in the southern countries, where the plants grow more mild, they are frequently used for that purpose. The plant which furnishes cassia, being very acrimonious, and even poisonous, in its recent state, affords an instance of the necessity of preparing acrid substances even in the hot countries: and there are other plants, such as arum-root, which are so exceedingly acrimonious in their natural state, that they cannot be swallowed with safety; yet, when deprived of that acrimony, will afford good nourishment.

The most remarkable properties of different vegetable substances as food, are taken notice of under their different names; here we shall only compare vegetable foods in general with those of the animal kind.

I. *In the Stomach*, they differ remarkably, in that the vegetables always have a tendency to acidity, while animal-food of all kinds tend rather to alkalescency and putrefaction. Some animal-foods, indeed, turn manifestly acid before they putrify; and it has been asserted, that some degree of accefency takes place in every kind of animal-food before digestion. This accefency of animal-food, however, never comes to any morbid degree, but the disease is always on the side of putrefaction. The accefency of vegetables is more frequent, and ought to be more attended to, than the alkalescency of animal food; which last, even in weak stomachs, is seldom felt; while accefency greatly affects both the stomach and system.

With regard to their difference of *solution*:—Heaviness, as it is called, is seldom felt from vegetables, except from tough farinaceous paste, or the most viscid substances; while the heaviness of animal-food is more frequently noticed, especially when in any great quantity. Difficulty of solution does not depend so much on firmness of texture, (as a man, from fish of all kinds, is more oppressed than from firmer substances), but on viscosity; and hence it is more frequent in animal-food,

especially in the younger animals.

With regard to *mixture*:—There is no instance of difficult mixture in vegetables, except in vegetable oils; while animal-foods, from both viscosity and oiliness, especially the fatter meats, are refractory in this respect. Perhaps the difference of animal and vegetable foods might be referred to this head of mixture. For vegetable food continues long in the stomach, giving little stimulus: Now the system is affected in proportion to the extent of this stimulus, which is incomparably greater from the animal viscid oily food, than from the vegetable, firmer, and more aqueous. However, there are certain applications to the stomach, which have a tendency to bring on the cold fit of fever, independent of stimulus, merely by their refrigeration: and this oftener arises from vegetables; as we see, in those hot countries where intermittents prevail, they are oftener induced from a surfeit of vegetable than of animal food. A proof of this is, that when one is recovering of an intermittent, there is nothing more apt to cause a relapse than cold food, especially if taken on those days when the fit should return, and particularly acceft, fermentable vegetables, as salad, melons, cucumbers, &c. *acido-dulces*, &c. which, according to Dr Cullen, are the most frequent causes of epidemics; therefore, when an intermittent is to be avoided, we shun vegetable diet, and give animal-foods, although their stimulus be greater.

II. *In the Intestines*. When the putrefaction of animal-food has gone too far, it produces an active stimulus, causing diarrhoea, dysentery, &c. But these effects are but rare: whereas from vegetable food and its acid, which, united with the bile, proves a pretty strong stimulus, they more frequently occur; but, luckily, are of less consequence, if the refrigeration is not very great. In the autumnal season, when there is a tendency to dysentery, if it is observed that eating of fruits brings it on, it is rather to be ascribed to their cooling than stimulating the intestines.

As to *food*—Wherever neither putrefaction, nor acidity, has gone a great length, animal-food keeps the belly more regular. Vegetable food gives a greater proportion of feculent matter, and when excreted by the stomach and intestines, is more apt to stagnate, and produce slow belly and costiveness, than animal stimulating food; which, before it comes to the great guts, where stoppage is made, has attained a putrefactive tendency, and gives a proper stimulus: and thus those who are costive from the use of vegetables, when they have recourse to animal-food are in this respect better.

III. *In the blood-vessels*. They both give a blood of the same kind, but of different quality. Animal-food gives it in greater quantity, being in great part, as the expression is, convertible in *succum et sanguinem*, and of easy digestion; whereas vegetable is more watery, and contains a portion of unconquerable saline matter, which causes it to be thrown out of the body by some excretion. Animal-food affords a more dense stimulating elastic blood than vegetable; stretching and causing a greater resistance in the solids, and again exciting their stronger action. It has been supposed, that accefency of vegetable food is carried into the blood-vessels, and there exerts its effects; but the tendency of animal-fluids is so strong to alkalescency, that the existence of an acid acrimony in animal-blood seems

very

very improbable. Animal-food alone will soon produce an alkalescent acrimony; and if a person who lives entirely on vegetables were to take no food for a few days, his acrimony would be alkalescent.

IV. We are next to take notice of the *quantity of nutriment* these different foods afford. Nutriment is of two kinds: the first repairs the waste of the solid fibres; the other supplies certain fluids, the chief of which is oil. Now, as animal-food is easier converted, and also longer retained in the system, and as it contains a greater proportion of oil, it will afford both kinds of nutriment more copiously than vegetables.

V. Lastly, *As to the different degrees of perspirability of these foods.* This is not yet properly determined. Sanctörus constantly speaks of mutton as the most perspirable of all food, and of vegetables as checking perspiration. This is a consequence of the different stimulus those foods give to the stomach, so that persons who live on vegetables have not their perspiration so suddenly excited. In time of digestion, perspiration is stopped from whatever food; much more so from cooling vegetables. Another reason why vegetables are less perspirable is, because their aquo-saline juices determine them to go off by urine, while the more perfectly mixed animal-food is more equally diffused over the system, and so goes off by perspiration. Hence Sanctörus's accounts may be underflood; for vegetable aliment is not longer retained in the body, but mostly takes the course of the kidneys. Both are equally perspirable in this respect, viz. that a person living on either, returns once a-day to his usual weight; and if we consider the little nourishment of vegetables, and the great tendency of animal food to corpulency, we must allow that vegetable is more quickly perspired than animal-food.

As to the question, Whether man was originally designed for animal or vegetable food, see the article **CARNIVOROUS.**

With regard to the effects of these foods on men, it must be observed, that there are no persons who live entirely on vegetables. The Pythagoreans themselves eat milk; and those who do so mostly, as these Pythagoreans are weakly, sickly, and meagre, labouring under a constant diarrhoea and several other diseases. None of the hardy, robust, live on these; but chiefly such as gain a livelihood by the exertion of their mental faculties, as (in the East Indies) factors and brokers; and this method of life is now confined to the hot climates, where vegetable diet, without inconvenience, may be carried to great excess. Though it be granted, therefore, that man is intended to live on these different foods promiscuously, yet the vegetable should be in very great proportion. Thus the Laplanders are said to live entirely on animal-food: but this is contradicted by the best accounts; for Linneus says, that besides milk, which they take sour, to obviate the bad effects of animal-food, they use also calla, menyanthus, and many other plants copiously. So there is no instance of any nation living entirely either on vegetable or animal food, though there are indeed some who live particularly on one or other in the greatest proportion. In the cold countries, *e. g.* the inhabitants live chiefly on animal-food, on account of the rigour of the season, their smaller perspiration, and little tendency to putrefaction.

Of more importance, however, is the following than the former question, viz. *In what proportion animal and vegetable food ought to be mixed?*

1. *Animal food* certainly gives most strength to the system. It is a known aphorism of Sanctörus, that *pondus addit robur*; which may be explained from the impletion of the blood-vessels, and giving a proper degree of tension for the performance of strong oscillations. Now animal-food not only goes a greater way in supplying fluid, but also gives the fluid more dense and elastic. The art of giving the utmost strength to the system is best understood by those who breed fighting-cocks. These people raise the cocks to a certain weight, which must bear a certain proportion to the other parts of the system, and which at the same time is so nicely proportioned, as that, on losing a few ounces of it, their strength is very considerably impaired. Dr Robinson of Dublin has observed, that the force and weight of the system ought to be determined by the largeness of the heart, and its proportion to the system: for a large heart will give large blood-vessels, while at the same time the viscera are less, particularly the liver; which last being increased in size, a greater quantity of fluid is determined into the cellular texture, and less into the sanguiferous system. Hence we see how animal-food gives strength, by filling the sanguiferous vessels. What pains we now bestow on cocks, the ancients did on the *Athlete*, by proper nourishment bringing them to a great degree of strength and agility. It is said that men were at first fed on figs, a proof of which we have from their nutritious quality: however, in this respect they were soon found to fall far short of animal-food; and thus we see, that men, in some measure, will work in proportion to the quality of their food. The English labour more than the Scots; and wherever men are exposed to hard labour, their food should be animal. Animal food, although it gives strength, yet loads the body; and Hippocrates long ago observed, that the athletic habit, by a small increase, was exposed to the greatest hazards. Hence it is only proper for bodily labours, and entirely improper for mental exercises; for whoever would keep his mind acute and penetrating, will exceed rather on the side of vegetable food. Even the body is oppressed with animal-food; a full meal always produces dulness, laziness, and yawning; and hence the feeding of gamblers, whose mind must be ready to take advantage, is always performed by avoiding a large quantity of animal-food. Farther, with regard to the strength of the body, animal-food in the first stage of life is hardly necessary to give strength: in manhood, when we are exposed to active scenes, it is more allowable; and even in the decline of life, some proportion of it is necessary to keep the body in vigour. There are some diseases which come on in the decay of life, at least are aggravated by it; among these the most remarkable is the gout. This, when it is in the system, and does not appear with inflammation in the extremities, has pernicious effects there, attacking the lungs, stomach, head, &c. Now to determine this to the extremities, a large proportion of animal-food is necessary, especially as the person is commonly incapable of much exercise.

Animal-food, although it gives strength, is yet of many hazards to the system, as it produces plethora and

all its consequences. As a stimulus to the stomach and to the whole system, it excites fever, urges the circulation, and promotes the perspiration. The system, however, by the repetition of these stimuli, is soon worn out; and a man who has early used the athletic diet, is either early carried off by inflammatory diseases, or, if he takes exercise sufficient to render that diet salutary, such an accumulation is made of putrescent fluids, as in his after-life lays a foundation for the most inveterate chronic distempers. Therefore it is to be questioned, whether we should desire this high degree of bodily strength, with all the inconveniences and dangers attending it. Those who are chiefly employed in mental researches, and not exposed to too much bodily labour, should always avoid an excess of animal-food. There is a disease which seems to require animal-food, viz. the hysteric or hypochondriac; and which appears to be very much a-kin to the gout, affecting the alimentary canal. All people affected with this disease are much disposed to acefcency; which sometimes goes so far, that no other vegetable but bread can be taken in, without occasioning the worst consequences. Here then we are obliged to prescribe an animal-diet, even to those of very weak organs; for it generally obviates the symptoms. However, several instances of scurvy in excess have been produced by a long-continued use of this diet, which it is always unlucky to be obliged to prescribe; and when it is absolutely necessary to prescribe, it should be joined with as much of the vegetable as possible, and when a cure is performed we should gradually recur to that again.

2. Next, let us consider the *vegetable* diet. The chief inconvenience of this is difficulty of assimilation; which, however, in the vigorous and exercised, will not be liable to occur. In warm climates, the assimilation of vegetable aliment is more easy, so that *there* it may be more used, and when joined to exercise gives a pretty tolerable degree of strength and vigour; and though the general rule be in favour of *animal* diet, for giving strength, yet there are many instances of their being remarkably produced from vegetable. Vegetable diet has this advantage, that it whets the appetite, and that we can hardly suffer from a full meal of it. Besides the disorders it is liable to produce in the *prima via*, and its falling short to give strength, there seem to be no bad consequences it can produce in the blood-vessels; for there is no instance where its peculiar acrimony was ever carried there, and it is certainly less putrifiable than animal food; nor, without the utmost indolence, and a sharp appetite, does it give plethora, or any of its consequences: so that we cannot here but conclude, that a large proportion of vegetable food is useful for the generality of mankind.

There is no error in this country more dangerous, or more common, than the neglect of bread: for it is the safest of vegetable aliment, and the best corrector of animal-food; and, by a large proportion of this alone, its bad consequences, when used in a hypochondriac state, have been obviated. The French apparently have as much animal-food on their tables as the Britons; and yet, by a greater use of bread and the dried acid fruits, its bad effects are prevented; and therefore bread should be particularly used by the English, as they are so voracious of animal food. Vegetable food is not only necessary to secure health, but

long life: and, as we have said, in infancy and youth we should be confined to it mostly; in manhood, and decay of life, use animal food; and, near the end, vegetable again.

There is another question much agitated, viz. *What are the effects of variety in food?* Is it necessary and allowable, or universally hurtful? Variety of a certain kind seems necessary; as vegetable and animal foods have their mutual advantages, tending to correct each other. Another variety, which is very proper, is that of liquid and solid food, which should be so managed as to temper each other; and liquid food, especially of the vegetable kind, is too ready to pass off before it is properly assimilated, while solid food makes a long stay. But this does not properly belong to the question, whether variety of the same kind is necessary or proper, as in animal-foods, beef, fish, fowl, &c. It doth not appear that there is any inconvenience arising from this mixture, or difficulty of assimilation, provided a moderate quantity be taken. When any inconvenience does arise, it probably proceeds from this, that one of the particular substances in the mixture, when taken by itself, would produce the *same effect*; and, indeed, it would appear, that this effect is not *heightened* by the mixture, but probably *obviated* by it. There are few exceptions to this, if any, e. g. taking a large proportion of acefcient substances with milk. The coldness, &c. acidity, flatulency, &c. may appear; and it is possible that the coagulium, from the acefcency of the vegetables, being somewhat stronger induced, may give occasion to too long retention in the stomach, and to acidity in too great degree. Again, the mixture of fish and milk often occasions inconveniences. The theory of this is difficult, though, from universal consent, it must certainly be just. Can we suppose that fish gives occasion to such a coagulium as runnet? If it does so, it may produce bad effects. Besides, fishes approach somewhat to vegetables, in giving little stimulus; and are accused of the same bad effects as these, viz. bringing on the cold fit of fever.

Thus much may be said for variety. But it also has its disadvantages, provoking to gluttony; this, and the art of cookery, making men take in more than they properly can digest: and hence, perhaps, very justly, physicians have universally almost preferred simplicity of diet; for, in spite of rules, man's eating will only be measured by his appetite, and satiety is sooner produced by *one* than by *many* substances. But this is so far from being an argument against variety, that it is one for it, as the only way of avoiding a full meal of animal-food, and its bad effects, is by presenting a quantity of vegetables. Another mean of preventing the bad effects of animal-food, is to take a large proportion of liquid; and hence the bad effects of animal-food are less felt in Scotland, on account of their drinking much with it, and using broths, which are at once excellent correctors of animal-food and preventives of gluttony.

WITH regard to the differences between ANIMAL FOODS, properly so called, the first regards their solubility, depending on a lax or firm texture of their different kinds.

I. SOLUBILITY of animal food seems to deserve less attention than is commonly imagined; for there are many

many instances of persons of a weak stomach incapable of breaking down the texture of vegetables, or even of dissolving a light pudding, to whom hung beef, or a piece of ham, was very grateful and easily digested. None of the theories given for the solution of animal-food in the human stomach seem to have explained that process sufficiently. Long ago has been discarded the supposition of an active corrosive menstruum there; and also the doctrine of trituration, for which, indeed, there seems no mechanism in the human body; and, till lately, physicians commonly agreed with Boerhaave in supposing nothing more to be necessary than a watery menstruum, moderate heat, and frequent agitation. This will account for solution in some cases, but not entirely. Let us try to imitate it out of the body with the same circumstances, and in ten times the time in which the food is dissolved in the stomach we shall not be able to bring about the same changes. Take the coagulated white of an egg, which almost every body can easily digest, and yet no artifice shall be able to dissolve it. Hence, then, we are led to seek another cause for solution, *viz.* fermentation; a notion, indeed, formerly embraced, but, on the introduction of mechanical philosophy, indulously banished, with every other supposition of that process taking place at all in the animal economy.

Many of the ancients imagined this fermentation to be putrefactive. But this we deny, as an acid is produced; though hence the fermentation might be reckoned the vinous, which, however, seems always to be morbid. Neither, indeed, is the fermentation purely acetous, but modified by putrescence; for Pringle has observed, that animal-matters raise and even expedite the acetous process. The fermentation, then, in the stomach is of a mixed nature, between the acetous and putrefactive, mutually modifying each other; though, indeed, in the intestines, somewhat of the putrefactive seems to take place, as may be observed from the state of the fæces broke down, and from the little disposition of such substances to be so, which are not liable to the putrefactive process, as the firmer parts of vegetables, &c. Upon this view solution seems to be extremely easy, and those substances to be most easily broke down which are most subject to putrefaction. See ANATOMY, n° 368.—and GASTRIC Juice.

But solution also depends on other circumstances, and hence requires a more particular regard.

1. There is a difference of solubility with respect to the manducation of animal-food, for which bread is extremely necessary, in order to keep the more slippery parts in the mouth till they be properly comminuted*. From want of proper manducation persons are subject to eructations; and this more frequently from the firm vegetable foods, as apples, almonds, &c. than from the animal, though, indeed, even from animal food, very tendinous, or swallowed in unbroken masses, such sometimes occur. Manducation is so much connected with solution, that some, from imperfectly performing that, are obliged to belch up their food, remanducate it, and swallow it again before the stomach can dissolve it, or proper nourishment be extracted. Another proof of our regard to solubility, is our rejecting the firmer parts of animal food, as bull-beef, and generally carnivorous animals.

2. Its effects with regard to solubility, seem also to be the foundation of our choice between *fat* and *lean*, *young* and *old* meats. In the *lean*, although, perhaps, a single fibre might be sufficiently tender, yet these, when collected in *fasciculi*, are very firm and compact, and of difficult solution; whereas in the *fat* there is a greater number of vessels, a greater quantity of juice, more interposition of cellular substance, and consequently more solubility. Again, in young animals, there is probably the same number of fibres as in the older, but these more connected: whereas, in the older, the growth depending on the separation of these, and the increase of vessels and cellular substance, the texture is less firm and more soluble; which qualities, with regard to the stomach, are at that time too increased, by the increased alkalescence of the animal. To this also may be referred our choice of castrated animals, *viz.* on account of their disposition to fatten after the operation.

3. It is with a view to the solubility, that we make a choice between meats recently killed, and those which have been kept for some time. As soon as meat is killed, the putrefactive process begins; which commonly we allow to proceed for a little, as that process is the most effectual breaker down of animal matters, and a great assistance to solution. The length of time during which meat ought to be kept, is proportioned to the meat's tendency to undergo the putrid fermentation, and the degree of those circumstances which favour it: Thus in the Torrid Zone, where meat cannot be kept above four or five hours, it is used much more recent than in these northern climates.

4. *Boiled* or *roasted* meats create a difference of solution. By boiling we extract the juices interposed between the fibres, approximate them more to each other, and render them of more difficult solubility; which is increased too by the extraction of the juices, which are much more alkalescent than the fibres: but when we want to avoid the stimulus of alkalescent food, and the quick solution, as in some cases of disease, the roasted is not to be chosen. Of roasted meat it may be asked, which are more proper, those which are most or least roasted? That which is least done is certainly the most soluble: even raw meats are more soluble than dressed, as Dr Cullen was informed by a person who from necessity was obliged, for some time, to eat such. But at the same time that meats little done are very soluble, they are very alkalescent; so that, wherever we want to avoid alkalescence in the *prima viæ*, the most roasted meats should be chosen. Those who throw away the broths of boiled meat do very improperly; for, besides their supplying a fluid, from their greater alkalescence they increase the solubility of the meat. Here we shall observe, that pure blood has been thought insoluble. Undoubtedly it is very nutritious; and though out of the body, like the white of eggs, it seems very insoluble, yet, like that too, in the body it is commonly easily digested. Moses very properly forbid it the Israelites, as, in warm countries, it is highly alkalescent; and even here, when it was used in great quantity, the scurvy was more frequent: but to a moderate use of it, in these climates, no such objection takes place.

5. Solubility is varied from another source, *viz.* viscosity

* See the article
BRAD.

cidity of the juice of aliment. Young animals, then, appear more soluble than old, not only on account of the compaction and firmness of texture in the latter, but also their greater viscosity of juice. And nothing is more common, than to be longer oppressed from a full meal of veal, than from the same quantity of beef, &c. Upon account, too, of their greater viscosity of juice, are the tendinous and ligamentous parts of animals longer retained than the purely muscular, as well as on account of their firmness of texture. Even fishes, whose muscular parts are exceedingly tender, are, on account of their gluey viscosity, longer of solution in the stomach. And eggs, too, which are exceedingly nourishing, have the same effect, and cannot be taken in great quantity: For the stomach is peculiarly sensible to gelatinous substances; and by this means has nature perhaps taught us, as it were by a sort of instinct, to limit ourselves in the quantity of such nutritive substances.

6. With regard to solution, we must take in the oils of animal-food; which, when tolerably pure, are the least putrescent part of it, and, by diminishing the cohesion of the fibres, render them more soluble. On this last account is the lean of fat meat more easily dissolved than other lean. But when the meat is exposed to much heat, this oil is separated, leaving the solid parts less easily soluble, and becoming itself empyreumatic, rancid, and of difficult mixture in the stomach. Fried meats, from the reasons now given, and baked meats, for the same, as well as for the tenacity of the paste, are preparations which diminish the solubility of the food. From what has been said, the preparation of food by fattening it, and keeping it for some time after killed, altho' it may administer to glutony, will yet, it must be confessed, increase the solution of the food.

II. The second difference of animal-food is with regard to ALKALESCENCY.

Of this we have taken a little notice already under the head of solubility.

1. From their too great alkalescency we commonly avoid the carnivorous animals, and the *feræ*; and choose rather the granivorous. Some birds, indeed, which live on insects, are admitted into our food; but no man, without *nausea*, can live upon these alone for any length of time. Fishes, too, are an exception to this rule, living almost universally on each other. But in these the alkalescency does not proceed so far; whether from the viscosity of their juice, their want of heat, or some peculiarity in their œconomy, is not easy to determine.

2. Alkalescency is determined by difference of age. The older animals are always more alkalescent than the young, from their continual progress to putrefaction. Homberg always found, in his endeavours to extract an acid from human blood, that more was obtained from the young than from the old animals.

3. A third circumstance which varies the alkalescency of the food, is the wildness or tameness of the animal; and this again seems to depend on its exercise. Dr Cullen knew a gentleman who was fond of cats for food: but he always used to feed them on vegetable food, and kept them from exercise; and in the same manner did the Romans rear up their rats, when in-

tended for food. In the same way the flesh of the partridge and the hen seems to be much the same; only, from its being more on the wing, the one is more alkalescent than the other. Again, tame animals are commonly used without their blood; whereas the wild are commonly killed in their blood, and upon that account, as well as their greater exercise, are more alkalescent.

4. The alkalescency of food may be determined from the quantity of volatile salt it affords. The older the meat is, it is found to give the greater proportion of volatile salt.

5. The alkalescency of aliment may also, in some measure, be determined from its colour, the younger animals being whiter and less alkalescent. We also take a mark from the colour of the gravy poured out, according to the redness of the juices judging of the animal's alkalescency.

6. The relief of food is found to depend much on its alkalescency, as does also the stimulus it gives and the fever it produces in the system. These effects are also complicated with the viscosity of the food, by which means it is longer detained in the stomach, and the want of alkalescency supplied.

Having mentioned animal food as differing in solubility and alkalescency, which often go together in the same subject, we come to the third difference, viz.

III. QUANTITY of Nutriment. Which is either absolute or relative: absolute with respect to the quantity it really contains, sufficient powers being given to extract it; relative, with respect to the assimilatory powers of those who use it. The absolute nutriment is of some consequence; but the relative, in the robust and healthy, and except in cases of extraordinary weakness, may, without much inconvenience, be disregarded. In another case is the quantity of nourishment relative, viz. with regard to its *perspirability*; for if the food is soon carried off by the excretions, it is the same thing as if it contained a less proportion of nourishment. For, giving more fluid, that which is longer retained affords more; and, for the repair of the solids, that retention also is of advantage. Now gelatinous substances are long retained; and are, besides, animal substances themselves, dissolved: so that, both absolutely and relatively, such substances are nutritious. Of this kind are eggs, shell-fish, &c. In adults, though it is disputed whether their solids need any repair, yet, at any rate, at this period, fluid is more required; for this purpose the alkalescent foods are most proper, being most easily dissolved. They are, at the same time, the most perspirable; on one hand that alkalescency leading to discase, while on the other their perspirability obviates it. Adults, therefore, as writers justly observe, are better nourished on the alkalescent; the young and growing, on gelatinous foods. All this leads to a comparison of young and old meats; the first being more gelatinous, and the last more alkalescent. This, however, by experience, is not yet properly ascertained. Mr Geoffroy is the only person who has been taken up with the analysis of foods. See *Mémoires de l'Académie*, l'an 1731 & 1732. His attempt was certainly laudable, and in some respects usefully performed; but, in general, his experiments were not sufficiently repeated, nor are, indeed, suf-

sufficiently accurate. He has not been on his guard against the various circumstances which affect meats; the cow kind liking a moist succulent herbage, which is not to be got in warm climates; while the sheep are fond of a dry food, and thrive best there. Again, some of his experiments seem contradictory. He says, that veal gives more solution than beef, while lamb gives less than mutton, which is much to be doubted. If both he and Sanctorius had examined English beef, the result, probably, would have been very different as to its perspirability, &c. Besides, Mr Geoffroy has only analysed beef and veal when raw; has made no proper circumstantial comparisons between quadrupeds and birds; and has examined these last along with their bones, and not their muscles, &c. by themselves, as he ought to have done, &c. If a set of experiments of this kind were properly and accurately performed, they might be of great use; but, at present, for the purpose of determining our present subject, we must have recourse to our alkalefescency, solubility &c.

IV. The fourth difference of animal foods, is, *The Nature of the Fluids they afford*. The whole of this will be understood, from what has been said on alkalefescency; the fluid produced being more or less dense and stimulating, in proportion as that prevails.

V. The fifth difference of animal-foods is with respect to their

PERSPIRABILITY. The sum of what can be said on this matter is this, that such foods as promote an accumulation of fluid in our vessels, and dispose to plethora, are the least perspirable, and commonly give most strength; that the more alkalescent foods are the most perspirable, though the viscid and less alkalescent may attain the same property by long retention in the system. The authors on perspirability have determined the perspiration of foods as imperfectly as Mr Geoffroy has done the solubility, and in a few cases only. We must not lay hold on what Sanctorius has said on the perspirability of mutton, because he has not examined, in the same way, other meats in their perfect state; far less on what Keil says of oysters, as he himself was a valetudinarian, and consequently an unfit subject for such experiments, and probably of a peculiar temperament.

As to the effects of Food on the MIND, we have already hinted at them above. It is plain, that delicacy of feeling, liveliness of imagination, quickness of apprehension, and acuteness of judgment, more frequently accompany a weak state of the body. True it is, indeed, that the same state is liable to timidity, fluctuation, and doubt; while the strong have that steadiness of judgment, and firmness of purpose, which are proper for the higher and more active scenes of life. The most valuable state of the mind, however, appears to reside in somewhat less firmness and vigour of body. Vegetable aliment, as never over-distending the vessels or loading the system, never interrupts the stronger motions of the mind; while the heat, fulness, and weight, of animal-food, are an enemy to its vigorous efforts. Temperance, then, does not so much consist in the quantity, for that always will be regulated by our appetite, as in the quality, viz. a large proportion of vegetable aliment.

Food of Plants. See AGRICULTURE, n° 1,—6. and PLANTS; also the article COMPOSTS.

FOOL, according to Mr Locke, is a person who makes false conclusions from right principles; whereas a madman, on the contrary, draws right conclusions from wrong principles.

FOOL- Stones, in botany. See ORCHIS.

FOOT, a part of the body of most animals whereon they stand, walk, &c. See ANATOMY, n° 62.

Foot, in the Latin and Greek poetry, a metre or measure, composed of a certain number of long and short syllables.

These feet are commonly reckoned 28: of which some are simple, as consisting of two or three syllables, and therefore called *disyllabic* or *trisyllabic feet*; others are compound, consisting of four syllables, and are therefore called *tetrasyllabic feet*.

The disyllabic feet are four in number, viz. the pyrrhichius, spondee, iambus, and trocheus. See PYRRHICHIVS, &c.

The trisyllabic feet are eight in number, viz. the dactylus, anapestus, tribrachys, molossus, amphibrachys, amphimacer, bacchius, and antibacchius. See DACTYL, &c.

The tetrasyllabic are in number 16, viz. the procleumaticus, dispondens, choriambus, antispastus, diiambus, dichoreus, ionicus a majore, ionicus a minore, epitritus primus, epitritus secundus, epitritus tertius, epitritus quartus, pæon primus, pæon secundus, pæon tertius, and pæon quartus. See PROCLEUMATICUS, &c.

Foot, in English poetry. See POETRY, n° 117, 175.

Foot is also a long measure consisting of 12 inches. Geometricians divide the foot into 10 digits, and the digit into 10 lines.

Foot Square, is the same measure both in breadth and length, containing 144 square or superficial inches.

Cubic or Solid Foot, is the same measure in all the three dimensions, length, breadth, and depth or thickness, containing 1728 cubic inches.

Foot of a Horse, in the menage, the extremity of the leg, from the coronet to the lower part of the hoof.

Foot-Level, among artificers, an instrument that serves as a foot-rule, a square, and a level. See LEVEL, RULE, and SQUARES.

FOOTE (Samuel, Esq;), the modern Aristophanes, was born at Truro, in Cornwall; and was descended from a very ancient family. His father was member of parliament for Tiverton, in Devonshire; and enjoyed the post of commissioner of the prize-office and fine-contract. His mother was heiress of the Dinely and Goodere families. In consequence of a fatal misunderstanding between her two brothers, Sir John Dinely Goodere, bart. and Samuel Goodere, esq; captain of his majesty's ship the Ruby, which ended in the death of both, a considerable part of the Goodere estate, which was better than 5000l. *per annum*, descended to Mr Foote.

He was educated at Worcester college, Oxford, which owed its foundation to Sir Thomas Cookes Winford, bart. a second cousin of our author's. On leaving the university, he commenced student of law in the Temple; but, as the dryness of this study did not suit the liveliness of his genius, he soon relinquished it. He married a young lady of a good family and some fortune; but, their tempers not agreeing, a perfect

harmony did not long subsist between them. He now lunched into all the fashionable foibles of the age, gaming not excepted; and in a few years spent his whole fortune. His necessities led him to the stage, and he made his first appearance in the character of Othello. He next performed Fondlewife with much more applause; and this, indeed, was ever after one of his capital parts. He attempted Lord Poppington likewise, but prudently gave it up. But, as Mr Foote was never a capital actor in the plays of others, his salary was very unequal to his gay and extravagant turn; and he contracted debts which forced him to take refuge within the verge of the court.

He relieved his necessities by a very laughable stratagem. Sir Francis D—l—l had long been his intimate friend, and had dissipated his fortune by similar extravagance. Lady N—l—l, who was likewise an intimate acquaintance of Foote's, and who was exceeding rich, was fortunately at that time bent upon a matrimonial scheme. Foote strongly recommended to her to consult upon this momentous affair the conjurer in the Old Bailey, whom he represented as a man of surprising skill and penetration. He employed an acquaintance of his own to perorate the conjurer, who depicted Sir Francis D—l—l at full length; described the time when, the place where, and the dress in which, she would see him. The lady was so struck with the coincidence of every circumstance, that she married D—l—l in a few days. For this service Sir Francis settled an annuity upon Foote; and this enabled him once more to emerge from obscurity.

In 1747 he opened the little theatre in the Haymarket, taking upon himself the double character of author and performer; and appeared in a dramatic piece of his own composing, called the *Diversions of the Morning*. This piece consisted of nothing more than the exhibition of several characters well known in real life, whose manner of conversation and expression this author very happily hit off in the diction of his drama, and still more happily represented on the stage, by an exact and most amazing imitation, not only of the manner and tone of voice, but even of the very persons, of those whom he intended to take off. In this performance, a certain physician, Dr L—n—n, well known for the oddity and singularity of his appearance and conversation, and the celebrated Chevalier Taylor, who was at that time in the height of his popularity, were made objects of Foote's ridicule; the latter, indeed, very deservedly; and, in the concluding part of his speech, under the character of a theatrical director, Mr Foote took off, with great humour and accuracy, the several styles of acting of every principal performer on the English stage.

This performance at first met with some opposition from the civil magistrates of Westminster, under the sanction of the act of parliament for limiting the number of playhouses, as well as from the jealousy of one of the managers of Drury-lane playhouse; but, the author being patronized by many of the principal nobility, and other persons of distinction, this opposition was over-ruled: and, having altered the title of his performance, Mr Foote proceeded, without further molestation, to give *Tea in a morning* to his friends, and represented it through a run of 40 mornings to crowded and splendid audiences.

The ensuing season he produced another piece of the same kind, which he called *An Audition of Pictures*. In this performance he introduced several new and popular characters; particularly Sir Thomas de Veil, then the acting justice of peace for Westminster, Mr Cook the celebrated auctioneer, and the equally famous Orator Henley. This piece also had a very great run.

His *Knights*, which was the produce of the ensuing season, was a performance of somewhat more dramatic regularity: but still, although his plot and characters seemed less immediately personal, it was apparent that he kept some particular real persons strongly in his eye in the performance; and the town took upon themselves to fix them where the resemblance appeared to be the most striking.

Thus Mr Foote continued, from time to time, to select, for the entertainment of the public, such characters, as well general as individual, as seemed most likely to engage their attention. His dramatic pieces, exclusive of the interlude called *Pity in Pattens*, are as follow: *Taite, The Knights, The Author, The Englishman in Paris, The Englishman Returned from Paris, The Mayor of Garrat, The Liar, The Patron, The Minor, The Orators, The Commissary, The Devil upon Two Sticks, The Lame Lover, The Maid of Bath, The Nabob, The Cozeners, The Capuchin, The Bankrupt, and an unfinished comedy called The Slanderer.*

All these works are only to be ranked among the *petites pieces* of the theatre. In the execution they are somewhat loose, negligent, and unfinished; the plots are often irregular, and the catastrophes not always conclusive: but, with all these deficiencies, they contain more strength of character, more strokes of keen satire, and more touches of temporary humour, than are to be found in the writings of any other modern dramatist. Even the language spoken by his characters, incorrect as it may sometimes seem, will, on a closer examination, be found entirely dramatical; as it abounds with those natural minutiae of expression which frequently form the very basis of character, and which render it the truest mirror of the conversation of the times in which he wrote.

In the year 1766, being on a party of pleasure with the late duke of York, lord Mexborough, and Sir Francis Delaval, Mr Foote had the misfortune to break his leg, by a fall from his horse; in consequence of which, he was compelled to undergo an amputation. This accident so sensibly affected the duke, that he made a point of obtaining for Mr Foote a patent for life; whereby he was allowed to perform, at the little theatre in the Haymarket, from the 15th of May to the 15th of September every year.

He now became a greater favourite of the town than ever: his very laughable pieces, with his more laughable performances, constantly filled his house; and his receipts were some seasons almost incredible. Parsimony was never a vice to be ascribed to Mr Foote; his hospitality and generosity were ever conspicuous; he was visited by the first nobility, and he was sometimes honoured even by royal guests.

The attack made upon his character by one of his domestics, whom he had dismissed for misbehaviour, is too well known to be particularized here. Suffice it to say, he was honourably acquitted of that charge: but

but it is believed by some, that the shock which he received from it accelerated his death; others pretend, that his literary altercation with a certain *then* duchess, or rather her agents, much affected him, and that from that time his health declined. It is probable, however, that his natural volatility of spirits could scarcely fail to support him against all impressions from either of these quarters.

Mr Foote, finding his health decline, entered into an agreement with Mr Colman, for his patent of the theatre; according to which, he was to receive from Mr Colman 1600*l.* *per annum*, besides a stipulated sum whenever he chose to perform. Mr Foote made his appearance two or three times last summer, in some of the most admired characters; but being suddenly affected with a paralytic stroke one night whilst upon the stage, he was compelled to retire. He was advised to bathe; and accordingly repaired to Brighthelmston, where he apparently recovered his former health and spirits, and was what is called the *fiddle of the company* who resorted to that agreeable place of amusement. A few weeks before his death, he returned to London; but, by the advice of his physicians, set out with an intention to spend the winter at Paris and in the south of France. He had got no farther than Dover, when he was suddenly attacked by another stroke of the palsy, which in a few hours terminated his existence. He died on the 21st of October 1777, in the 56th year of his age, and was privately interred in the cloisters of Westminster abbey.

FORAMEN, in anatomy, a name given to several apertures or perforations in divers parts of the body; as, 1. The external and internal foramina of the cranium or skull. 2. The foramina in the upper and lower jaw. 3. Foramen lachrymale. 4. Foramen membrance tympani. See ANATOMY.

FORAMEN *Ovale*, an oval aperture or passage thro' the heart of a fetus, which closes up after birth. It arises above the coronal vein, near the right auricle, and passes directly into the left auricle of the heart, serving for the circulation of the blood in the fetus, till such time as the infant breathes, and the lungs are open; it being generally reckoned one of the temporary parts of the fetus, wherein it differs from an adult; although almost all anatomists, Mr Cheselden excepted, assure us, that the foramen *ovale* has sometimes been found open in adults. See FOETUS.

FORBES (Patrick), bishop of Aberdeen, was born in 1654, when the affairs of the church of Scotland were in much confusion; to the settlement of which he greatly contributed. As chancellor of the university of Aberdeen, he improved that seat of learning by repairing the fabric, augmenting the library, and reviving the professorships. He published a *Commentary on the Revelations*, at London, in 1613; and died in 1635.

FORBES (John), the son of Patrick, but of much more extensive learning than his father, was perhaps excelled by none of his age, which will be allowed by those who read his *Historical and Theological Institutes*. He was bishop of Aberdeen; but was expelled by the Covenanters, and forced to fly beyond sea. He continued in Holland two years; and, upon his return, lived private on his estate at Corke, until he died in 1648. An edition of all his works was printed in two vols folio at Amsterdam in 1703.

VOL. IV.

FORBES (William), a learned bishop of Edinburgh, born in 1585. His ill-health, and the anti-episcopal disposition of the Scots, confined him chiefly to a retired life; but when Charles I. in 1633, founded an episcopal church at Edinburgh, he thought none more worthy to fill the see than Mr Forbes; who, however, died three months after his consecration, in 1634. Though very able and learned, he published nothing; but wrote a treatise to pacify controversies, which was printed at London 24 years after his death.

FORBES (Duncan, Esq; of Culloeden), was born in the year 1685. In his early life, he was brought up in a family remarkable for hospitality; which perhaps led him afterwards to a freer indulgence in social pleasures. His natural disposition inclined him to the army; but, as he soon discovered a superior genius, by the advice of his friends he applied himself to letters. He directed his studies particularly to the civil law; in which he made a quick progress, and in 1709 was admitted an advocate. From 1722 to 1737, he represented in parliament the boroughs of Inverness, Fortrose, Nairn, and Forbes. In 1725, he was made king's advocate; and Lord President of the Court of Session, in 1737. In the troubles of 1715 and 1745, he espoused the royal cause; but with so much prudence and moderation did he conduct himself at this delicate conjuncture, that not a whisper was at any time heard to his prejudice. The glory he acquired in advancing the prosperity of his country, and in contributing to re-establish peace and order, was the only reward of his services. He had even impaired, and almost ruined, his private fortune in the cause of the public; but government did not make him the smallest recompense. The minister, with a meanness for which it is difficult to account, desired to have a state of his disbursements. He was so much shocked at the rudeness of this treatment, that he left the minister without making any reply. Throughout the whole course of his life he had a lively sense of religion, without the least taint of superstition; and his charity was extended to every sect and denomination of religionists indiscriminately. He was well versed in the Hebrew language; and wrote, in a flowing and oratorical style, concerning religion natural and revealed, some important discoveries in theology and philosophy, and concerning the sources of incredulity. He died in 1747, in the 62d year of his age; and his works have since been published in two volumes octavo.

FORCE, in mechanics, denotes the cause of the change in the state of a body when, being at rest, it begins to move, or has a motion which is either not uniform or not direct. See MECHANICS.

Central Forces. See MECHANICS.

Centrifugal Force. See CENTRIFUGAL.

FORCE, in law, signifies any unlawful violence offered to things or persons, and is divided into simple and compound. *Simple force* is what is so committed, that it has no other crime attending it; as where a person by force enters on another's possession, without committing any other unlawful act. *Compound force*, is where some other violence is committed with such an act which of itself alone is criminal; as if one enters by force into another's house, and there kills a person, or ravishes a woman. There is likewise a force implied in law, as in every trespass, rescue, or distress,

17 R and

Forceps,
Forcible.

and an actual force with weapons, number of persons, &c.—Any person may lawfully enter a tavern, inn, or victualling-house; so may a landlord his tenant's house to view repairs, &c. But if, in these cases, the person that enters commits any violence or force, the law will intend that he entered for that purpose.

FORCEPS, in surgery, &c. a pair of scissors for cutting off, or dividing, the fleshy membranous parts of the body, as occasion requires. See **SURGERY**.

FORCIBLE ENTRY, is a violent and actual entry into houses, or lands; and a forcible detainer, is where one by violence with-holds the possession of lands, &c. so that the person who has a right of entry is barred, or hindered, therefrom.

At common law, any person that had a right to enter into lands, &c. might retain possession of it by force. But this liberty being abused, to the breach of the peace, it was therefore found necessary that the same should be restrained: Though, at this day, he who is wrongfully dispossessed of goods may by force retake them. By statute, no persons shall make an entry on any lands or tenements, except where it is given by law, and in a peaceable manner, even tho' they have title of entry, on pain of imprisonment: and where a forcible entry is committed, justices of peace are authorized to view the place, and inquire of the force by a jury, summoned by the sheriff of the county; and they may cause the tenements &c. to be restored, and imprison the offenders till they pay a fine. Likewise a writ of forcible entry lies, where a person seized of freehold, is by force put out thereof.

FORCIBLE Marriage, of a woman of estate, is felony. For by the statute 3 H. 7. c. 2. it is enacted, "That if any persons shall take away any woman having lands or goods, or that is heir apparent to her ancestor, by force, and against her will, and marry or defile her; the takers, procurers, abettors and receivers of the woman taken away against her will, and knowing the same, shall be deemed principal felons; but as to procurers and accessories, they are, before the offence be committed, to be excluded the benefit of clergy, by 39 Eliz. c. 9. The indictment on the statute 3 H. 7. is expressly to set forth, that the woman taken away had lands or goods, or was heir apparent; and also that she was married or defiled, because no other case is within the statute; and it ought to allege that the taking was for lucre. It is no excuse that the woman at first was taken away with her consent: for if the afterwards refuse to continue with the offender, and be forced against her will, she may from that time properly be said to be taken against her will; and it is not material whether a woman so taken away be at last married or defiled with her own consent or not, if she were under force at the time; the offender being in both cases equally within the words of the act.

Those persons who, after the fact, receive the offender, are but accessories after the offence, according to the rules of common law; and those that are only privy to the damage, but not parties to the forcible taking away, are not within the act, *H. P. C.* 119. A man may be indicted for taking away a woman by force in another country; for the continuing of the force in any country, amounts to a forcible taking there. *Ibid.* Taking away any woman-child un-

der the age of 16 years and unmarried, out of the custody and without the consent of the father or guardian, &c. the offender shall suffer fine and imprisonment; and if the woman agrees to any contract of matrimony with such person, she shall forfeit her estate during life, to the next of kin to whom the inheritance should descend, &c. *Stat. 4 & 5. P. & M. c. 8.* This is a force against the parents: and information will lie for seducing a young man or woman from their parents, against their consents, in order to marry them, &c. See **MARRIAGE**.

FORCING, in gardening, a method of producing ripe fruits from trees before their natural season. The method of doing it is this: A wall should be erected ten feet high; a border must be marked out on the south side of it, of about four feet wide, and some stakes must be fastened into the ground all along the edge of the border; these should be four inches thick. They are intended to rest the glass lights upon, which are to slope backwards to the wall, to shelter the fruit as there shall be occasion; and there must be, at each end, a door to open either way, according as the wind blows. The frame should be made moveable along the wall, that when a tree has been forced one year, the frame may be removed to another, and so on, that the trees may each of them be forced only once in three years, at which rate they will last a long time. They must be always well-grown trees that are chosen for forcing; for young ones are soon destroyed, and the fruit that is produced from them is never so well tasted. The fruits most proper for this management are the avant or small white nutmeg, the albarle, the early newington, and the brown nutmeg peaches; Mr Fairchild's early, and the el-rugo and newington neArines; the masculine apricot, and the may-duke and may cherry. For grapes, the white and black sweet-water are the properest; and of gooseberries the Dutch white, the Dutch early green, and the walnut gooseberry; and the large Dutch white and large Dutch red currants.

The dung, before it is put to the wall, should be laid together in a heap for five or six days, that it may heat uniformly through; and when thus prepared it must be laid four feet thick at the base of the wall, and go sloping up till it is two feet thick at the top. It must be laid at least within three or four inches of the top of the wall; and when it sinks, as it will sink two or three feet, more dung must be laid on; for the first heat will do little more than just swell the blossoms. The covering the trees with glasses is of great service; but they should be taken off to admit the benefit of gentle showers to the trees, and the doors at the ends should be either left entirely open, or one or both of them opened, and a mat hung before them, at once to let the air circulate and keep off the frosts.

The dung is never to be applied till towards the end of November; and three changes of it will be sufficient to ripen the cherries, which will be very fine in February. As to the apricots, grapes, neArines, peaches, and plums, if the weather be milder, the glasses are to be opened to let in sunshine or gentle showers.

If a row or two of scarlet strawberries be planted at the back of the frame, they will ripen in February or the beginning of March; the vines will blossom in April, and the grapes will be ripe in June.

Forcing.

Jacob's
Law Dict.

It should be carefully observed, not to place early and late ripening fruits together, because the heat necessary to force the late ones will be of great injury to the early ones after they have fruited.

The masculine apricot will be ripe in the beginning of April, the early nectarines will be ripe about the same time, and the forward sort of plums by the latter end of that month. Gooseberries will have fruit fit for tarts in January or February, and will ripen in March; and currants will have ripe fruit in April.

The trees need not be planted so distant at these walls as at others, for they do not shoot so freely as in the open air; nine feet asunder is sufficient. They should be pruned about three weeks before the heat is applied.

FORDOUN (John of), the father of Scottish history, flourished in the reign of Alexander III. towards the end of the 13th century. But of his life there is nothing known with certainty, though there was not a monastery that possessed not copies of his work. The first five books of the history which bears his name were written by him: the rest were fabricated from materials left by him, and from new collections by different persons. A manuscript in vellum of this historian is in the library of the university of Edinburgh.

FORDYCE (David), an elegant and learned writer of the present age, was professor of philosophy in the Marischal college, Aberdeen. He was originally designed for the ministry; to prepare himself for which was the whole aim of his ambition, and for a course of years the whole purpose of his studies. How well he was qualified to appear in that character, appears from his "Theodorus, a dialogue concerning the art of preaching." After having finished this work, he went abroad on his travels, in order to obtain fresh stores of knowledge: but after a successful tour through several parts of Europe, he was unfortunately cast away in a storm on the coast of Holland. Besides the above work, he wrote Dialogues on education, 8vo. and a Treatise of Moral Philosophy published in the Preceptor. The third edition of his Theodorus was published in London, after his untimely death, by his brother the Rev. Mr James Fordyce, an eminent dissenting minister, in 1755.

FORECASTLE of a SHIP, that part where the foremast stands. It is divided from the rest by a bulk-head.

FOREIGN, something extraneous, or that comes from abroad.

FOREIGN, in the English law, is used in various significations. Thus,

FOREIGN Attachment, is an attachment of the goods of foreigners found within a city or liberty, for the satisfaction of some citizen to whom the foreigner is indebted; or it signifies an attachment of a foreigner's money in the hands of another person.

FOREIGN Kingdom, a kingdom under the dominion of a foreign prince.

At the instance of an ambassador or consul, an offender against the laws here may be sent for hither from a foreign kingdom to which he hath fled. And, where a stranger of Holland, or any foreign country, buys goods at London, for instance, and there gives a note under his hand for payment, and then goes away privately into Holland; in that case, the seller may have

a certificate from the lord mayor, on the proof of the sale and delivery of such goods, whereupon a process will be executed on the party in Holland.

FOREIGN Opposer or *Apposer*, an officer in the exchequer that opposes or makes a charge on all sheriffs, &c. of their green wax; that is to say, fines, issues, amerciements, recognizances, &c.

FOREIGN Plea, signifies an objection to the judge of the court, by refusing him as incompetent, because the matter in question is not within his jurisdiction.

FOREIGN Seamen, serving two years on board British ships, whether of war, trade, or privateers, during the time of war, shall be deemed natural-born subjects.

FOREIGNER, the natural-born subject to some foreign prince.

Foreigners, though made denizens, or naturalized, are disabled to bear any office in government, to be of the privy-council, or members of parliament, &c. This is by the acts of the settlement of the crown. Such persons as are not freemen of a city or corporation, are also called *foreigners*, to distinguish them from the members of the same.

FOREJUDGER, in law, signifies a judgment whereby one is deprived, or put by a thing in question.

To be *forejudged the court*, is where an officer or attorney of any court is expelled the same for malpractice, or for not appearing to an action on a bill filed against him, &c. And where an attorney of the common-pleas is sued, the plaintiff's attorney delivers the bill to one of the criers of the court, who calls the attorney defendant, and solemnly proclaims aloud, that, if he does not appear thereto, he will be forejudged: likewise a rule is given by the secondary for his appearance: and if the attorney appears not in four days, then the clerk of the warrants strikes such an attorney off the roll of attorneys; after which he becomes liable to be arrested like any other person: but where an attorney is forejudged, he may be restored on clearing himself from his contumacy, and making satisfaction to the plaintiff, &c.

FORELOCKS, in the sea-language, little flat wedges made with iron, used at the ends of bolts, to keep them from flying out of their holes.

FORE-MAST of a SHIP, a large round piece of timber, placed in her fore-part, or fore-castle, and carrying the fore-mast and fore-top-fall yards. Its length is usually $\frac{2}{3}$ of the main-mast, and the fore-top-gallant-mast is $\frac{1}{2}$ the length of the fore-top.

FOREMAST-MEN, are those on board a ship that take in the top-falls, sling the yards, furl the sails, bowse, trice, and take their turn at the helm, &c.

FOREST, in geography, a huge wood; or, a large extent of ground covered with trees. The word is formed of the Latin *foresta*, which first occurs in the capitulars of Charlemagne, and which itself is derived from the German *forst*, signifying the same thing. Spelman derives it from the Latin *foris restat*, by reason forests are out of towns. Others derive *foresta* from *feris*, q. d. *Foresta, quod sit tuta statio ferarum*, as being a safe station or abode for wild beasts.

The Caledonian and Hercynian forests are famous in history. The first was a celebrated retreat of the ancient Picts and Scots: The latter anciently occupied

the greatest part of Europe; particularly Germany, Poland, Hungary, &c. In Cesar's time it extended from the borders of Alsatia and Switzerland to Transylvania; and was computed 60 days journey long, and 9 broad: some parts or cantons thereof are still remaining.

The ancients adored forests, and imagined a great part of their gods to reside therein: temples were frequently built in the thickest forests; the gloom and silence whereof naturally inspire sentiments of devotion, and turns mens thoughts within themselves.

For the like reason, the ancient Druids made forests the place of their residence; performed their sacrifices, instructed their youth, and gave laws therein.

FOREST, in law, is defined, by Manwood, a certain territory of woody grounds and fruitful pastures, privileged for wild-beasts and fowls of forest, chafe, and warren, to rest and abide under the protection of the king, for his princely delight; bounded with unremovable marks and meres, either known by matter of record or prescription; replenished with wild beasts of venery or chafe, with great coverts of vert for the said beasts; for preservation and continuance whereof, the vert and venison, there are certain particular laws, privileges, and officers.

Forests are of such antiquity in England, that, excepting the New-Forest in Hampshire, erected by William the Conqueror, and Hampton Court, erected by Henry VIII. it is said, that there is no record or history which makes any certain mention of their erection, though they are mentioned by several writers and in several of our laws and statutes.—Ancient historians tell us, “that New-forest was raised by the destruction of 22 parish-churches, and many villages, chapels, and manors, for the space of 30 miles together, which was attended with divers judgments on the posterity of William I. who erected it: for William Rufus was there shot with an arrow, and before him Richard the brother of Henry I.; and Henry nephew to Robert, the eldest son of the Conqueror, did hang by the hair of the head in the boughs of the forest, like unto Ab-salom.” *Blount.*

Besides the New-forest, there are 68 other forests in England, 13 chafes, and more than 700 parks: the four principal forests are New-Forest on the sea, Shire-wood-forest on the Trent, Dean-forest on the Severn, and Windsor-forest on the Thames.

A forest in the hands of a subject is properly the same thing with a CHASE; being subject to the common law, and not to the forest-laws. But a chase differs from a forest, in that it is not inclosed; and likewise, that a man may have a chase in another man's ground as well as his own; being indeed the liberty of keeping beasts of chase, or royal game therein, protected even from the owner of the land, with a power of hunting them thereon. See PARK.

The manner of erecting a forest is thus: Certain commissioners are appointed under the great seal, who view the ground intended for a forest, and fence it round: this commission being returned into chancery, the king causeth it to be proclaimed throughout the county where the land lieth, that it is a forest; and prohibits all persons from hunting there, without his leave. Though the king may erect a forest on his own ground and waste, he may not do it on the ground of other

persons without their consent; and agreements with them for that purpose ought to be confirmed by parliament.

A forest, strictly taken, cannot be in the hands of any but the king; for no person but the king has power to grant a commission to be justice in eyre of the forest: yet, if he grants a forest to a subject, and that on request made in the chancery, that subject and his heirs shall have justices of the forest, in which case the subject has a forest in law.

A second property of a forest is, the courts thereof. See FOREST-COURTS, *infra*.

A third property is the officers belonging to it, as the justices, warden, verderer, forester, agistor, regarder, keeper, bailiff, beadle, &c. See the articles AGISTOR, BAILIFF, FORESTER, &c.

By the laws of the forest, the receivers of trespassers in hunting, or killing of the deer, if they know them to be the king's property, are principal trespassers. Likewise, if a trespass be committed in a forest, and the trespasser dies, after his death, it may be punished in the life-time of the heir, contrary to common law. Our Norman kings punished such as killed deer in any of their forests with great severity; also in various manners; as by hanging, loss of limbs, gelding, and putting out eyes. By *magna charta de forestis*, it is ordained, that no person shall lose life or member for killing the king's deer in forests, but shall be fined; and if the offender has nothing to pay the fine, he shall be imprisoned a year and a day, and then be delivered, if he can give security not to offend for the future, &c. *9 Hen. III. c. 1.*

Before this statute, it was felony to hunt the king's deer; and by a late act, persons armed and dignified, appearing in any forest, &c. if they hunt, kill, or steal any deer, &c. are guilty of felony. *9 Geo. I. c. 22.*

He who has any licence to hunt in a forest or chase, &c. is to take care that he does not exceed his authority; otherwise he shall be deemed a trespasser from the beginning, and be punished for that fact, as if he had no licence. See further, the articles GAME, and GAME-LAW.

Beasts of the forest are, the hart, hind, buck, doe, boar, wolf, fox, hare, &c. The seasons for hunting whereof are as follow, viz. that of the hart and buck begins at the feast of St John Baptist, and ends at Holy-rod day; of the hind and doe, begins at Holy-rod, and continues till Candlemas; of the boar, from Christmas to Candlemas; of the fox begins at Christmas, and continues till Lady-day; of the hare at Michaelmas, and lasts till Candlemas.

FOREST-COURTS, courts instituted for the government of the king's forests in different parts of the kingdom, and for the punishment of all injuries done to the king's deer or venison, to the vert or greenward, and to the court in which such deer are lodged. These are the courts of attachments, of regard, of swinmote, and of justice-seat. 1. The court of attachments, woodmote, or forty-days court, is to be held before the verderers of the forest once in every forty days; and is instituted to inquire into all offenders against vert and venison: who may be attached by their bodies, if taken with the mainour (or *mainœuvre, à manu*) that is, in the very act of killing venison or stealing wood, or *Blackst. Commens* preparing to do so, or by fresh and immediate pursuit after

Forest ||
Forestalling after the act is done; else they must be attached by their goods. And in this forty-days court the foresters or keepers are to bring in the attachments, or presentments of *viridi et venatione*; and the verderors are to receive the same, and to enroll them, and to certify them under their seals to the court of justice-seat or sweinmote: for this court can only inquire of, but not convict, offenders. 2. The court of regard, or survey of dogs, is to be holden every third year for the lawing or expeditation of malliffs; which is done by cutting off the claws of the forefect, to prevent them from running after deer. No other dogs but malliffs are to be thus lawed or expeditated, for none other were permitted to be kept within the precincts of the forest; it being supposed that the keeping of these, and these only, was necessary for the defence of a man's house. 3. The court of sweinmote is to be holden before the verderors, as judges, by the steward of the sweinmote, thrice in every year; the swains or freeholders within the forest composing the jury. The principal jurisdiction of this court is, firstly, to inquire into the oppressions and grievances committed by the officers of the forest; "*de super-oneratione forestariorum, et aliorum ministrorum forestæ; et de eorum oppressionibus populo regis illatis*;" and, secondly, to receive and try presentments certified from the court of attachments against offences in vert and venison. And this court may not only inquire, but convict also; which conviction shall be certified to the court of justice-seat under the seals of the jury, for this court cannot proceed to judgment. But the principal court is, 4. The court of justice-seat, which is held before the chief justice in eyre, or chief itinerant judge, *capitalis iustitiarum in itinere*, or his deputy; to hear and determine all trespasses within the forest, and all claims of franchises, liberties, and privileges, and all pleas and causes whatsoever therein arising. It may also proceed to try presentments in the inferior courts of the forests, and to give judgment upon conviction of the sweinmote. And the chief justice may therefore, after presentment made or indictment found, but not before, issue his warrant to the officers of the forest to apprehend the offenders. It may be held every third year; and 40 days notice ought to be given of its sitting. This court may fine and imprison for offences within the forest, it being a court of record: and therefore a writ of error lies from hence to the court of king's bench, to rectify and redress any mal-administrations of justice; or the chief justice in eyre may adjourn any matter of law into the court of king's bench.

FOREST-TOWNS, in geography, certain towns of Suabia in Germany, lying along the Rhine, and the confines of Switzerland, and subject to the house of Austria. Their names are *Rhinefeld, Seckingen, Laufenburg, and Waldhut*.

FORE-STAFF, or **CROSS-STAFF**, an instrument used at sea for taking the altitude of the sun, moon, or stars. See **STAFF**.

FORESTALLER, a person who is guilty of forestalling. See the next article.

FORESTALLING, in law, buying or bargaining for any corn, cattle, victuals, or merchandise, in the way as they come to fairs or markets to be sold, before they get thither, with an intent to sell the same again at a higher price.

The punishment for this offence, upon conviction at the quarter-sessions, by two or more witnesses, is, for the first time, two months imprisonment and the loss of the goods, or the value; for the second offence, the offender shall be imprisoned six months, and lose double the value of the goods; for the third offence, he shall suffer imprisonment during the king's pleasure, forfeit all his goods and chattels, and stand on the pillory; but the statute does not extend to maliters buying barley, or to badgers licensed.

FORESTER, a sworn officer of the forest, appointed by the king's letters-patent, to walk the forest at all hours, and watch over the vert and venison; also to make attachments and true presentments of all trespasses committed within the forest.

If a man comes into a forest in the night, a forester cannot lawfully beat him before he makes some resistance; but in case such a person resists the forester, he may justify a battery. And a forester shall not be questioned for killing a trespasser that, after the peace cried to him, will not surrender himself, if it be not done on any former malice; though, where trespassers in a forest, &c. do kill a person that opposes them, it is murder in all, because they were engaged in an unlawful act, and therefore malice is implied to the person killed.

FORETHOUGHT. **FELONY**, in Scots law, signifies premeditated murder. See **MURDER**.

FORFAR, a town of Scotland, and capital of a county of the same name, situated in W. Long. 2. 32. N. Lat. 56. 25. of which Mr Pennant gives the following account. "It contains about 2000 souls; but since the great era of the prosperity of North Britain, has increased above one half. The manufactures of lins in this neighbourhood, from fourpence to sevenpence a-yard, are very considerable, and bring in, as is said, near 20,000l. a-year.—The castle stood on a small hill near the town, but at present not a fragment is left.—The lake lies, or rather did lie, at a small distance from the castle; and, according to tradition, once surrounded the town; there being in several parts, even to this day, marks of the deserted channel. Of late years it has been very considerably reduced by draining; to which the vast quantity of fine marle at the bottom was the temptation. This fine manure is found there in strata from three to ten feet thick, and very often is met with beneath the peat in the moors. The land improved with it yields four crops successively: after which it is laid down with barley and clover." Forfar is a parliament-town, classed with Perth, Dundee, Compar, and St Andrews, which all together send one member to parliament.

FORFAR-SHIRE, a county of Scotland of which Forfar is the capital. Including Angus, Glenila, Glenelch, and Glenprasslin, it extends 29 miles from east to west, and 16 where broadest, though in some places the breadth does not exceed five miles. On the north it is divided from the Brae of Mar, by a ridge of the Binchinnen mountains; it is bounded on the south by the Frith of Tay and the British ocean; on the east by Meams, and on the west by Perthshire. Part of the Grampian mountains runs through this country, which is agreeably diversified with hill and dale. It produces lead and iron in abundance, together with quarries of freestone and slate, with which the inhabitants drive a

Forester ||
Forfar.

Forfar,
Forfeiture.

Smollet's
present state
of all Na-
tions, ii. 70.

considerable traffic. The county is well watered with lakes, rivers, rivulets, and fountains, shaded with large forests, roughened with brown mountains, and waved with green hills interperfed with fields and meadows, and adorned with fine feats and plantations. Their heaths and woods abound with hart, hind, roebuck, and moor-game; their streams are stocked with trout and falmon. Their hills are covered with flocks of fheep, and their fields afford plentiful harvefts of wheat and all forts of grain. The mountains to the weft and north are inhabited by Highlanders: but the Lowlanders poffefs the towns and champaign country, and are remarkable for their politeness and hofpitality; though this laft virtue often degenerates into downright debauchery, in fomuch, that the gentlemen value themfelves upon their prowefs in drinking. The common people are sober, numerous, and addicted to traffic. Forfarfhire exhibits many monuments of antiquity. At the village of Miggle, in the neighbourhood of Coupar, there are feveral ftones erected in the church-yard, embellifhed with the figures of different animals and other ornaments. In the church-yard of Glamis, we fee an old obelisk or entire ftone 16 feet high, fet up over the grave of king Malcom II. who was murdered by the connivance of his own domeftics. This ftone is engraved with a number of figures alluding to the regicide; and at a little diftance, within the park of Glamis, there is another ftone marked with hieroglyphical fymbols, which feem to exprefs the perpetration of the fame murder. At the village of Coffens, in the fame neighbourhood, a very curious obelisk appears lying in the fields. It is known by the name of *St Orland's ftone*, and exhibits a great variety of figures in bas relief. There is another fmall ftone infcribed with figures at Balutheren, in the neighbourhood of Dundee. At the diftance of a mile to the fouthward of Glamis, ftands Denoon caftle, upon an eminence, environed with fteep rocks almoft inacceffible, having on the north two or three rows of terraces. It is built in a femicircular form, encompassed with a ftupendous wall of ftone and earth, 27 feet high, and 30 feet in thicknefs. It has two entries, one to the fouth-eaft and another to the north. The whole circumference of the wall amounts to 335 yards; and within this area, the ruins of ancient buildings are ftill vifible. About four miles to the fouthward of Brechin, at a place called *Aberlenny*, we find four or five ancient obelisks, one of which is engraved with figures, fuppofed to be monuments of a great victory gained at the village of Loncarty, by the Scots over the Danes; a victory entirely owing to the valour of an hufbandman and his two fons, of the furname of *Hay*, who were ennobled for their prowefs by king Kenneth III. From thefe defended the earls of Errol, hereditary high-constables of Scotland.

FORFEITURE, originally fignifies a tranfgreffion, or offence againft fome penal law. The word is formed of the bafe Latin *forisfactura*; whence *forfaitura* and *forfaitura*, and the French *forfait*. *Forisfactura* comes of *forisfacere*; which, according to Ifidore, fignifies to “hurt or offend,” *facere contra rationem*; and which is not improbably derived of *foris* “out,” and *facere*, “to do,” q. d. an action out of rule, or contrary to the rules. Borel will have *forfait* derived from the uſing of force, or violence: Lo-

bineau in his glosſary will have *forisfacta* properly *Forfeiture*. to fignify a mulct or amend, not a *forfeit*; which latter he derives from the bafe Britiſh *forſed*, “a penalty.”

But, with us, it is now more frequently uſed for the effect of ſuch tranſgreſſion; or the loſing ſome right, privilege, eſtate, honour, office, or effects, in conſequence thereof; than for the tranſgreſſion itſelf.

Forfeiture differs from *confiſcation*, in that the former is more general; while confiſcation is particularly applied to ſuch things as become forfeited to the king's exchequer; and goods confiſcated are ſaid to be ſuch as nobody claims.

Forfeitures may be either in *civil* or *criminal* caſes.

I. With reſpect to the firſt, a man that hath an eſtate for life or years, may forfeit it many ways, as well as by treaſon or felony; ſuch as alienation, claiming a greater eſtate than he hath, or affirming the reverſion to be in a ſtranger, &c. When a tenant in tail makes leaſes, not warranted by the ſtatute; a copyholder commits waſte, refuſes to pay his rent, or do ſuit of court; and where an eſtate is granted upon condition, on non-performance thereof, &c. they will make a forfeiture.

Entry for a forfeiture ought to be by him who is next in reverſion, or remainder, after the eſtate forfeited. As if tenant for life or years commits a forfeiture, he who has the immediate reverſion or remainder ought to enter; though he has the fee, or only an eſtate-tail.

II. Forfeiture in criminal caſes is twofold; of real, and perſonal eſtates.

I. As to real eſtates, by **ATTAINDER** in high-treaſon, a man forfeits to the king all his lands and tenements of inheritance, whether fee-fimple or fee-tail; and all his rights of entry on lands and tenements, which he had at the time of the offence committed, or at any time afterwards, to be for ever veſted in the crown; and alſo the profits of all lands and tenements, which he had in his own right for life or years, ſo long as ſuch intereſt ſhall ſubſiſt. This forfeiture relates backwards to the time of the treaſon committed; ſo as to avoid all intermediate ſales and incumbrances, but not thoſe before the fact: and therefore a wife's jointure is not forfeitable for the treaſon of her huſband; becauſe ſettled upon her previous to the treaſon committed. But her dower is forfeited, by the expreſs provision of ſtatute 5 & 6 Edw. VI. c. 11. And yet the huſband ſhall be tenant by the curteſy of the wife's lands, if the wife be attainted of treaſon: for that is not prohibited by the ſtatute. But, though after attainder the forfeiture relates back to the time of the treaſon committed, yet it does not take effect unleſs an attainder be had, of which it is one of the fruits; and therefore, if a traitor dies before judgment pronounced, or is killed in open rebellion, or is hanged by martial law, it works no forfeiture of his lands: for he never was attainted of treaſon. But if the chief juſtice of the king's bench (the ſupreme coroner of all England) in perſon, upon the view of the body of him killed in open rebellion, records it and returns the record into his own court, both lands and goods ſhall be forfeited.

The natural juſtice of forfeiture or confiſcation of property, for treaſon, is founded on this conſideration: That

Blackſt.
Comment.

That he who hath thus violated the fundamental principles of government, and broken his part of the original contract between king and people, hath abandoned his connexions with society; and hath no longer any right to those advantages, which before belonged to him purely as a member of the community; among which *social* advantages the right of transferring or transmitting property to others is one of the chief. Such forfeitures, moreover, whereby his posterity must suffer as well as himself, will help to restrain a man, not only by the sense of his duty, and dread of personal punishment, but also by his passions and natural affections; and will interest every dependent and relation he has, to keep him from offending: according to that beautiful sentiment of Cicero, "*ne vero me fugit quam sit acerbum, parentum scelera filiorum poenis sui: sed hoc præclare legibus comparatum est, ut caritas liberorum amiciores parentes reipublica redderet.*" And therefore Aulus Cassellius, a Roman lawyer in the time of the triumvirate, used to boast that he had two reasons for despising the power of the tyrants; his old age, and his want of children: for children are pledged to the prince of the father's obedience. Yet many nations have thought, that this posthumous punishment favours of hardship to the innocent; especially for crimes that do not strike at the very root and foundation of society, as treason against the government expressly does. And therefore, although confiscations were very frequent in the times of the earlier emperors, yet Arcadius and Honorius in every other instance but that of treason thought it more just, *ibi esse poenam, ubi et noxa est*; and ordered that "*peccata suos teneant auctores, nec ulterius progrediatur metus, quam reperiarit delictum*:" and Justinian also made a law to restrain the punishment of relations; which directs the forfeiture to go, except in the case of *crimen majestatis*, to the next of kin to the delinquent. On the other hand, the Macedonian laws extended even the capital punishment of treason, not only to the children, but to all the relations of the delinquent: and of course their estates must be also forfeited, as no man was left to inherit them. And in Germany, by the famous golden bull, (copied almost *verbatim* from Justinian's code) the lives of the sons of such as conspire to kill an elector are spared, as it is expressed, by the emperor's *particular bounty*. But they are deprived of all their effects and rights of succession, and are rendered incapable of any honour ecclesiastical and civil: "to the end that, being always poor and necessitous, they may for ever be accompanied by the infamy of their father; may languish in continual indigence; and may find (says this mercilefs edict) their punishment in living, and their relief in dyin."

In England, forfeiture of lands and tenements to the crown for treason is by no means derived from the feudal policy, but was antecedent to the establishment of that system in this island; being transmitted from our Saxon ancestors, and forming a part of the ancient Scandinavian constitution. But in certain treasons relating to the coin, (which seem rather a species of the *crimen falsi* than the *crimen læsæ majestatis*) it is provided by some of the modern statutes which constitute the offence, that it shall work no forfeiture of lands, save only for the life of the offenders; and by all, that it shall not deprive the wife of her dower. And,

in order to abolish such hereditary punishment entirely, it was enacted by statute 7 Ann. c. 21. that, after the decease of the late pretender, no attainer for treason should extend to the disinheriting of any heir, nor to the prejudice of any person, other than the traitor himself. By which, the law of forfeitures for high treason would by this time have been at an end, had not a subsequent statute intervened to give them a longer duration. The history of this matter is somewhat singular, and worthy observation. At the time of the union, the crime of treason in Scotland was, by the Scots law, in many respects different from that of treason in England; and particularly in its consequence of forfeitures of entailed estates, which was more peculiarly English: yet it seemed necessary, that a crime so nearly affecting government should, both in its essence and consequences, be put upon the same footing in both parts of the united kingdoms. In new-modelling these laws, the Scotch nation and the English house of commons struggled hard, partly to maintain, and partly to acquire, a total immunity from forfeiture and corruption of blood; which the house of lords as firmly resisted. At length a compromise was agreed to, which is established by this statute, viz. that the same crimes, and no other, should be treason in Scotland that are so in England; and that the English forfeitures and corruption of blood, should take place in Scotland, till the death of the then pretenders; and then cease throughout the whole of Great Britain: the lords artfully proposing this temporary clause, in hopes (it is said), that the prudence of succeeding parliaments would make it perpetual. This has partly been done by the statute 17 Geo. II. c. 39. (made in the year preceding the late rebellion), the operation of these indemnifying clauses being thereby still farther suspended till the death of the sons of the pretender.

In petit treason and felony, the offender also forfeits all his chattel interests absolutely, and the profits of all freehold estates during life; and, after his death, all his lands and tenements in fee-simple (but not those in tail) to the crown, for a very short period of time: for the king shall have them for a year and a day, and may commit therein what waste he pleases; which is called the king's *year, day, and waste*. Formerly the king had only a liberty of committing waste on the lands of felons, by pulling down their houses, extirpating their gardens, ploughing their meadows, and cutting down their woods. And a punishment of a similar spirit appears to have obtained in the oriental countries, from the decrees of Nebuchadnezzar and Cyrus in the books of Daniel and Ezra; which, besides the pain of death inflicted on the delinquents there specified, ordain, "that their houses shall be made a dunghill." But this tending greatly to the prejudice of the public, it was agreed in the reign of Henry the first, in England, that the king should have the profits of the land for one year and a day, in lieu of the destruction he was otherwise at liberty to commit: and therefore *magna charta* provides, that the king shall only hold such lands for a year and a day, and then restore them to the lord of the fee; without any mention made of waste. But the statute 17 Edw. II. *de prerogativa regis*, seems to suppose, that the king shall have his year, day, and waste; and not the year and day *instead* of waste. Which Sir

Forfeiture.

Edward Coke (and the author of the Mirror, before, him) very justly look upon as an encroachment, tho a very ancient one, of the royal prerogative. This year, day, and walle, are now usually compounded for; but otherwise they regularly belong to the crown: and, after their expiration, the land would naturally have descended to the heir, (as in gavelkind tenure it still does) did not its feudal quality intercept such descent, and give it by way of escheat to the lord. These forfeitures for felony do also arise only upon attainder; and therefore a *felo de se* forfeits no lands of inheritance or freehold, for he never is attainted as a felon. They likewise relate back to the time the offence was committed, as well as forfeitures for treason; so as to avoid all intermediate charges and conveyances. This may be hard upon such as have unwarily engaged with the offender: but the cruelty and reproach must lie on the part, not of the law, but of the criminal; who has thus knowingly and dishonestly involved others in his own calamities.

2. The forfeiture of goods and chattels accrues in every one of the high kinds of offence; in high treason, or misprison thereof, petit treason, felonies of all sorts whether clergyable or not, self-murder or felony *de se*, petty larceny, standing mute, &c. For flight also, on an accusation of treason, felony, or even petit larceny, whether the party be found guilty or acquitted, if the jury find the flight, the party shall forfeit his goods and chattels: for the very flight is an offence, carrying with it a strong presumption of guilt, and is at least an endeavour to elude and flake the course of justice prescribed by the law. But the jury very seldom find the flight: forfeiture being looked upon, since the vast increase of personal property of late years, as too large a penalty for an offence to which a man is prompted by the natural love of liberty.

There is a remarkable difference or two between the forfeiture of lands, and of goods and chattels. (1.) Lands are forfeited upon attainder, and not before: goods and chattels are forfeited by conviction. Because in many of the cases where goods are forfeited, there never is any attainder; which happens only where judgment of death or outlawry is given: therefore, in those cases, the forfeiture must be upon conviction, or not at all; and, being necessarily upon conviction in those, it is so ordered in all other cases, for the law loves uniformity. (2.) The forfeiture of lands has relation to the time the fact was committed, so as to avoid all subsequent sales and incumbrances: but the forfeiture of goods and chattels has no relation backwards; so that those only which a man has at the time of conviction shall be forfeited. Therefore a traitor or felon may *bona fide* sell any of his chattels, real or personal, for the subsistence of himself and family between the fact and conviction: for personal property is of so fluctuating a nature, that it passes through many hands in a short time; and no buyer could be safe, if he were liable to return the goods which he had fairly bought, provided any of the prior vendors had committed a treason or felony. Yet if they be collusively and not *bona fide* dealt with, merely to defraud the crown, the law (and particularly the statute 13 Eliz. c. 5.) will reach them; for they are all the while truly and substantially the goods

of the offender: and as he, if acquitted, might recover them himself, as not parted with for a good consideration; so, in case he happens to be convicted, the law will recover them for the king.

FORFICULA, the EAR-WIG, in zoology, a genus of insects belonging to the order of coleoptera. The antennæ are bristly; the elytra are dimidiated; the wings are covered; and the tail is forked. There are two species, viz. the auriculata, or common earwig, with the tops of the elytra white; and the minor, with testaceous and unpotted elytra.—It is a very troublesome creature, frequently introducing itself into the ears, and causing a great deal of pain by its biting: it likewise burrows in other parts of the body, which it bites in the same manner.

Ear-wigs are very mischievous vermin in gardens, especially where carnations are preferred; for they are so fond of these flowers, that, if care is not taken to prevent them, they will entirely destroy them, by eating off the sweet part at the bottom of the petals or leaves. To prevent which, most people have stands erected, which have a basin of earth or lead round each supporter, which is constantly kept filled with water. Others hang the hollow claws of crabs and lobsters upon sticks in divers parts of the garden, into which those vermin get; and by often searching them, you will destroy them without much trouble, which will be of great service to your wall-fruit, for these are great destroyers also of all soft fruits.

FORGE, properly signifies a little furnace, where-in smiths and other artificers of iron or steel, &c. heat their metals red hot, in order to soften them and render them more malleable and manageable on the anvil.

An ordinary forge is nothing but a pair of bellows, the nozzle of which is directed upon a smooth area, on which coals are placed. The nozzle of a pair of bellows may be also directed to the bottom of any furnace, to excite the combustion of the coals placed there, by which a kind of forge is formed. In laboratories, there is generally a small furnace consisting of one cylindrical piece, open at top, which has at its lower side a hole for receiving the nozzle of a double bellows. This kind of forge-furnace is very convenient for fusions, as the operation is quickly performed, and with few coals. In its lower part, two inches above the hole for receiving the nozzle of the bellows, may be placed an iron-plate of the same diameter, supported upon two horizontal bars, and pierced near its circumference with four holes diametrically opposite to each other. By this disposition, the wind of the bellows, pushed forcibly under this plate, enters at these four holes; and thus the heat of the fire is equally distributed, and the crucible in the furnace is equally surrounded by it. This contrivance is used in the forge-furnaces for melting copper, with this difference only, that these furnaces are square, which is a matter of no consequence.

As the wind of bellows strongly and rapidly excites the action of the fire, a forge is very convenient when a great heat is to be applied quickly: but it is not suitable when the heat is to be gradually increased.

The forge, or blast of bellows, is used in several operations in small; as to fuse salts, metals, ores, &c. It is also much used in works in the great, which require strong heat, without much management; and chiefly in the

Forficula, Forge.

Forge,
Forge.

Forgery,
Forging.

the smelting of ores, and fusion of metallic matters.

FORGE is also used for a large furnace, wherein iron-ore, taken out of the mine, is melted down: or it is more properly applied to another kind of furnace, wherein the iron-ore, melted down and separated in a former furnace, and then cast into sows and pigs, is heated and fuled over again, and beaten afterwards with large hammers, and thus rendered more soft, pure, ductile, and fit for use.

FORGE, in the train of artillery, is generally called a *travelling-Forge*, and may not be improperly called a portable smith's-shop: at this forge all manner of smith's work is made, and it can be used upon a march as well as in camp. Formerly they were very ill contrived, with 2 wheels only, and wooden supporters to prop the forge for working when in the park. Of late years they are made with 4 wheels, which answers their purpose much better.

FORGE for red-hot Balls, is a place where the balls are made red-hot before they are fired off: it is built about five or six feet below the surface of the ground, of strong brick-work, and an iron grate, upon which the balls are laid, with a very large fire under them.

FORGER, in law, one guilty of FORGERY.

FORGERY, (from the French *forger*, i. e. *accudere, fabricare*, "to beat on an anvil," "forge," or "form,") may be defined at common law, to be "the fraudulent making or alteration of a writing to the prejudice of another man's right:" for which the offender may suffer fine, imprisonment, and pillory. And also, by a variety of statutes, a more severe punishment is inflicted on the offender in many particular cases, which are so multiplied of late as almost to become general. We shall mention the principal instances.

By statute 5 *Eliz. c. 14.* to forge or make, or knowingly to publish or give in evidence, any forged deed, court-roll, or will, with intent to affect the right of real property, either freehold or copyhold, is punished by a forfeiture to the party grieved of double costs and damages; by standing in the pillory, and having both his ears cut off, and his nostrils slit, and seared; by forfeiture to the crown of the profits of his lands, and by perpetual imprisonment. For any forgery relating to a term of years, or annuity, bond, obligation, acquittance, release, or discharge of any debt or demand of any personal chattels, the same forfeiture is given to the party grieved; and on the offender is inflicted the pillory, loss of one of his ears, and half a year's imprisonment: the second offence, in both cases, being felony without benefit of clergy.

Besides this general act, a multitude of others, since the revolution, (when paper-credit was first established) have inflicted capital punishment on the forger, altering, or uttering as true when forged, of any bank bills or notes, or other securities; of bills of credit issued from the exchequer; of south-sea bonds, &c.; of lottery tickets or orders; of army or navy debentures; of East-India bonds; of writings under seal of the London or royal-exchange assurance; of the hand of the receiver of the pre-fines, or of the accountant-general and certain other officers of the court of chancery; of a letter of attorney or other power to receive or transfer stock or annuities; and on the personating a proprietor thereof, to receive or transfer such annuities, stock, or dividends: also on the personating, or

procuring to be personated, any seaman or other person, entitled to wages or other naval emoluments, or any of his personal representatives; and the taking, or procuring to be taken, any false oath in order to obtain a probate, or letters of administration, in order to receive such payments; and the forging, or procuring to be forged, and likewise the uttering or publishing, as true, of any counterfeited seaman's will or power: to which may be added, though not strictly reducible to this head, the counterfeiting of mediterranean passes, under the hands of the lords of the admiralty, to protect one from the piratical states of Barbary; the forging or imitating of any stamps to defraud the public revenue; and the forging of any marriage register or licence: all which are, by distinct acts of parliament, made felonies without benefit of clergy. By statutes 13 *Geo. III. c. 52. & 59.* forging or counterfeiting any stamp or mark to denote the standard of gold and silver plate, and certain other offences of the like tendency, are punished with transportation for 14 years. By statute 12 *Geo. III. c. 48.* certain frauds on the stamp-duties, therein described, principally by using the same stamps more than once, are made single felony, and liable to transportation for seven years. And the same punishment is inflicted by statute 13 *Geo. III. c. 38.* on such as counterfeit the common seal of the corporation for manufacturing plate-glass (thereby erected), or knowingly demand money of the company by virtue of any writing under such counterfeit seal.

There are also two other general laws, with regard to forgery; the one 2 *Geo. II. c. 25.* whereby the first offence in forging or procuring to be forged, acting or assisting therein, or uttering or publishing as true, any forged deed, will, bond, writing obligatory, bill of exchange, promissory note, indorsement or assignment thereof, or any acquittance or receipt for money or goods, with intention to defraud any person, (or corporation), is made felony without benefit of clergy. And by statute 7 *Geo. II. c. 22.* it is equally penal to forge, or cause to be forged, or utter as true, a counterfeit acceptance of a bill of exchange, or the number of any accountable receipt for any note, bill, or any other security for money; or any warrant or order for the payment of money, or delivery of goods. So that, through the number of these general and special provisions, there is now hardly a case possible to be conceived, wherein forgery, that tends to defraud, whether in the name of a real or fictitious person, is not made a capital crime.

FORGING, in law, the act of FORGERY.

FORGING, in smithery, the beating or hammering iron on the anvil, after having first made it red-hot in the forge, in order to extend it into various forms, and fashion it into works. See FORGE.

There are two ways of forging and hammering iron. One is by the force of the hand, in which there are usually several persons employed, one of them turning the iron and hammering likewise, and the rest only hammering. The other way is by the force of a water-mill, which raises and works several huge hammers beyond the force of man; under the strokes whereof the workmen present large lumps or pieces of iron, which are sustained at one end by the anvils, and at the other by iron-chains fastened to the ceiling of the forge.

Forgiveness forge. See MILL.

Form.

This last way of forging is only used in the largest works, as anchors for ships, &c. which usually weigh several thousand pounds. For the lighter works, a single man serves to hold, heat, and turn with one hand, while he hammers with the other.

Each purpose the work is designed for, requires its proper heat; for if it be too cold, it will not feel the weight of the hammer, as the smiths call it when it will not batter under the hammer; and if it be too hot, it will red-scar, that is, break or crack under the hammer.

The several degrees of heats the smiths give their irons, are, first, a blood-red heat; secondly, a white-flame-heat; and, thirdly, a sparkling or welding heat.

FORGIVENESS, the act of pardoning any offender. See MORALS, n° 126.

FORISFAMILIATION, in law. When a child, upon receiving a portion from his father, or otherwise, renounces his legal title to any further share of his father's succession, he is said to be *forisfamiliarized*.

FORLI, an ancient and considerable town of Italy, and capital of a territory of the same name, in Romagna, with a bishop's see. The public structures are very handsome; and it is seated in a fertile, healthy, and pleasant country, 10 miles south-east of Faenza, and 45 north-east of Florence. E. Long. 12. 1. N. Lat. 44. 28.

FORLORN-HOPE, in the military art, signifies men detached from several regiments, or otherwise appointed, to make the first attack in day of battle; or, at a siege, to storm the counterescarp, mount the breach, or the like.—They are so called from the great danger they are unavoidably exposed to; but the word is old, and begins to be obsolete.

FORM, in physics, the essential or distinguishing modification of the matter whereof a natural body is composed, so as thereby to give it such a particular manner of existence; being that which constitutes it such a particular body, and distinguishes it from every other body.

FORM is also used, in a moral sense, for the manner of being or doing a thing according to rules: thus we say, a form of government, a form of argument, &c.

FORM, in law, the rules established and requisite to be observed in legal proceedings.—The formal part of the law, or method of proceeding, cannot be altered but by parliament; for if once these *outworks* were demolished, there would be an inlet to all manner of innovation in the body of the law itself.

FORM, in carpentry, is used to denote the long seats or benches in the cloisters of churches or in schools, for the priests, prebends, religious, or scholars, to sit on. At schools, the word *form* is frequently applied to what is otherwise termed a *class*. See CLASS.

FORM also denotes the external appearance or surface of a body, or the disposition of its parts, as to the length, breadth, and thickness.

FORM is also used, among mechanics, for a sort of mould wherein any thing is fashioned or wrought.

Printer's FORM, an assemblage of letters, words, and lines, ranged in order, and so disposed into pages by the compositor; from which, by means of ink and a press, the printed sheets are drawn.

Every form is included in an iron-chase, wherein it

is firmly locked by a number of pieces of wood; some long and narrow, and others of the form of wedges. There are two forms required for every sheet, one for each side; and each form consists of more or fewer pages, according to the size of the book.

Hatters' FORM, is a large block or piece of wood, of a cylindrical figure; the top thereof rounded, and the bottom quite flat. Its use is, to mould or fashion the crown of the hat, after the matter thereof has been beaten and filled.

Papermakers' FORM, is the frame or mould wherein the sheets are fashioned. See PAPER.

FORMA PAUPERIS, in law, is when a person has just cause of suit, but is so poor, that he cannot defray the usual charges of suing at law or in equity; in which case, on making oath that he is not worth 5*l.* in the world, on all his debts being paid, and producing a certificate from some lawyer that he has good cause of suit, the judge will admit him to sue in *forma pauperis*; that is, without paying any fee to counsellors, attorneys, or clerk: the statute 1 Hen. VII. c. 12. having enacted, that counsel and attorneys, &c. shall be assigned to such poor persons *gratis*. Where it appears that any pauper has sold or contracted for the benefit of his suit, whilst it is depending in court, such cause shall be thenceforth totally dismissed; and a person suing in *forma pauperis*, shall not have a new trial granted him, but is to acquiesce in the judgment of the court.

FORMAL, something belonging to or constituting the form of a thing. See FORM.

FORMATION, in philosophy, an act whereby something is formed or produced.—For the formation of the fetus in the womb, see GENERATION.

FORMATION of Stones. See STONE.

FORMATION of Metals and Minerals. See METAL and MINERAL.

FORMATION, in grammar, signifies the manner of forming one word from another: thus *accountantship* is formed from *accountant*, and this last from *account*.

FORMEDON, in law, (*breve de forma donationis*) a writ that lies for a person who has a right to lands or tenements, by virtue of any entail, arising from the statute of Westm. 2 Ch. II.

This writ is of three kinds, viz. a descender, remainder, and reverter. Formedon in *descender*, lies where a tenant in tail incloses a stranger, or is disseised and dies, the heir may bring this writ to recover the lands. Formedon in *remainder*, lies where a man gives lands, &c. to a person in tail, and, for default of issue of his body, the remainder to another in tail: here if the tenant in tail dies without issue, and a stranger abates and enters into the land, he in remainder shall have this writ. Formedon in *reverter*, lies where lands are entailed on certain persons and their issue, with remainder over for want of issue; and, on that remainder failing, then to revert to the donor and his heirs: in this case, if the tenant in tail dies without issue, and also he in remainder, the donor and his heirs, to whom the reversion returns, may have this writ for the recovery of the estate, though the same be alienated, &c.

FORMICA, or the ANT, in zoology, a genus of insects belonging to the order of hymenoptera, the characters of which are these: There is a small scale betwix the breast and belly, and the joint is so deep, that the animal appears as if it were almost cut through the body.

Form
||
Formica.

body. The females, and the neuters or working ants which have no sexual characteristics, are furnished with a hidden sting; and both the males and females have wings, but the neuters have none. There are 18 species, most of them distinguished by their colours.

These insects keep together in companies like the bees, and maintain a sort of republic. Their nest is not exactly square, but longer one way than the other; and in it there are a sort of paths, which lead to different magazines. Some of the ants are employed in making the ground firm, by mixing it with a sort of glue, for fear it should crumble and fall down upon their heads. They may be sometimes seen to gather several twigs, which serve them for rafters, which they place over the paths, to support the covering; they lay others across them, and upon them rushes, weeds, and dried grass, which they heap up into a double declivity, which serves to turn off the water from their magazines. Some of these have to lay up their provisions in, and in others they lay their eggs.

As for the provisions, they lay up every thing that is fit for them to eat; and you may often see one loaded with pippin or grain of fruit, another with a dead fly, and several together with the carcase of a may-bug or other insect. If they meet with any they cannot bring away, they eat it upon the spot, or at least so much of it as may reduce it to a bulk small enough for them to carry. They do not run about where they please, at all adventures: for some of them are sent abroad to make discoveries; and if they bring back news that they have met with a pear, or a sugar-loaf, or a pot of sweet-meats, they will run from the bottom of the garden, as high as the third story of a house, to come at it. They all follow each other in the same path, without wandering to the right or the left; but in the fields they are more at their liberty, and are allowed to run about in search of game. There is a sort of green fly, that does a great deal of mischief among the flowers, and which curls up the leaves of peach and pear trees: and these are surrounded with a sort of glue, or honey, which the ants hunt after very greedily; for they touch neither the plant nor the flies themselves.

Next to this, their greatest passion is to lay up hoards of wheat, and other corn; and for fear the corn should sprout by the moisture of the subterraneous cells, they gnaw off the end which would produce the blade. The ants are often seen pushing along grains of wheat, or barley, much larger than themselves.

In Africa, and particularly in Guinea, the ants are exceedingly troublesome, and do a great deal of mischief. They make their nests of earth in the fields, twice as high as a man; besides which they build large nests in high trees, from which places they advance in such prodigious swarms to the houses, that they frequently oblige the inhabitants to quit their beds in the night-time. They will sometimes attack a living sheep; which in a night's time they will reduce to a perfect skeleton, leaving not the least thing except the bones. It is common for them to serve domestic fowls in the same manner, and even the rats themselves cannot escape them. If you place a worm or a beetle where only one or two ants are, they will immediately depart, and bring with them above an hundred; after which they seize their prey, and march off with it in good order. These ants are of various sorts; some great, others

small; some black, and others red: the sting of this last is very painful, and causes an inflammation: the white are as transparent as crystal, and have such strong teeth, that in a night's time they will eat their way through a thick wooden chest, and make it as full of holes as if it had been penetrated by hail-stone.

There are also several sorts of ants in the East Indies, whose numbers are prodigious: some of them are exceeding large, and of a ruddy colour, inclining to black; and some have wings, but others have none. They are very pernicious to the fruits of the earth, and do a great deal of mischief in houses, unless great care is taken to prevent them. It is remarkable, that if one ant meets another that is laden, it always gives way to let it pass freely.

The ant lays eggs in the manner of the common flies, and from these eggs are hatched a sort of small maggots or worms without legs: these are sharp at one end, and blunt at the other; and are white, but so transparent, that the intestines are seen through the skin. These, after a short time, change into large white aureliae, which are what are usually called *ante eggs*. That end which is to be the tail is the largest, and that which is the head is somewhat transparent.

The ants move these about at pleasure with their forceps. It is well known, that when a nest of these creatures is disturbed, and the aureliae scattered about, the ants are at infinite pains to get together all that are unhurt, and make a nest for them again: nay, any ants will do this, and those of one nest will often take care of the aureliae of another.

The affection of the ant for its offspring is amazing. They carry the young worms about in their mouths, that nothing may injure them; and when the earth of the nest is dry, they carry them down to a greater depth, but when wet they bring them to the surface, that they may not be injured by the damps.

The common ant builds only with small pieces of dry earth, and there is always found a vast quantity either of eggs, worms, or aureliae, at the bottom of the nest. The aureliae are covered only with a thin skin; and when carefully opened, they shew the worm perfect, and in its several stages of perfection.

The forecast of ants in providing against the winter is a mistake. They are supposed not to eat in the winter, but to spend that season, like dormice and many other sorts of animals, in a state of sleep. What confirms this is, that they have been observed, as the cold draws on in the autumn, to move very heavily, and in the vintage-time they can hardly stir at all; so that the provision they make seems intended not for themselves, but for their young.

The care these creatures take of their offspring is remarkable. Whenever a hill is disturbed, all the ants are found busied in consulting the safety, not of themselves, but of the eggs or these larger bodies inclosing the maggot or young ant; they carry these down any way so as to get them out of sight, and will do this over and over as often as they are disturbed.

They carry away the eggs and vermicels together in their confusion; but, as soon as the danger is over, they carefully separate them, and place each sort in parcels by themselves under shelter of different kinds, and at various depths, according to the different degrees of warmth and coverture the different states require.

require.

In the warm season of the year, they every morning bring up the eggs, as they are usually called, to the surface, or nearly so; and from ten in the forenoon to five in the afternoon or thereabouts, all these will be found just under the surface; and if the hills be examined toward eight in the evening, they will be found to have carried them all down; and if rainy weather be coming on, it will be necessary to dig a foot deep or more, in order to find them.

These little creatures are very troublesome in gardens, and in pasture-lands; as well by feeding on the fruit, as by making up hills for their habitation. In the hotter countries, as Italy, Spain, and the West Indies, ants are the greatest pest of the fields. Trees may be preserved from them by encompassing the stem, for four fingers breadth, with a roll of wool, newly pulled from the sheep's belly; or by laying saw-dust all round the stump of it. Some anoint the tree with tar, which has the same effect. See *Amr.*

The large, black, winged ants of America, to avoid the great rains which fall there at particular seasons, make to themselves large nests on trees, with a covered way for them to go up and down on the lee-side of the tree. These nests are roundish on the outside, made of light brown earth, plastered smooth. They are larger than a bushel; and in the inside are many sinuous caverns or lodgings communicating with one another. See Plate CVIII. fig. 1. A, The ants nest; B, The tubular passage, made of the same materials.

Formica-Leo, the *Ant-lion*, in zoology, an insect so called from its devouring great numbers of ants. It is the caterpillar or worm of a fly much resembling the libellæ or dragon-flies; and feeds chiefly upon ants, from which property it derives its name.

It is somewhat of the nature of the spider in its way of taking its prey, its manner of spinning, and the figure and softness of its body. It has, in its general figure, somewhat of the appearance of the millepes or wood-louse, so that some have mistaken it at first sight for that animal. It is of a dirty greyish colour, marked with some black spots; and these are also composed of many points when viewed with a microscope, which make it resemble a hedge-hog or porcupine. Its body is composed of several rings, and has thence a wrinkled look. It has six legs, four are joined to the breast, and the other two to a longer part, which may be taken for its neck. Its head is small and flat, and it has two remarkable horns: these are about a sixth part of an inch long, and as thick as a hair: they are hard, hollow, and hooked at the end like the claws of a cat. At the origin of each of these horns, it has a clear and bright black eye, which sees very distinctly, and gives the creature notice to escape on sight of the smallest object.—This creature is not able to hunt after its prey, nor to destroy large insects; it can only draw into its snares such as come near its habitation, and of these very few are such as he can manage: all the winged kind are able to escape by flight; and the beetle kinds, and others that have hard shells upon their bodies, are of no use to him, as his horns cannot pierce them. The smallness of the ant, and its want of wings, make it the destined prey of this devourer. The manner in which he catches his prey is as follows.

He usually encamps under an old wall, that he may

be sheltered from the injuries of the weather; and he always chooses a place where the soil is composed of a fine dry sand. In this he makes a pit of the shape of a funnel, or an inverted hollow cone. If he intends the pit to be but small, he thrusts down his hinder part into the sand, and by degrees plunges himself backward into it; and when he has got to a certain depth, he tosses out the loose sand which has run down with his head, artfully throwing it off beyond the edges of his pit. Thus he lies at the bottom of a small hollow, which is widest at the top, and comes sloping down to his body.

But if he is to make a larger pit, more pains are required to bring it to perfection. He first traces, in the surface of the sand, a large circle, which is the erected base or mouth of the pit he is to make in form of an inverted cone. He then buries himself in the sand near the edge of this circle, and carefully throws up the sand above him, with his head tossing it out beyond the circumference of the circle. Thus he continues his work, running down backwards in a spiral line all the way, and carefully throwing off the sand from above him, till he is come to the place of his rest, which is the point or reverted apex of the hollow cone he has formed by his passage. The length of his neck, and the flatness of his head, gives him a power of using the whole as a spade, and throwing off the sand with great ease; and his strength in this part is so great, that he is able to throw off a quantity of it to six inches distance. This is a power he exerts oftener, however, in throwing away the remains of the animals he has fed upon, that his den may not become frightful to others of the same species, by seeing their fellow carcases about it.

When he has finished his pit, he buries himself at the bottom of it among the sand, leaving no part above ground but the tips of his two horns, which he expands to the two sides of the pit. In this condition he lies and waits for his prey, and never comes up afterwards. When an ant, or any other such creature, chances to walk over the edges of his pit, its steps throw down a little of the sand, which naturally running down to the bottom of the pit, gives the enemy notice of his prey; he then tosses up the sand which covers his head, to bury the ant, and bring him down with its returning force to the bottom; and as one such attempt cannot be sufficient to prevent the ant's escape, he throws more and more sand upon him, till he by degrees brings him down. All the endeavours of the ant to escape, when once it is within the verge of the pit, are in vain; for, as it attempts to climb, the sand runs away from under its feet, and it sinks the lower for every attempt. This motion of the sand also informs the enemy where it is, and directs him to throw up more sand in the right place; which it does, till the poor ant falls to the bottom between its horns. It then plunges their points deep into the ant's body; and having sucked out all the juice out of the prey, it throws out the empty skin as far from the hole as it can. This done, it mounts up the edges of its pit, and if it has suffered any injury, repairs it with great care, and immediately buries itself again in the centre, to wait for another meal. The horns of this creature are its only organs for receiving nourishment; it never brings any animal which it has seized near to its head, but always holds

it at the tip of the horns. They therefore plainly serve as syringes, to draw into its stomach the juices of the bodies of the insects it feeds upon: neither is there any mouth or trunk, or any other organ to be discovered about its head, which could serve to the purpose of eating; the head seeming only intended for throwing away the sand in forming the pit. The horns of this animal being so necessary to its life, nature has provided for the restoring them in case of accidents; and, if cut off, they are found to grow again.

The food this creature procures by its pit can be but little; and as it has no power of catching its prey any other way, its motion being only backwards, and that slowly, and by small spaces at a time, some people have believed its catching now and then an ant by this means was rather for diversion than hunger. But tho' the formica leo will live a long time without food, and even pass through all its changes when shut up in a box, yet it is always ready to eat when food is offered it; it always appears starved and small when kept thus; and if a fly is given it in this hungry state, it will so suck out all its juices, that the shell remaining may be rubbed to powder between the fingers, while the body of the creature that has sucked it appears remarkably swelled and distended; so that it is plain that the juices of the prey are conveyed into the body of the creature; though it is not easy to see by what means, the horns not appearing to have any perforation.

When the formica leo has lived a proper time in this state, it leaves its pit, and is only seen drawing lines and traces on the surface of the sand. After this it buries itself under the surface; and there incloses itself in a fine web, in which it is to pass its transformation into the winged state. This case is made of a sort of silk which the creature spins in the manner of the spider, and of a quantity of the grains of sand cemented together by a glutinous humour which flows from its pores. This case, however, would be too harsh and coarse for the body of the creature, and therefore it serves only for the outer covering to defend it from injuries; the creature spinning one of pure and incomparably fine silk, of a beautiful pearl colour, within it, which covers its whole body.

When the creature has lain some time in this case, it throws off its outer skin, with the eyes, the horns, and every other part necessary to its life before, and becomes an oblong nymph, in which a careful eye may trace the form of the fly into which it is to be transformed. There may be seen, through its transparent covering, new eyes, new horns, wings, and all the other parts of the animal in its perfect state. This nymph makes its way about half out of the shell, and remains in this condition, but without farther life or motion, till the perfect fly makes its way out at a slit in the back. In this last state it much resembles the libellæ or dragon-flies common about our waters. The male couples with the female in this state only; and M. Ponsart, to whom the world is obliged for this curious description, is of opinion that the females lay only one egg; but this is very different from the course of nature in the other animals of the same class.

When this insect forms its pit in a bed of pure sand, it is made and repaired with great ease; but where it meets with other substances among the sand, the labour becomes greatly the more embarrassing. If, for

instance, when the creature has half-formed its pit, and then comes to a stone of some moderate size, it does not desert the work for this, but goes on, intending to remove that impediment at last. When the pit is finished, the creature crawls backward up the side of the place where the stone is, and getting its backside under it, takes great pains and time to get it on a true poise, and then begins to crawl backward with it up the edge to the top of the pit, to get it out of the way. It is a very common thing to see a formica-leo in this manner labouring at a stone four times as big as its own body; and, as it can only move backward, and the poise is hard to keep, especially up a slope of such crumbly matter as sand, which moulders away from under its feet, and necessarily alters the position of its body, the stone very frequently falls down when near the verge, and then it is sure to roll to the bottom. In this case the animal attacks it again in the same way, and often is not discouraged by five or six miscarriages of this kind, but, after all, attempts again, and at length gets over the verge of the place. When it has done this, it does not leave it there, lest it should roll in again; but is always at the pains of pushing it farther on, till it has removed it to a necessary distance from the edge of the pit.

The common formica-leo moves only backward; but Mr Rouet has observed a species which moves forward in the common way of other animals, and makes no pit of this kind to entrap its prey, but seizes other insects by force.

FORMOSA, an island in the Pacific ocean, between 119° and 122° of E. Long. and between 22° and 25° N. Lat. about 100 miles east of Canton in China. It is subject to the Chinese.

FORMULA, or FORMULARY, a rule or model, or certain terms prescribed or decreed by authority, for the form and manner of an act, instrument, proceeding, or the like.

FORMULA, in church-history and theology, signifies a profession of faith.

FORMULA, in medicine, imports the constitution of medicines, either simple or compound, both with respect to their prescription and consilience.

FORMULARY, a writing containing the form of an oath, declaration, attestation, abjuration, &c. to be made on certain occasions.

FORNACALIA, or FORNICALIA, in Roman antiquity, a festival instituted by Numa in honour of Fornax, the goddess of ovens; wherein certain cakes were made, and offered in sacrifice before the ovens.

FORNICATION, (*Fornicatio*, from the *fornices* in Rome, where the lewd women prostituted themselves for money), is whoredom, or the act of incontinency, between single persons; for if either of the parties is married, it is *adultery*. Formerly court-leets had power to inquire of and punish fornication and adultery; in which courts the king had a fine assessed on the offenders, as appears by the book of Domesday.

In the year 1650, when the ruling powers found fit for their interest to put on the semblance of a very extraordinary strictness and purity of morals, not only incest and wilful adultery were made capital crimes, but also the repeated act of keeping a brothel, or committing fornication, were (upon a second conviction) made felony without benefit of clergy. But, at the restoration,

tion, when men, from an abhorrence of the hypocrisy of the late times, fell into a contrary extreme of licentiousness, it was not thought proper to renew a law of such unfashionable rigour. And these offences have been ever since left to the feeble coercion of the spiritual court, according to the rules of the canon law; a law which has treated the offence of incontinence, nay, even adultery itself, with a great degree of tenderness and lenity; owing perhaps to the constrained celibacy of its first compilers. The temporal courts therefore take no cognizance even of the crime of adultery other-wise than as a private-injury. See ADULTERY.

FORNIX, in anatomy, is part of the corpus callosum in the brain; so called, because of a distant resemblance it hath to the arches of ancient vaults when viewed in a particular manner.

FORRAGE, in the military art, denotes hay, oats, barley, wheat, grass, clover, &c. brought into the camp by the troopers, for the sustenance of their horses.

It is the business of the quarter-master general to appoint the method of forrage, and post proper guards for the security of the foragers.

FORRES, a parliament-town of Scotland in the county of Murray. W. Long. 3. 20. N. Lat. 57. 40. It is classed with Inverness, Fortrose, and Nairn.

FORT, in the military art, a small fortified place, environed on all sides with a moat, rampart, and parapet. Its use is to secure some high ground or the passage of a river, to make good an advantageous post, to defend the lines and quarters of a siege, &c.

Forts are made of different figures and extents, according as the ground requires. Some are fortified with bastions, others with demi-bastions. Some again are in form of a square, others of a pentagon. A fort differs from a citadel, as this last is built to command some town.

FORTALICE, in Scots law, signified anciently a small place of strength, originally built for the defence of the country; and which on that account was formerly reckoned *inter regalia*, and did not go along with the lands upon which it was situated without a special grant from the crown. Now, fortalices are carried by a general grant of the lands; and the word is become synonymous with manor-place, messuage, &c.

FORTESCUE (Sir John), lord chief justice of the king's bench, and lord high chancellor of England, in the reign of king Henry VI. was descended from the ancient family of Fortescue, in the county of Devon. He studied the municipal laws of England in Lincoln's Inn, of which he was made one of the governors in the fourth and seventh years of the reign of king Henry VI. In 1430 he was called to the degree of a serjeant at law, and in 1441 was constituted the king's serjeant. The following year he was made lord chief justice of the king's bench; in which honourable station he continued till near the end of that king's reign, who shewed him many particular marks of his favour, and advanced him to the post of lord high chancellor of England. During the reign of king Edward IV. he followed the fortunes of the house of Lancaster, and was many years in exile with queen Margaret and prince Edward her son. At length, they having a prospect of retrieving their desperate fortunes, the queen and

prince returned to England, and Sir John Fortescue, with many others, accompanied them: but soon after the decisive battle of Tewksbury, he was thrown into prison and attainted, with other Lancastrians; but found means to procure his pardon from Edward IV. He wrote, 1. A learned commentary on the politic laws of England, for the use of prince Edward; to one edition of which Mr Selden wrote notes. 2. The difference between an absolute and limited monarchy, as it more particularly regards the English constitution: (which was published, with some remarks, by John Fortescue, afterwards Lord Fortescue, in 8vo, in 1714; and a second edition was published, with amendments, in 1719.) And several works, which still remain in manuscript. He died near 90 years of age; and was buried in the parish-church of Ebburton, where a monument was erected to his memory, in 1677, by one of his descendants.

FORTH, one of the most noble and commodious rivers in Scotland. It takes its rise near the bottom of Leimon hills; and running from west to east, receives in its passage many considerable streams, deriving their waters from the eminences in the midland counties of North Britain. Between Stirling and Alloa, the Forth winds in a most beautiful and surprising manner; so that, though it is but four miles by land, it is 24 by water between these two places. Below Alloa the river expands itself to a great breadth between the counties of Lothian and Fife, till at Queen's-ferry it is contracted by promontories shooting into it from both coasts; so that, from being four or five, there it is not above two miles broad. In the middle of the channel lies a small island called *Tachgarry*, which has a spring of fresh water: and upon it there was anciently a fort; and if that was thoroughly repaired, or a new one erected, and there were either forts or blockhouses on the opposite promontories, that part of the river which lies between Alloa and Queens-ferry would be as secure and convenient a harbour as could be desired. Below Queen's-ferry the north and south shores receding, the body of the water gradually enlarges till it becomes two or three leagues broad, affording several safe harbours on both sides, and excellent roads throughout, unembarrassed with latent rocks, shoals, or sands; and allowing secure anchorage to the largest ships within a league of the coast, in almost any part of the Frith; and to vessels of a smaller size within a mile or less. The Frith, or (as it is commonly written) the *Frith*, of Forth, is, at the mouth of it, from North Berwick to Fifehead, full five leagues broad; having the little island of May (on which there is a light-house, and there might also be a fort) in the middle of it, and to the west of this the rocky island of Bala; notwithstanding which, the largest fleet may enter and sail up it many miles with the utmost facility and in the greatest safety. From its mouth to Stirling-bridge it is 20 leagues in extent. It was known to the ancients by the name of *Bodotria*, or (as Ptolemy calls it) *Boderia*, and has been ever famous for the number of its havens; some of which are, indeed, in their present condition, scarce worthy of that name; but, however, most of them are capable of being put in a much better state, whenever the commerce of this country shall require it.

F O R T I F I C A T I O N ;

THE art of fortifying a town, or other place; or of putting them in such a posture of defence, that every one of its parts defends, and is defended by, some other parts, by means of ramparts, parapets, moats, and other bulwarks; to the end that a small number of men within may be able to defend themselves for a considerable time against the assaults of a numerous army without, so that the enemy in attacking them must of necessity suffer great loss.

The origin and rise of fortification, is undoubtedly owing to the degeneracy of mankind. In the first ages of the world, men were dispersed up and down the countries in separate families, as we are told in the histories of the Jews and Scythians, who wandered from one place to another, for the sake of finding pasture for their cattle. These families became in time so numerous as to form large communities, which settled all together in a place; from whence villages and towns had their origin and rise: but they found it was necessary, for the common security, to surround those towns with walls and ditches, to prevent all violences from their neighbours, and sudden surprisings. This was sufficient for some time, till offensive weapons were invented, and conquering became a fashion. Then walls with loop-holes were made at proper distances, in order to screen the defenders against the arrows of the assailants: but finding that, as soon as the enemy got once close to the walls, they could be from no part be discovered or repulsed; for this reason they added square towers at proper distances from each other, so that every part of the wall might be defended by the adjacent sides of the towers. However, this manner of inclosing of towns was found to be imperfect, because there remained still one of the faces of the towers which fronted the field that could not be seen from any other part, and therefore could not be defended. To remedy this, they made the towers round instead of square, imagining this figure to be the strongest to resist the battering engines, as likewise to be better defended from the other parts of the wall.

Notwithstanding the superiority of this method above the former, there remained yet a part of these towers unseen and incapable of being defended; which made them change the figure of the towers again; that is, they made them square as before; but, instead of presenting a face to the field as formerly, they presented an angle; by this means they effectually found out such a disposition of their works, that no part could be attacked without being seen or defended by some other part.

This last method was in use a long while; and would in all probability have continued to this day, if gun-powder had not been found out: but the violence of the guns and mortars soon convinced the world, that such towers and walls were but a weak defence against these thundering engines; and besides, as the nature of the attack was entirely changed, it was also necessary to change that of fortifying likewise.

From that time, ramparts were added to the walls, the towers enlarged into bastions, and all sorts of out-

works have been added, such as ravelins, counterguards, horn and crown works, and others of the like nature, in order to render the defence in some measure equivalent to the attack.

Notwithstanding all the improvements which have been made in the art of fortifying since the invention of gun-powder, that of attacking is still superior to it: engineers have tried in vain to render the advantages of a fortification equal to those of the attack; the superiority of the besiegers fire, together with the greater number of men, obliges generally, sooner or latter, the besieged to submit.

The greatest improvement made in the art of attacking happened in the year 1697, when M. Vauban made first use of ricochet-firing at the siege of Ath, whereby the besieged placed behind the parapets were as much exposed to the fire of the besiegers as if there had been none; whereas, before, they had been secure as long as the parapet was not demolished: and the worst is, that there can be no remedy found to prevent this enflaming, without falling into inconveniences almost as bad as those which we endeavour to avoid.

FORTIFICATION is either regular or irregular. Regular fortification, is that built in a regular polygon, the sides and angles of which are all equal, being commonly about a musket-shot from each other. Irregular fortification, on the contrary, is that where the sides and angles are not uniform, equidistant, or equal; which is owing to the irregularity of the ground, valleys, rivers, hills, and the like.

SECTION I. Of Regular Fortification.

ALTHOUGH authors agree as to the general form in the present manner of fortifying, yet they mostly differ in particular constructions of the parts. As it would be both needless and superfluous to treat of all the different methods hitherto proposed, we shall content ourselves with explaining those only, which are most esteemed by the best judges, and have been mostly put in practice.

Construction of M. VAUBAN'S Method.

THIS method is divided into little, mean, and great; the little is chiefly used in the construction of citadels, the mean in that of all sorts of towns, and the great in particular cases only.

We shall give the construction of the mean, as being most useful; and refer the reader to the table hereafter, for those dimensions which are different in these several fortifications.

Inscribe in a circle a polygon of as many sides as the Plate CXXI. fortification is designed to have fronts; let AB be one fig. 1. of the sides of half an hexagon, which bisect by the perpendicular CD; divide half AC of it into nine equal parts, and one of these into ten others; then these divisions will serve as a scale to construct all the parts of the fortification, and each of them is supposed to be a toise or fathom, that is, six French feet; and therefore.

fore the whole side AB is supposed to be 180 toises.

As the dividing a line into so many equal parts, is troublesome and tedious; it is more convenient to have a scale of equal parts by which the works may be constructed.

If therefore, in this case, the radius is taken equal to 180 toises, and the circle described with that radius being divided into six equal parts, or the radius being carried six times round, you will have an hexagon inscribed; AB being bisected by the perpendicular CD as before, set off 30 toises from C to D, and draw the indefinite lines ADG, BDF; in which take the parts AE, BH, each equal to 50 toises; from the centre E describe an arc through the point H, meeting AD in G, and from the centre H describe an arc through the point E, meeting BD in F; or which is the same, make each of the lines EG, HF, equal to the distance EH; then the lines joining the points A, E, F, G, H, B, will be the principal or outline of the front.

If the same construction be performed on the other sides of the polygon, you will have the principal or outline of the whole fortification.

If, with a radius of 20 toises, there be described circular arcs, from the angular points B, A, M, T, and lines are drawn from the opposite angles E, H, &c. so as to touch these arcs their parts a, b, c, &c. together with these arcs, will represent the outline of the ditch.

DEFINITIONS.

1. The part FEALN, is called the bastion.
2. AE, AL, the faces of the bastion.
3. EF, LN, the flanks.
4. FG, the curtain.
5. FN, the gorge of the bastion.
6. AG, BF, the lines of defence.
7. AB, the exterior side of the polygon.
8. CD, the perpendicular.
9. Any line which divides a work into two equal parts, is called the capital of that work.

10. a, b, c, the counterescarp of the ditch.

11. A, M, the flanked angles.

12. H, E, L, the angles of the shoulder, or shoulder only.

13. G, F, N, the angles of the flank.

14. Any angle whole point turns from the place is called a *salient angle*, such as A, M: and any angle whole point turns towards the place, *re-entering angle*, such as b, F, N.

15. If there be drawn two lines parallel to the principal or outline, the one at 3 toises distance, and the other at 8 from it; then the space yx included between the principal one and that farthest distant, is called the *rampart*.

And the space x x, contained by the principal line, and that near to it, and which is generally stained black, is called the *parapet*.

16. There is a fine line drawn within four feet of the parapet, which expresses a step called *banquette*.

N. B. All works have a parapet of three toises thick, and a rampart of 8 to 10, besides their slopes. The rampart is elevated more or less above the level of the place, from 10 to 20 feet, according to the nature of the ground and the particular constructions of engineers.

The parapet is a part of the rampart elevated from 6 to 7½ feet above the rest, in order to cover the troops which are drawn up there from the fire of the enemy in a siege; and the banquette is two or three feet higher than the rampart, or about four feet lower than the parapet; so that when the troops stand upon it, they may just be able to fire over the parapet.

17. The body of the place, is all that which is contained within this first rampart: for which reason, it is often said to construct the body of the place; which means properly, the construction of the bastions and curtains.

18. All the works which are constructed beyond the ditch before the body of the place are called *out-works*.

T A B L E.

Side of Polyg.	Forts.					Little Fortif.					Mean		Great.		
	80	90	100	110	120	130	140	150	160	170	180	190	200	260	
Perpendicular.	10	11	12½	14	15	16	20	21	23	25	30	31	25	22	
Faces bast.	22	25	28	30	33	35	40	42	45	47	50	53	55	60	
Cap. of ravel.	25	28	30	35	38	40	45	50	50	52	55	55	60	50	

In the first vertical column are the numbers expressing the lengths of the exterior sides from 80 to 260. In the second, the perpendiculars answering to these sides. In the third, the lengths of the faces of bastions; and in the fourth, the lengths of the capitals of the ravelins.

The forts are mostly, if not always, squares: for which reason, the perpendiculars are made one eighth of the exterior sides; because if they were more, the gorges of the bastions would become too narrow.

The little fortification is chiefly designed for citadels, and are commonly pentagons; the perpendiculars are made one seventh of the exterior side: the mean is used in all kinds of fortifications from an hexagon up-

wards to any number of sides: and the great is seldom used but in an irregular fortification, where there are some sides that cannot be made less without much expence; or in a town which lies near a great river, where the side next the river is made from 200 to 260 toises; and as that side is less exposed to be attacked than any other, the perpendicular is made shorter, which saves much expence.

The faces of the bastions are all ¾ths of the exterior sides, or nearly so, because the fractions are neglected.

It may be observed in general, that in all squares the perpendicular is ¼th of the exterior side, and all pentagons ⅓th, and in all the rest upward ½th.

1. Construction of Orillons and retired Flanks.

DESCRIBE the front MPQRST as before, and divide the flank into three equal parts, of which suppose S r to be one: from the opposite flanked angle M draw a line M r, in which take the part m r of 5 toises; take likewise R n in the line of defence M R, produced, equal to 5 toises, and join n m, upon which as a base describe the equilateral triangle n p m, and from the angle p, opposite to the base as centre, is described the circular flank n m.

And if S r be bisected by the perpendicular r, 2, and another be erected upon the face ST, at S; the intersection 2 of these two perpendiculars, will be the centre of the arc which forms the orillon.

The orillons are very useful in covering the retired flanks, which cannot be seen but directly in the front; and as these orillons are round, they cannot be so easily destroyed as they would be if they were of any other figure.

2. Construction of Ravelins or Half-moons.

FIG. 2. Set off 55 toises, from the re-entering angle O of the counterescarp, on the capital O L or on the perpendicular produced, and from the point L draw lines to the shoulders AB; whose parts LM, LN, terminated by the counterescarp, will be the faces, and MO, ON, the semi-gorges of the ravelin required.

This is Mr Vauban's method of constructing ravelins, according to some authors: and others will have the faces of the ravelin to terminate on those of the bastions within 3 toises of the shoulders; which seems to be the best way, for these ravelins cover the flanks much better than the others.

The ditch before the ravelin is 12 toises, its counterescarp parallel to the faces of the ravelins; and is made in a circular arc, before the salient angle; as likewise all ditches are in general.

When the ravelins are made with flanks, as in fig. 3. the faces should terminate on those of the bastions, at least 5 toises from the shoulders.

The flanks are made by setting off 10 toises from the extremities of the faces, from f to h, and from m to l; and from the points h, l, the flanks h k, l p, are drawn parallel to the capital L O of the ravelin.

There are sometimes redoubts made in the ravelin, such as in fig. 2. which is done by setting off 16 toises from the extremities of the faces on the semi-gorges from N to b, and from M to a; and from the points b, a, the faces are drawn parallel to those of the ravelin: the ditch before the redoubt is 6 toises, and its counterescarp parallel to the faces.

3. Construction of Tenailles.

A tenaille is a work made in the ditch before the curtain, the parapet of which is only 2 or 3 feet higher than the level ground of the ravelin. There are three different sorts: the first are those as in fig. 4. which are made in the direction of the lines of defence, leaving a passage of 3 toises between their extremities and the flanks of the bastions, as likewise another of 2 in the middle for a bridge of communication to the ravelin.

The second fort are those as in fig. 5. Their fa-

ces are in the lines of defence, and 16 toises long, besides the passage of 3 toises between them and the flanks of the bastions; their flanks are found by describing arcs from one shoulder of the tenaille as centre through the other, on which are set off 10 toises for the flanks desired.

And the third fort are those as in fig. 6. Their faces are 16 toises, as in the second fort, and the flanks are parallel to those of the bastions.

The use in general of tenailles, is to defend the bottom of the ditch by a grazing fire, as likewise the level ground of the ravelin, and especially the ditch before the redoubt within the ravelin, which can be defended from no where else so well as from them.

The first fort do not defend the ditch so well as the others, as being too oblique a defence; but as they are not subject to be enfiladed, M. Vauban has generally preferred them in the fortifying of places, as may be seen in the citadel of Lille, at Laudan, New Brisac, and in a great many other places.

The second fort defend the ditch much better than the first, and add a low flank to those of the bastions; but as these flanks are liable to be enfiladed, they have not been much put in practice. This defect might however be remedied, by making them so as to be covered by the extremities of the parapets of the opposite ravelins, or by some other work.

As to the third fort, they have the same advantage as the second, and are likewise liable to the same objections; for which reason, they may be used with the same precautions which have been mentioned in the second.

Tenailles are esteemed so necessary, that there is hardly any place fortified without them: and it is not without reason. For when the ditch is dry, the part behind the tenailles serves as a place of arms, from which the troops may sally, destroy the works of the enemy in the ditch, oppose their descent, and retire with safety; and the communication from the body of the place to the ravelin becomes easy and secure: which is a great advantage; for by that means the ravelin may make a much better defence, as it can be supplied with troops and necessaries at any time. And if the ditch is wet, they serve as harbours for boats, which may carry out armed men to oppose the passage over the ditch whenever they please; and the communication from the tenailles to the ravelin, becomes likewise much easier than it would be without them.

4. Construction of Lunettes.

FIG. 7. Lunettes are placed on both sides of the ravelin, such as B, to increase the strength of a place: they are constructed, by bisecting the faces of the ravelin with the perpendicular LN; on which is set off 30 toises from the counterescarp of the ditch, for one of its faces; the other face, PN, is found by making the semi-gorge TP of 25 toises; the ditch before the lunettes is 12 toises, the parapet 3, and the rampart 8, as in the ravelin.

There is sometimes another work made to cover the salient angle of the ravelin, such as A, called *bonnet*, whose faces are parallel to those of the ravelin, and when produced bisect those of the lunettes; the ditch before it is 10 toises.

There are likewise lunettes, such as D in fig. 8. whose faces are drawn perpendicular to those of the ravelin, within a third part from the salient angle; and their demi-gorges are only 20 toises.

This kind of works may make a good defence, and cost no very great expence; for as they are so near the ravelin, the communication with it is very easy, and one cannot well be maintained till they are all three taken.

5. Construction of Tenaillons.

FIG. 9. Produce the faces of the ravelin beyond the counterescarp of the ditch, at a distance MN of 30 toises, and take on the counterescarp of the great ditch 15 toises from the re-entering angle p to q, and draw Nq; then q N M p will be the tenaillons required; its ditch is 12 toises, that is, the same as that of the ravelin. Sometimes there is made a retired battery in the front of the tenaillons, as in B; this battery is 10 toises from the front to which it is parallel, and 15 toises long.

There are commonly retrenchments made in the tenaillons, such as O; their parapets are parallel to the fronts MN, and bisect the side qN; the ditch before this retrenchment is 3 toises: and there is a banquette before the parapet next to the ditch of about 8 feet, called *berm*; which serves to prevent the earth of the parapet (which seldom has any revetment) from falling into the ditch.

It is to be observed, that the ravelin, before which tenaillons are constructed, must have its salient angle much greater than the former construction makes them; otherwise the salient angles of the tenaillons become too acute; for which reason we made the capital of this ravelin 45 toises, and the faces terminate within 3 toises of the shoulders.

6. Construction of Counterguards.

FIG. 10. 11. When the counterguard is placed before the ravelin, set off 40 toises on the capital of the ravelin from the salient angle A, to the salient angle B, of the counterguard; and 10 from C to D; on the counterescarp of the ditch.

When the counterguard is before the bastion, such as in fig. 2. its salient angle F is 50 toises from the salient angle E of the bastion, and the breadth near the ditch of the ravelin 10 toises as before.

The ditch before the counterguards is 12 toises, and its counterescarp parallel to the faces.

Counterguards are made before the ravelin on some particular occasions only; but are frequently constructed before the bastions, as covering the flanks wonderfully well. Some authors, as Mr Blondel and Mr Coehorn, will have them much narrower than they are here.

7. Construction of Hornworks.

FIG. 12. Produce the capital of the ravelin beyond the salient angle A, at a distance AB of about 80 toises; draw DBE at right angles to AB; in which take BD, BE, each equal to 55 toises; and on the exterior side DE, trace a front of a polygon in the same manner as that of the body of the place, making the perpendicular BF 10 toises, and the faces 30.

The branches D a, E b, of the hornwork, when produced, terminate on the faces of the bastions, within 5 toises of the shoulders. The ditch of the hornwork is 12 toises, and its counterescarp parallel to the branches; and in the front terminates at the shoulders, in the same manner as the great ditch before the bastions.

The capital of the ravelin before the front of the hornwork is 35 toises, and the faces terminate on the shoulders, or rather 2 or 3 toises beyond them: and the ditch before the ravelin is 8 toises.

There are sometimes retrenchments made within the hornwork, such as S, S; which are constructed by erecting perpendiculars to the faces of the ravelins, within 25 toises of their extremities. This retrenchment, like all others, has a parapet turfed only with a berm of 8 feet before it; as likewise, a ditch from 3 to 5 toises broad.

FIG. 13. When a hornwork is made before the bastion, the distance D L of the front from the salient angle of the bastion is 100 toises, and the branches terminate on the faces of the adjacent ravelins within 5 toises from their extremities; all the rest is the same as before.

8. Construction of Crownworks.

FROM the salient angle, A, of the ravelin, as a centre, describe an arc of a circle with a radius of about 120 toises, cutting the capital of the ravelin produced at C; from the point C, set off the cords CB, CF, each of them equal to 110 toises: and on each of which, as an exterior side, construct a front of a polygon of the same dimensions as in the hornwork; that is, the perpendicular should be 18 toises, the faces 30, and the branches terminate on the faces of the bastions within 25 toises of the shoulders.

The ditch is 12 toises, the capital of the ravelin 35, and its ditch 8; that is, the same as in the hornwork.

Sometimes the crownwork is made before the bastion, as in fig. 2. The arc is described from the salient angle A of the bastion, with a radius of 120 toises, as before; and the branches terminate on the faces of the adjacent ravelins within 25 toises of their extremities: the rest of the dimensions and constructions are the same as before.

Hornworks, as well as crownworks, are never made but when a large spot of ground falls beyond the fortification, which might be advantageous to an enemy in a siege, or to cover some gate or entrance into a town.

9. Construction of Covert-ways and Glacis.

ALTHOUGH we have not hitherto mentioned the covert-way, nevertheless all fortifications whatsoever have one; for they are esteemed to be one of the most essential parts of a modern fortification; and it is certain, the taking the covert-way, when it is in a good condition and well defended, is generally the most bloody action of the siege.

After having constructed the body of the place, and all the outworks which are thought necessary, lines are drawn parallel to the outmost counterescarp of the ditches, at 6 toises distant from it; and the space m n, m n, included between that line and the counterescarp, will be the covert-way required.

Fig. 3. There is in every re-entering angle of the counterfarp a place of arms, m; which is found by setting off 20 toifes from the re-entering angle a, on both sides from a to b, and from a to c; and from the points b, c, as centres, arcs are described with a radius of 25 toifes, so as to intersect each other in d; then the lines drawn from this intersection to the points b, c, will be the faces of the places of arms.

If lines are drawn, parallel to the lines which terminate the covert way, and the places of arms, at 20 toifes distant from them, the space x, x, x, between these lines and those which terminate the covert-way, will be the glacis.

At the extremities of the place of arms, are traverses made, such as v, v, which serve to inclose them; these traverses are 3 toifes thick, and as long as the covert-way is broad; and a passage is cut in the glacis round them, of about 6 or 8 feet, in order to have a free communication with the rest of the covert-way.

There are also traverses of the same dimensions before every salient angle of the balion and outworks, and are in the same direction as the faces of those works produced; and the thickness lies at the same side as the parapets.

The passages round these last traverses are likewise from 6 to 8 feet wide.

In each place of arms are two sally ports z z, which are 10 or 12 feet wide, for the troops to sally out; in time of a siege they are shut up, with barriers or gates.

10. Construction of Arrows and Detached Redoubts.

An arrow is a work made before the salient angles of the glacis, such as A, fig. 3. It is composed of a parapet of 3 toifes thick, and 40 long; and the ditch before it 5 toifes, terminating in a slope at both ends. The communication from the covert way into these arrows is 4 or 5 toifes wide; and there is a traverse, r, at the entrance, of 3 toifes thick, with a passage of 6 or 8 feet round it.

A detached redoubt is a kind of work much like a ravelin, with flanks placed beyond the glacis; such as B: they are made in order to occupy some spot of ground which might be advantageous to the besiegers; likewise to oblige the enemy to open their trenches farther off than they would do otherwise.

Their distance from the covert-way ought not to exceed 120 toifes, that it may be defended by musket-shot from thence.

The gorge a b is 40 toifes; the flanks a c, b f, which are perpendicular to the gorge, 10; and the faces c d, f d, 30: the ditch before it is 6 toifes, ending in slopes at both ends; the covert-way 4; the branches of the covert-way are 42 toifes long, or thereabouts; the faces of the places of arms y, y, which are perpendicular to the branches, 10; and the other, which is parallel to them, 14.

The communication from the covert-way into the redoubt, is 5 or 6 toifes wide; and there is a traverse made just at the entrance, and another in the middle when it is pretty long. The parapets of this communication terminate in a slope or glacis.

If these redoubts are above 50 toifes distant from the covert-way, the besiegers carry their trenches

round, and enter through the gorge; by which the troops that are in them are made prisoners of war, if they do not retire betimes; to prevent which, some other outworks should be made to support them.

11. Construction of Second Ditches and Covert-ways.

Fig. 4. When the ground is low, and water to be found, there is often a ditch about 10 or 12 toifes made round the glacis; and opposite to the places of arms are constructed lunettes, beyond the ditch: such as D, whose breadth on the counterfarp of the ditch is 10 toifes, from b to a, and from c to d; and the faces a L, d L, are parallel to those of the places of arms; the ditch before them is from 8 to 10 toifes wide.

The second covert-way is 4 toifes, the semi-gorges of the places of arms, m, about 15; and the faces perpendicular to the counterfarp; the second glacis is from 15 to 18 toifes broad.

This second covert-way has traverses every where, in the same manner as the first.

12. Construction of Profiles.

A PROFILE is the representation of a vertical section of a work; it serves to shew those dimensions which cannot be represented in plans, and is necessary in the building of a fortification. Profiles are generally constructed upon a scale of 30 feet to an inch. It would be endless to describe all their particular dimensions; we shall therefore lay down the principal rules only, given by M. Vauban, on this subject.

1. Every work ought to be at least 6 feet higher than that before it, so that it may command those before it; that is, that the garrison may fire from all the works at the same time, with great and small arms, at the besiegers in their approaches. Notwithstanding this specious pretence, there are several authors who object against it. For, say they, if you can discover the enemy from all the works, they can discover, by the same reason, all the works from their batteries; so that they may destroy them without being obliged to change their situation, and thereby dismount all the guns of the place before they come near it.

But if all the works were of the same height, those within cannot be destroyed, till such time as those before them are taken: guns might be placed in the covert-way and outworks to obstruct the enemy's approach; and when they come near the place, they might be transported into the inner-works: and as the body of the place would be much lower, the expence would be considerably diminished.

But when works are low, they are easily enfiladed by the ricochet batteries, which is a kind of firing with a small quantity of powder, by giving the gun an elevation of 10 or 12 degrees: this might however be partly prevented, by making the parapets near the salient angles, for the space of 8 toifes on each side, 5 or 6 feet higher than the rest of the works.

2. The covert-way should be lower than the level-ground, otherwise the body of the place must be raised very high, especially where there are several outworks; this is to be understood only when the works exceed each other in height, otherwise it need not be below the level.

3. The bases of all inward slopes of earth should be at least equal to the height, if not more.

4. The bases of all outward slopes of earth, two thirds of their heights.

5. The slopes of all walls or revetments should be one fifth of their height; or one sixth might perhaps be sufficient: the height of a wall is estimated from the bottom of the ditch, and not from the beginning of its foundation.

6. The slopes of all parapets and traverses are one sixth of their breadth; that is, 3 feet towards the field; or the inside, where the banquettes should be, 3 feet higher than the outside.

7. When the revetment of a rampart goes quite up to the top, 4 feet of the upper-part is a vertical wall of 3 feet thick, with a square stone at the top of it, projecting 6 inches; and a circular one below, or where the slope begins, of 8 or 10 inches diameter: they go quite round the rampart, and the circular projection is called the *cordon*.

Where the straight part of the wall ends and the slope begins, the wall is always made 5 feet thick; and the counterforts or buttresses reach no higher than that place.

7. When the rampart is partly walled, and partly turfed, then one fifth of the height which is turfed must be added to 5 feet, to get the thickness of the wall above.

And having the thickness of any wall above, by adding one fifth of its height from the bottom of the ditch, the sum will be the thickness of the wall at the bottom; but if a sixth part is only taken for the slope, then a sixth part must be added.

For instance, suppose a rampart of 30 feet high from the bottom of the ditch, and that 10 of which are to be turfed; then the fifth part of 10, which is 2, added to 5, gives 7 for the wall above; and as this wall is 20 feet high, the fifth of which is 4, and 4 added to the thickness 7 above, gives 11 for the thickness near the foundation.

Plate CXIII. fig. 1. Represents, in military perspective, the profiles of the body of a place, the ravelin and covert-way: which gives a clear idea of what is meant by a profile, and from which those of all other works may be easily conceived.

SECT. II. Of Irregular Fortification.

THE most essential principle in fortification, consists in making all the fronts of a place equally strong, so that the enemy may find no advantage in attacking either of the sides. This can happen no otherwise in a regular fortification situated in a plain or even ground: but as there are but few places which are not irregular, either in their works or situations, and the nature of the ground may be such as makes it impracticable to build them regular, without too great expence; it is so much the more necessary to shew in what consists the strength or weakness of a town irregularly fortified, so that the weakest part may be made stronger by additional outworks; as likewise, if such a place is to be attacked, to know which is the strongest or weakest part.

1. Construction of an irregular place situated in an open country.

If the place to be fortified is an old town inclosed by a wall or rampart, as it most frequently happens, the engineer is to consider well all the different circumstances of the figure, situation, and nature of the ground; and to regulate his plan accordingly, so as to avoid the disadvantages, and gain all the advantages possible: he should examine, whether by cutting off some parts of the old wall or rampart, and taking in some ground, the place can be reduced into a regular figure, or nearly so; for, if that can be done without increasing the expence considerably, it should by no means be omitted. Old towns have often towers placed from distance to distance, as Douay, Tournay, and many other places, which are generally made use of, and mended when it may be done. If there is a rampart without bastions or towers, it must be well considered, whether bastions may not be added, or if it is not better to make only some outworks: if the ditch about this rampart is not too wide and deep, it would be advantageous to make detached bastions; otherwise ravelins and counterguards must be constructed. Special care must be taken, to make all the sides of the polygon as nearly equal as possible, and that the length of the lines of defence do not exceed the reach of musket-shot; but if that cannot be done, those sides which are on the narrowest part should be made the longest.

If it should happen, that some of the sides are inaccessible, or of very difficult approach, either on account of some precipice, marshy ground, or inundation, they may be made much longer than the others, which are of easy access, and the flanks need not be so large as the rest; by doing so, there will be some expences saved, which may be used in making the other sides stronger by adding more outworks.

There are few situations, but what are more advantageous in some parts than in others; it is therefore the business of an engineer to distinguish them, and to render those sides strong by art, which are not by nature.

If the situation is low and watery, lunettes or tenailons, and such other small outworks, should be constructed; because they are not of any great expence, and may make a very good defence. But if one side of the place only is low, and running water is to be had, a second ditch and covert-way with lunettes may be made, by observing, that if the first glacis is made to slope, so as to become even with the level of the water in the second ditch; or if the water can be swelled by means of dykes or sluices, so as to overflow the best part of the first glacis, it should be done: for, by so doing, these works will be able to make a very good defence, since the besiegers will find it a difficult matter to lodge themselves upon this glacis; which cannot be done but within a few toises of the first covert-way, where the besieged are ready to receive them, and to destroy their works with great advantage; whereas the enemy cannot support their workmen but from the second covert-way, which is too far off to be of any great service to them.

But if the situation is of a dry nature, without any water about it, caponiers should be made in the great ditch, from the curtains to the ravelin, and batteries

raised.

railed in the entrance of the ditch before the ravelin, whose parapet must slope off into a glacis so as to afford no cover for the enemy behind them. Arrows and detached redoubts are likewise very proper to be used in such a case; and sometimes horn or crown-works, if it should be thought convenient: but these works should never be constructed, without an absolute necessity, either to occupy a spot of ground which might be advantageous to the enemy, or to cover some gate or entrance into the town; for they are of great expence, and their defence seems not to be answerable to it.

Most of the places in Flanders are fortified with horn-works, such as Ipres, Tournay, Lille, and others.

If the place to be fortified is new, and the situation will not admit of a regular construction; particular care must be taken in choosing such a spot of ground as is most advantageous, and least liable to any disadvantages either in the building or in the maintaining of it. All hills or rising grounds should be avoided, which might command any part of the works; marshy grounds, because such situations are unwholesome; or lakes and standing waters, for the same reason, excepting a lake is or may be made navigable: good water should be had either within the place or near it, for it is absolutely necessary for men and cattle; the air should be wholesome, otherwise the continual sickness that may reign in such a place might prevent people to come and live in it, and the garrison would not be in a condition to defend themselves as they ought to do: in short, all the different circumstances attending such an undertaking should be maturely considered, before a resolution is taken to fortify any place.

When a situation is fixed upon, the next thing to be considered is, the bigness of the town and the number of its outworks; which must absolutely depend upon the consequence such a place is of to a nation. If it is only to guard a pass, or entrance into a country, it need not be so large: but if it is to be a place either to promote or to protect trade, it should be large and commodious; the streets should be wide, and the buildings regular and convenient. As to what regards the fortification, its construction should depend on the nature of the situation; and the number of works, on the funds or expence a prince or a nation will be at; which, however, ought to be according to the benefit arising from such a place: for, as such undertakings are of very great expence, an engineer cannot be too sparing in his works; on the contrary, the greatest economy should be used, both in regard to the number of works, and to their construction. The body of the place may have (A) revetments quite up to the top, or only in part, and the rest turfed: but as to the outworks, they should have half revetments, or they may be made with turf only; as being not so necessary to prevent the place from being surpris'd, which may nevertheless make a good defence.

On Plate CXIII. fig. 2. is the plan of an octagon, one half of which is similar and equal to the other half; it being suppos'd, that the situation would not admit of fortification quite regular; the exterior sides are each 180 toises, and the works are constructed according to our method: but because the sides AB, EF,

are weaker than the rest, as has been proved before, we have added tenailles, redoubts in the ravelins, and lunettes, to render them nearly equal in strength with the others; and if counter-guards were made before the bastions A and B, it would effectually secure that front. Instead of lunettes, any other works may be made, as may be thought convenient and according to the nature of the ground. If it should be judged necessary to add other outworks to the ravelins all round the place, care must be taken to add likewise more to the fronts AB, EF, in order to render the advantages and disadvantages of attacking on either side equal.

2. Construction of an irregular place, situated on a hill or rock.

In the construction of such places, care must be taken that no neighbouring hill commands any part of the works; the town should always be built on the highest part; but if it should be thought more convenient to place it lower, then the upper part must be fortified with a fort; the situation should be made level as near as possible, by removing the earth from some places to fill up others; and if it cannot well be levelled without extraordinary expence, works must be made on the highest part, so as to command and protect the lower. The works ought to occupy all the upper part of the hill; but if it should be too extensive to be all inclosed, or so irregular as not to be fortified without great inconvenience, the parts which fall without should be fortified with some detached works, and a communication with the place must be made either above or under ground. There should be no cavity or hollow roads, within cannon-shot, round about the place, where the enemy might be able to approach under cover. If there should happen to be a spring near the top of the hill, it should be inclosed in the fortification; or if that cannot be done, by some work or other: for there is nothing more necessary, and at the same time scarcer, in such situations, than water; for which reason there cannot be too much care in providing it: several cisterns are to be made to receive the rain-water, and to preserve it; wells should be dug likewise, though ever so deep, the water of which will serve for common use.

Places built on hills or rocks, should never be large: for their use is generally to guard passes or inlets into a country, and are seldom useful in traffic, and it is a difficult matter to provide for a large garrison in such situations, neither should any such place be built without some very material reasons: but when it is absolutely necessary, great care and precaution should be taken to render the works as perfect as the situation will admit of, and at the same time to be as frugal in the expence as possible.

3. Construction of irregular fortifications situated near rivers, lakes, or the sea.

As the intent of building these kind of places is chiefly to facilitate and protect trade, they are of more importance than any other kind, especially in maritime countries, where the principal strength and power depends on them: for which reason, we shall treat of:

(A) Revetments are chiefly made to prevent a place from being surpris'd: outworks do not want to be made so; the taking them by surpris is of no great consequence, except in a siege, when other cautions are used to prevent it.

of this construction more largely than of any other.

The first thing to be considered is their situation, which ought to be such as to afford a good harbour for shipping, or a safe and easy entrance in stormy weather; but as it is hardly possible to find any, where ships may go in and lie secure with all winds, care should be taken to make them safe to enter with those winds which are most dangerous: but it is not sufficient that the harbour is safe against stormy weather, they should likewise be so against an enemy, both by land and water; for it often happens, that ships are destroyed where it was imagined they were secure, which is of too great consequence not to be provided against; for which reason, forts or batteries must be built in the most convenient places, to prevent the enemy's ships from coming too near, so as to be able to cannonade those in the harbour, or sling shells amongst them; and if there is any danger of an enemy's approach by land, high ramparts and edifices must be built, so as to cover them.

When a river is pretty large, and it is not convenient for making a harbour without great expence, the ships may ride along the shore; which, for that reason, must be made accessible for ships of burden: this may be done by advancing the quay into the river, if the water is too shallow, or by digging the river sufficiently deep for that purpose.

And to prevent an enemy from coming up the river, forts must be built on both sides, especially when there are any turnings or windings. Antwerp is such a place: for the Scheld is sufficiently deep to carry ships of great burden, which may come quite near the town-wall; and several forts are built below it on both sides, so that it would not be an easy matter for an enemy to come up the river.

When the river is but small, so that no ships of burden can come thro' it; it is sufficient to make it run thro' some of the works, where proper landing places are contrived, from whence the goods may be carried in to the place; as at Sarrelouis, where a hornwork is built beyond the Sarre, in the gorge of which the goods are landed.

If the breadth of the river does not exceed 200 yards, it commonly passes through the middle of the town, and proper quays are made on each side; in such a case, the fortification is so contrived, as that the river passes through the curtain, in order to have a bastion on each side to defend the coming in and going out.

When M. Vauban fortified near rivers, he made always the exterior side near the water much longer than any of the others; such as Hunninghen on the Rhine, and Sarrelouis on the Sarre; but for what reason he fortified these places in that manner, has not been told by any author.

But it is plain that the sides which terminate at the river, are the weakest; because the besiegers trenches being secured by the river, they may draw most of their troops off, and act therefore with more vigour and strength on the other side: besides, as the strength of a side increases in proportion as the angle of the polygon is greater, by making the side next the river

longer, the angles at its extremities become wider, and consequently the adjacent sides stronger.

There are other advantages, besides those mentioned already, which arise from the lengthening that side; for if the river is pretty deep so as not to be fordable, that side is not liable to be attacked; and by increasing its length, the capacity of the place increases much more in proportion to the expence, than if more sides were made; the centre of the place will be likewise nearer the river, which makes it more convenient for transporting the goods from the water-side to any part of the town.

To illustrate this method of M. Vauban's, we shall give the plan of Hunninghen: this place was built for the sake of having a bridge over the Rhine, for which reason he made it only a pentagon; the side AB next to the river is 200 toises, and each of the others but 180.

About the space $a b c$, which lies before the front AB, is a stone wall; and the passages x, x , are shut up with sluices, to retain the water in the ditches in dry seasons: and to prevent an enemy from destroying the sluice near the point c , whereby the water would run out and leave the ditches dry, the redoubt y was built in the little island hard by, in order to cover that sluice; without which precaution the place might be insulted from the river side, where the water is shallow in dry season.

The hornwork K beyond the Rhine was built to cover the bridge; but as this work cannot be well defended cros the river, the hornwork H was made to support the other.

Before finishing the description of this plan, we shall shew how to find the long side AB.

After having inscribed the two sides GE, GF, in a circle, draw the diameter CD, so as to be equally distant from the line joining the points E, F, that is parallel to it; on this diameter set off 100 toises on each side of the centre; from these points draw indefinite perpendiculars to the diameter; then if from the points E, F, as centres, two arcs are described with a radius of 180 toises, their intersections A and B, with the said perpendiculars, will determine the long side AB, as likewise the other two FB and EA. In like manner may be found the long or short side of any polygon whatsoever.

When a place near a river is to be fortified, for the safety of commerce, particular care should be taken in leaving a good space between the houses and the water-side, to have a key or landing place for goods brought by water; it should also be contrived to have proper places for ships and boats to lie secure in stormy weather, and in time of a siege: and as water-carriage is very advantageous for transporting goods from one place to another, as likewise for bringing the necessary materials, not only for building the fortification, but also the place itself, the expences will be lessened considerably when this convenience can be had; for which reason, places should never be built any where else but near rivers, lakes, or the sea; excepting in extraordinary cases, where it cannot be avoided.

Fig. 3.

Fig. 10.



Fig. 3. FORTIFICATION.



Fig. 2.



Fig. 11.



Fig. 12.



Fig. 13.



Fig. 4.

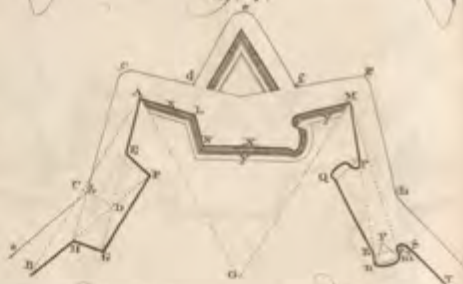


Fig. 6.

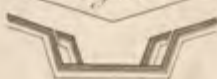


Fig. 7.



Fig. 4.



Fig. 9.



Fig. 8.



Fig. 5.



Fig. 1.*Fig. 3.**Fig. 2.**Fig. 4.*

A. B. M. L.





FORTIN, FORTELET, or *Field-Fort*, a scone or little fort, whose flanked angles are generally 120 fathoms distant from one another. See **FORT**.

The extent and figure of fortins are different, according to the situation and nature of the ground; some of them having whole bastions, and others demi-bastions. They are made use of only for a time, either to defend the lines of circumvallation, or to guard some passage or dangerous post.

FORTISSIMO, in music, sometimes denoted by FFF, or *fff*, signifies to sing or play very loud or strong.

FORTITUDE, the same with courage or bravery. See **MORALS**, n° 117.

FORTUNATE-ISLANDS, in ancient geography, certain islands, (concerning the situation of which authors are not agreed), famous for the golden apples of the **HESPERIDES**.—The common opinion is, that they are the **CANARY ISLANDS**.

FORTUNE, **FORTUNA**, a goddess worshipped with great devotion by the ancient Greeks and Romans; who believed her to preside over human affairs, and to distribute wealth and honour at her pleasure. The Greeks had a great number of temples dedicated to Fortune, under the name of *τυχη*. The poet Pindar makes her one of the *Parcæ*, or destinies, and the daughter of Jupiter. Ancus Martius, king of the Romans, was the first who built a temple at Rome to this deity, under the name of *Fortuna Virilis*, on account that courage, no less than good-fortune, is requisite to obtain a victory. Servius Tullius built a temple to Fortune, under the name of *Primigenia*. The Romans gave several other appellations to Fortune, such as *Fortuna Libera*, *Redux*, *Publica*, &c.

There was a statue of Fortune at Athens, holding betwixt her arms Plutus the god of riches. Pausanias says, that her most ancient form was that which Bupalus made in Greece, in shape of a woman with a round ball on her head, and a cornucopia under her arm. Macrobius says, that she was first set forth with wings on her shoulders, having by her side the rudder of a ship; and that she was placed upon a wheel, and had in her right hand a golden ball, and in her left a whip. In Egypt she was painted like a woman, turning a great glass wheel, on the top of which were represented a great number of men playing, others climbing up, and others having attained the summit of the wheel, precipitating themselves and falling down again. Modern painters represent Fortune by a naked woman standing on a globe, with a bandage on her eyes.—Horace's description of this goddess, and her great power, may be seen in Ode xxv. lib. 1. Juvenal, in Satire x. 365, calls Fortune the deity of fools.

FORTUNE-TELLERS. Persons pretending to tell fortunes are to be punished with a year's imprisonment, and standing four times on the pillory. *Stat. 9 Geo. II. c. 5.*

FORTY-DAYS Court, the court of attachment or *woodmote*, held before the verderors of the forest once every forty days, to inquire concerning all offenders against vert and venison. See **FOREST**.

FORUM, in Roman antiquity, a public standing place within the city of Rome, where causes were judicially tried, and orations delivered to the people.

FORUM, was also used for a place of traffic, answer-

ing to our market-place: of these there were vast numbers, as the *forum piscarium*, *olitorium*, &c. These were generally called *fora venalia*; in contradistinction to the former, which were called *fora civilia*.

FORUM, is also used, among casuists, &c. for jurisdiction; thus they say, *In foro legis*, &c.

FOSS, or **Fossa**, in anatomy, a kind of cavity in a bone, with a large aperture, but no exit or perforation.

Foss, in fortification, a hollow place, commonly full of water, lying between the scarp and counterescarp, below the rampart; and turning round a fortified place or a post, that is to be defended. See **MOAT**.

Foss-Way, one of the four principal highways of England, that anciently led through the kingdom, supposed to be made by the Romans, having a ditch upon one side thereof.

FOSSARII, in antiquity, a sort of officers in the eastern church, whose business it was to inter the dead. St Jerom assures us, that the rank of the *fossarii* held the first place among the clerks: but he is to be understood of those clerks only who had the direction and intendance of the interment of the devout. Some authors insinuate, that the *fossarii* were instituted in the time of the apostles.

FOSSIL, in natural history, denotes, in general, every thing dug out of the earth, whether they be natives thereof, as metals, stones, salts, earthen, and other minerals; or extraneous, reposit in the bowels of the earth by some extraordinary means, as earthquakes, the deluge, &c. See **METAL**, **STONE**, &c.

Native fossils, according to Dr Hill, are substances found either buried in the earth, or lying on its surface, of a plain simple structure, and shewing no signs of containing vessels or circulating juices. These are subdivided, by the same author, 1. Into fossils naturally and essentially simple. Of these, some are neither inflammable, nor soluble in water; as simple earthen, talcs, fibrarizæ, gypsum, selenitæ, crystal, and spars: others, though uninflamable, are soluble in water; as all the simple salts: and others, on the contrary, are inflamable, but not soluble in water; as sulphur, auripigmentum, zarnick, amber, ambergrease, gagate, asphaltum, amplexites, lithanthrax, naphtha, and pifalphaltæ. 2. The second general subdivision of fossils comprehends all such as are naturally compound, but unmetallic. Of these, some are neither inflammable, nor soluble in water; as compound earthen, stones, septariæ, siderochitæ, scrupi, semipellucid gems, lithidia, conissalæ, and pellucid gems: others are soluble in water, but not inflammable; as all the metallic salts: and, lastly, some are inflamable, but not soluble in water; as the marcasites, pyrites, and phlogonia. 3. The third, and last, general division of fossils comprehends all the metallic ones; which are bodies naturally hard, remarkable heavy, and fusible in fire. Of these, some are perfectly metallic, as being malleable when pure; such are gold, lead, silver, copper, iron, and tin: others are imperfectly metallic, as not being malleable even in their purest state; such are antimony, bismuth, cobalt, zinc, and quicksilver or mercury. Of all which substances, the reader will find a particular description under their respective heads, **EARTH**, **TALC**, **MERCURY**, **GYPNUM**, &c.

Extraneous fossils are bodies of the vegetable or animal

Foster || Fothergill, Fothering, || Foundation

mal kingdoms accidentally buried in the earth. Of the vegetable kingdom, there are principally three kinds, trees or parts of them, herbaceous plants, and corals; and of the animal kingdom there are four kinds, sea-shells, the teeth or bony palates and bones of fishes, complete fishes, and the bones of land-animals. See TREE, WOOD, PLANT, SHELL, &c.

As to the reason why these extraneous fossils come to be lodged in the bowels of the earth, the common opinion is, that this great change was effected by the universal deluge. See DELUGE.

FOSTER (Dr James), a most distinguished and popular dissenting minister, born at Exeter in 1697. He began to preach in 1718; and strong disputes arising soon after, among the dissenters, concerning the Trinity and subscription to tests, his judgment determining him to the obnoxious opinions, the clamour grew loud against him, and occasioned more than one removal. His talents were hid among obscure country congregations, until 1724; when he was chosen to succeed Dr Gale in Barbican, where he laboured as pastor above 20 years. The Sunday evening-lecture, begun in the Old Jury meeting-house in 1728, and which he conducted with such uncommon applause for more than 20 years, indisputably shewed his abilities as a preacher. Persons of all persuasions and ranks in life flocked to hear him: and Mr Pope has honoured him with a commendatory couplet in his satires; which, however, his commentator laboured to destroy the intention of by a frivolous note. In 1746, he attended the unhappy lord Kilmarnock, at his execution on Tower-hill; an office which those who lived with him imagined made too deep an impression on his sympathizing spirit, as his vivacity abated from that time. He died in 1753; after having published several valuable compositions and sermons; particularly, 1. A defence of Christianity, against "Tindal's Christianity as old as the Creation." 2. An essay on fundamentals. 3. Four volumes of sermons. 4. Discourses on natural religion and social virtue, in 4to.

FOSTER (Samuel), an ingenious English mathematician of the last century, and astronomical professor in Gresham college, was one of that learned association which met for cultivating the new philosophy during the political confusions, and which Charles II. established into the Royal Society. Mr Foster, however, died in 1652, before this incorporation took place; but wrote a number of mathematical and astronomical treatises, too many to particularize.—There were two other mathematical students of this name; William Foster, a disciple of Mr Oughtred, who taught in London; and Mark Foster, author of a treatise on trigonometry, who lived later than the former two.

FOTHERGILL (Dr George), was born in Westmoreland in 1705, where his family had been long seated on a competent estate that had descended regularly for several generations. After an academical education in Queen's college, Oxford, of which he became a fellow, he was, in 1751, elected principal of St Edmund's-hall, and presented to the vicarage of Brumley in Hampshire. Having been long afflicted with an asthma, he died in 1760. He was the author of a collection of much esteemed sermons, in 2 vols 8vo. The first volume consists of occasional discourses, published by himself; the second printed from his MSS.

FOTHERING, a peculiar method of endeavouring to stop a leak in the bottom of a ship while she is afloat, either under sail, or at anchor. It is usually performed in the following manner: A basket is filled with ashes, cinders, and chopped rope-yarns, and loosely covered with a piece of canvas; to this is fastened a long pole, by which it is plunged repeatedly in the water, as close as possible to the place where the leak is conjectured to lie. The oakum or chopped rope-yarns being thus gradually shaken through the twigs, or over the top of the basket, are frequently sucked into the hole along with the water, so that the leak becomes immediately choked; and the future entrance of the water is thereby prevented.

FOUGADE, or FOUGASSE, in the art of war, a little mine, about 8 or 10 feet wide, and 10 or 12 deep, dug under some work or post, which is in danger of falling into the enemy's hands; and charged with sacks of powder, covered with stones, earth, and whatever else can make great destruction. It is set on fire like other mines, with a faucille. See MINE.

FOUL, or FOULE, in the sea-language, is used when a ship has been long untrimmed, so that the grass-weeds, or barnacles, grow to her sides under water. A rope is also foul when it is either tangled in itself, or hindered by another, so that it cannot run or be over-hauled.

Foul imports, also, the running of one ship against another. This happens sometimes by the violence of the wind, and sometimes by the carelessness of the people on board, to ships in the same convoy, and to ships in port by means of others coming in. The damages occasioned by running foul, are of the nature of those in which both parties must bear a share. They are usually made half to fall upon the sufferer, and half upon the vessel which did the injury: but in cases where it is evidently the fault of the master of the vessel, he alone is to bear the damage.

Foul-Water. A ship is said to make foul-water, when, being under sail, the comes into such shoal-water, that though her keel do not touch the ground, yet it comes so near it, that the motion of the water under her raises the mud from the bottom.

Foul is also a disease in cattle, proceeding from blood, and a waterish rheum that falls down into the legs, and makes them swell.

Foul or Pimpled Face. See GUTTA Rosacea.

FOULA, or Foul Island, one of the Shetland isles, lying between six and seven leagues west from the mainland. It is about three miles long, narrow, and full of rough, steep, and bare rocks; one of which is so large, and runs up to such an height, that it may be clearly seen from Orkney. This, therefore, may be reckoned with the greatest probability to be the *Thule* of Tacitus, whatever might be the *Thule* of the Phenicians and Greeks. It has scarce any pasturage, and but very little arable land; but that, however small in extent, is very fertile, out of the produce of which, with fowl and fish, the poor inhabitants subsist. They have nothing that can be called a port; and the only commodities they have are stock-fish, train-oil, and feathers.

FOUMART, in zoology, a species of MUSTELA. FOUNDATION, in architecture, is that part of a building which is under-ground. See ARCHITECTURE, n° 101, — 112. 129, &c.

Foundation Palladio allows a sixth part of the height of the whole building for the hollowing or under-digging; unless there be cellars underground, in which case he would have it somewhat lower.

FOUNDATION, denotes also a donation or legacy, either in money or lands, for the maintenance and support of some community, hospital, school, &c.

Jacob's Law Dist. The king only can *found* a college, but there may be a college in reputation founded by others. If it cannot appear by inquiry who it was that founded a church or college, it shall be intended that it was the king, who has power to found a new church, &c. The king may found and erect an hospital, and give a name to the house upon the inheritance of another, or license another person to do it upon his own lands; and the words *fundo, erect*, &c. are not necessary in every foundation, either of a college or hospital, made by the king; but it is sufficient if there be words equivalent: the incorporation of a college or hospital is the very foundation; but he who endows it with lands is the founder; and to the erection of an hospital, nothing more is requisite but the incorporation and foundation. Persons seized of estates in fee-simple, may erect and found hospitals for the poor by deed enrolled in chancery, &c. which shall be incorporated, and subject to such visitors as the founder shall appoint, &c. stat. 39 Eliz. c. 5.

FOUNDER, in a general sense, the person who lays a foundation, or endows a church, school, religious house, or other charitable institution. See **FOUNDATION**.

FOUNDER, also implies an artist who casts metals, in various forms, for different uses, as guns, bells, statues, printing-characters, candlesticks, buckles, &c. whence they are denominated gun-founders, bell-founders, figure founders, letter-founders, founders of small works, &c. See **FOUNDRY**.

FOUNDER, in the sea-language: A ship is said to founder, when by an extraordinary leak, or by a great sea breaking in upon her, she is so filled with water, that she cannot be freed of it; so that she can neither veer nor steer, but lie like a log; and not being able to swim long, will at last sink.

FOUNDERED, in farriery. See there, § xli.

FOUNDERY, or **FOUNDRY**, the art of casting all sorts of metals into different forms. It likewise signifies the work-house or smelting-hut wherein these operations are performed.

FOUNDRY of Small-works, or Casting in Sand. The sand used for casting small-works is at first of a pretty soft, yellowish, and clammy nature: but it being necessary to strew charcoal-dust in the mould, it at length becomes of a quite black colour. This sand is worked over and over, on a board, with a roller, and a sort of knife; being placed over a trough to receive it, after it is by these means sufficiently prepared.

This done, they take a wooden board of a length and breadth proportional to the things to be cast, and putting a ledge round it, they fill it with sand, a little moistened, to make it duly cohere. Then they take either wood or metal models of what they intend to cast, and apply them so to the mould, and press them into the sand, as to leave their impression there. Along the middle of the mould is laid half a small brass cylinder, as the chief canal for the metal to run through,

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when melted, into the models or patterns; and from this chief canal are placed several others, which extend to each model or pattern placed in the frame. After this frame is finished, they take out the patterns, by first loosening them all round, that the sand may not give way.

Then they proceed to work the other half of the mould with the same patterns in just such another frame; only that it has pins, which, entering into holes that correspond to it in the other, make the two cavities of the pattern fall exactly on each other.

The frame, thus moulded, is carried to the melter, who, after extending the chief canal of the counter-part, and adding the cross canals to the several models in both, and stirring mill-dust over them, dries them in a kind of oven for that purpose.

Both parts of the mould being dry, they are joined together by means of the pins; and to prevent their giving way, by reason of the melted metal passing thro' the chief cylindrical canal, they are screwed or wedged up like a kind of press.

While the moulds are thus preparing, the metal is fusing in a crucible of a size proportionate to the quantity of metal intended to be cast.

When the moulds are coolish, the frames are unscrewed, or unwedged, and the cast work taken out of the sand, which sand is worked over again for other castings.

FOUNDRY of Statues. The casting of statues depends on the due preparation of the pit, the core, the wax, the outer mould, the inferior furnace to melt off the wax, and the upper to fuse the metal. The pit is a hole dug in a dry place something deeper than the intended figure, and made according to the prominence of certain parts thereof. The inside of the pit is commonly lined with stone, or brick; or, when the figure is very large, they sometimes work on the ground, and raise a proper fence to resist the impulsion of the melted metal.

The inner mould, or core, is a rude mass to which is given the intended attitude and contours. It is raised on an iron grate, strong enough to sustain it, and is strengthened within by several bars of iron. It is generally made either of potter's clay, mixed with hair and horse-dung; or of plaster of Paris mixed with brick-dust. The use of the core is to support the wax, the shell, and lessen the weight of the metal. The iron bars and the core are taken out of the brass figure through an aperture left in it for that purpose, which is soldered up afterwards. It is necessary to leave some of the iron bars of the core, that contribute to the steadiness of the projecting part, within the brass figure.

The wax is a representation of the intended statue. If it be a piece of sculpture, the wax should be all of the sculptor's own hand, who usually forms it on the core: Though it may be wrought separately in cavities, moulded on a model, and afterwards arranged on the ribs of iron over the grate; filling the vacant space in the middle with liquid plaster and brick-dust, whereby the inner core is proportioned as the sculptor carries on the wax.

When the wax, which is the intended thickness of the metal, is finished, they fill small waxen tubes perpendicular to it from top to bottom, to serve both as canals for the conveyance of the metal to all parts of

Foundry. the work; and as vent-holes, to give passage to the air, which would otherwise occasion great disorder when the hot metal came to encompass it.

The work being brought thus far, must be covered with its shell, which is a kind of crust laid over the wax, and which being of a soft matter, easily receives the impression of every part, which is afterwards communicated to the metal upon its taking the place of the wax, between the shell and the mould. The matter of this outer mould is varied according as different layers are applied. The first is generally a composition of clay, and old white crucibles well ground and sifted, and mixed up with water to the consistence of a colour fit for painting; accordingly they apply it with a pencil, laying it seven or eight times over, and letting it dry between whiles. For the second impression, they add horse-dung and natural earth to the former composition. The third impression is only horse-dung and earth. Lastly, the shell is finished by laying on several more impressions of this last matter, made very thick with the hand.

The shell, thus finished, is secured by several iron girts, bound round it, at about half a foot distance from each other, and fastened at the bottom to the grate under the statue, and at top to a circle of iron where they all terminate.

If the statue be so big that it would not be easy to move the moulds with safety, they must be wrought on the spot where it is to be cast. This is performed two ways: in the first, a square hole is dug under ground, much bigger than the mould to be made therein, and its inside lined with walls of free-stone or brick. At the bottom is made a hole of the same materials with a kind of furnace, having its aperture outwards: in this is a fire made to dry the mould, and afterwards melt the wax. Over this furnace is placed the grate, and upon this the mould, &c. formed as above. Lastly, at one of the edges of the square pit, is made another large furnace to melt the metal. In the other way, it is sufficient to work the mould above ground, but with the like precaution of a furnace and grate underneath. When finished, four walls are to be run around it, and by the side thereof a massive made for a melting-furnace. For the rest the method is the same in both. The mould being finished, and inclosed as described, whether under ground or above it, a moderate fire is lighted in the furnace under it, and the whole covered with planks, that the wax may melt gently down, and run out at pipes contrived for that purpose, at the foot of the mould, which are afterwards exactly closed with earth, so soon as the wax is carried off. This done, the hole is filled up with bricks thrown in at random, and the fire in the furnace augmented, till such time as both the bricks and mould become red hot. After this, the fire being extinguished, and every thing cold again, they take out the bricks and fill up their place with earth moistened, and a little beaten to the top of the mould, in order to make it the more firm and steady. These preparatory measures being duly taken, there remains nothing but to melt the metal, and run it into the mould. This is the office of the furnace above described, which is commonly made in the form of an oven with three apertures, one to put in the wood, another for a vent, and a third to run the metal out at. From

this last aperture, which is kept very close, while the metal is in fusion, a small tube is laid, whereby the melted metal is conveyed into a large earthen basin, over the mould, into the bottom of which all the big branches of the jets, or casts, which are to convey the metal into all the parts of the mould, are inserted.

These casts or jets are all terminated with a kind of plugs, which are kept close, that, upon opening the furnace, the brassy, which gushes out with violence, may not enter any of them, till the basin be full enough of matter to run into them all at once. Upon which occasion they pull out the plugs, which are long iron rods with a head at one end, capable of filling the whole diameter of each tube. The whole of the furnace is opened with a long piece of iron fitted at the end of each pole, and the mould filled in an instant. This completes the work in relation to the casting part; the rest being the sculptor's or carver's business, who, taking the figure out of the mould and earth wherewith it is encompassed, saws off the jets with which it appears covered over, and repairs it with chisels, gravers, puncheons, &c.

Foundry of Bells. The metal, it is to be observed, is different for bells, from what it is for statues; there being no tin in the statue-metal: but there is a fifth, and sometimes more, in the bell-metal.

The dimensions of the core and the wax for bells, if a ring of bells especially, are not left to chance, but must be measured on a scale, or diapasen, which gives the height, aperture, and thickness, necessary for the several tones required.

It is on the wax that the several mouldings and other ornaments are formed to be represented in relievo, on the outside of the bell.

The business of bell-foundry is reducible to three particulars. 1. The proportion of a bell. 2. The forming of the mould; and, 3. The melting of the metal.

The proportions of our bells differ much from those of the Chinese: in ours, the modern proportions are, to make the diameter fifteen times the thickness of the brim, and twelve times the height.

There are two kinds of preparations, viz. the simple and the relative: the former are those proportions only that are between the several parts of a bell, to render it sonorous; the relative proportions establish a requisite harmony between several bells.

The particulars necessary for making the mould of a bell are, 1. The earth: the most cohesive is the best; it must be well ground and sifted, to prevent any chinks. 2. Brick-stone; which must be used for the mine, mould, or core, and for the furnace. 3. Horse-dung, hair, and hemp, mixed with the earth, to render the cement more binding. 4. The wax for inscriptions, coats of arms, &c. 5. The tallow equally mixed with the wax, in order to put a slight lay of it upon the outer mould, before any letters are applied to it. 6. The coals to dry the mould.

For making the mould, they have a scaffold consisting of four boards, ranged upon trestles. Upon this they carry the earth, grossly diluted, to mix it with horse-dung, beating the whole with a large spataula.

The compasses of construction is the chief instrument for making the mould, which consist of two different

ferent legs joined by a third piece. And last of all, the founders shelves, on which are the engravings of the letters, cartridges, coats of arms, &c.

They first dig a hole of a sufficient depth to contain the mould of the bell, together with the case, or cannon, under ground; and about six inches lower than the terreplain, where the work is performed. The hole must be wide enough for a free passage between the mould and walls of the hole, or between one mould and another, when several bells are to be cast. At the centre of the hole is a stake erected, that is strongly fastened in the ground. This supports an iron peg, on which the pivot of the second branch of the compasses turns. The stake is encompassed with a solid brick-work, perfectly round, about half a foot high, and of the proposed bell's diameter. This they call a *mill-stone*. The parts of the mould are, the core, the model of the bell, and the shell. When the outer surface of the core is formed, they begin to raise the core, which is made of bricks that are laid in courses of equal height upon a lay of plain earth. At the laying of each brick, they bring near it the branch of the compasses, on which the curve of the core is shaped, so as that there may remain between it and the curve the distance of a line, to be afterwards filled up with layers of cement. The work is continued to the top, only leaving an opening for the coals to bake the core. This work is covered with a layer of cement, made of earth and horse-dung; on which they move the compasses of construction, to make it of an even smoothness every where.

The first layer being finished, they put the fire to the core, by filling it half with coals, through an opening that is kept shut, during the baking, with a cake of earth that has been separately baked. The first fire consumes the stake, and the fire is left in the core half or sometimes a whole day: the first layer being thoroughly dry, they cover it with a second, third, and fourth; each being smoothed by the board of the compasses, and thoroughly dried before they proceed to another.

The core being completed, they take the compasses to pieces, with intent to cut off the thickness of the model, and the compasses are immediately put in their place to begin a second piece of the mould. It consists of a mixture of earth and hair, applied with the hand on the core, in several cakes that close together. This work is finished by several layers of a thinner cement of the same matter, smoothed by the compasses, and thoroughly dried before another is laid on. The first layer of the model is a mixture of wax and grease spread over the whole. After which are applied the inscriptions, coats of arms, &c. besmeared with a pencil dipped in a vessel of wax in a chaffing-dish: this is done for every letter. Before the shell is begun, the compasses are taken to pieces, to cut off all the wood that fills the place of the thickness to be given to the shell.

The first layer is the same earth with the rest, sifted very fine; whilst it is tempering in water, it is mixed with cow's hair, to make it cohere. The whole being a thin cullis, is gently poured on the model, that fills exactly all the sinuosities of the figures, &c. and this is repeated till the whole is two lines thick over the model. When this layer is thoroughly dried, they

cover it with a second of the same matter, but somewhat thicker: when this second layer becomes of some consistence, they apply the compasses again, and light a fire in the core, so as to melt off the wax of the inscriptions, &c.

After this, they go on with other layers of the shell, by means of the compasses. Here they add to the cow's hair a quantity of hemp, spread upon the layers, and afterwards smoothed by the board of the compasses. The thickness of the shell comes to four or five inches lower than the mill-stone before observed, and surrounds it quite close, which prevents the extravasation of the metal. The wax should be taken out before the melting of the metal.

The ear of the bell requires a separate work, which is done during the drying of the several incrustations of the cement. It has seven rings; the seventh is called the *bridge*, and unites the others, being a perpendicular support to strengthen the curves. It has an aperture at the top, to admit a large iron peg, bent at the bottom; and this is introduced into two holes in the beam, fastened with two strong iron keys. There are models made of the rings, with masses of beaten earth, that are dried in the fire, in order to have the hollow of them. These rings are gently pressed upon a layer of earth and cow's hair, one half of its depth; and then taken out, without breaking the mould. This operation is repeated 12 times for 12 half-moulds, that two and two united may make the hollows of the six rings: the same they do for the hollow of the bridge, and bake them all, to unite them together.

Upon the open place left for the coals to be put in, are placed the rings that constitute the ear. They first put into this open place the iron-ring to support the clapper of the bell; then they make a round cake of clay, to fill up the diameter of the thickness of the core. This cake, after baking, is clapped upon the opening, and soldered with a thin mortar spread over it, which binds the cover close to the core.

The hollow of the model is filled with an earth, sufficiently moist to fix on the place, which is strewed at several times upon the cover of the core; and they beat it gently with a pestle, to a proper height; and a workman smooths the earth at top with a wooden trowel dipped in water.

Upon this cover, to be taken off afterwards, they assemble the hollows of the rings. When every thing is in its proper place, they strengthen the outside of the hollows with mortar, in order to bind them with the bridge, and keep them steady at the bottom, by means of a cake of the same mortar, which fills up the whole aperture of the shell. This they let dry, that it may be removed without breaking. To make room for the metal, they pull off the hollows of the rings, through which the metal is to pass, before it enters into the vacuity of the mould. The shell being unloaded of its ear, they range under the millstone five or six pieces of wood, about two feet long, and thick enough to reach almost the lower part of the shell; between these and the mould, they drive in wooden wedges with a mallet, to shake the shell of the model whereon it rests, so as to be pulled up and got out of the pit.

When this and the wax are removed, they break the model and the layer of earth, through which the metal must run, from the hollow of the rings, between

the shell and the core. They smoke the inside of the shell, by burning straw under it, that helps to smooth the surface of the bell. Then they put the shell in the place, so as to leave the same interval between that and the core; and before the hollows of the rings or the cap are put on again, they add two vents, that are united to the rings, and to each other, by a mass of baked cement. After which they put on this mass of the cap, the rings, and the vent, over the shell, and folder it with thin cement, which is dried gradually by covering it with burning coals. Then, they fill up the pit with earth, beating it strongly all the time, round the mould.

The furnace has a place for the fire, and another for the metal. The fire-place has a large chimney with a spacious ash-hole. The furnace which contains the metal, is vaulted, whose bottom is made of earth, rammed down; the rest is built with brick. It has four apertures; the first, through which the flame re- vibrates; the second is closed with a stopple that is opened for the metal to run; the others are to separate the dross, or scorie, of the metal by wooden rakes: through these last apertures passes the thick smoke. The ground of the furnace is built sloping, for the metal to run down.

Foundry of Great Guns and Mortar-Pieces. The method of casting these pieces is little different from that of bells: they are run maffy, without any core, being determined by the hollow of the shell; and they are afterwards bored with a steel trepan, that is worked either by horses or a water-mill.

For the metal, parts, proportions, &c. of these pieces, see GUNNERY.

Letter-Foundry, or Casting of Printing-Letters. The first thing requisite is to prepare good steel-punches, on the face of which is drawn the exact shape of the letter with pen and ink, if the letter be large, or with a smooth blunted point of a needle, if small; and then, with proper gravers, the cutter digs deep between the strokes, letting the marks stand on the punch; the work of hollowing being generally regulated by the depth of the counter-punch: then he fills the outside, till it is fit for the matrice.

They have a mould to justify the matrices by, which consists of an upper and under part, both which are alike, except the stool and spring behind, and a small roundish wire in the upper part, for making the nick in the flank of the letter. These two parts are exactly fitted into each other, being a male and female gage, to slide backwards and forwards.

Then they justify the mould, by casting about 20 samples of letters, which are set in a composing-stick, with the nicks towards the right hand; and comparing these every way with the pattern-letters set up in the same manner, they find the exact measure of the body to be cast.

Next they prepare the matrix, which is of brass or copper, an inch and a half long, and of a proportionable thickness to the size of the letter it is to contain. In this metal is sunk the face of the letter, by striking the letter-punch the depth of an *n*. After this, the sides and face of the matrice are justified, and cleared, with files, of all bunnings that have been made by sinking the punch.

Then it is brought to the furnace, which is built up-

right of brick with four square sides, and a stone at top, in which is a hole for the pan to stand in.

Printing-letters are made of lead, hardened with iron or stub-nails. To make the iron run, they mingle an equal weight of antimony, beaten small in an iron mortar, and stub-nails together. They charge a proper number of earthen-pots, that bear the fire, with the two ingredients, as full as they can hold; and melt it in an open furnace, built for that purpose.

When it bubbles, the iron is then melted, but it evaporates very much. This melted compost is ladled into an iron-pot, wherein is melted lead, that is fixed on a furnace close to the former, 3 lb of melted iron to 25 lb of lead; this they incorporate according to art.

The caster taking the pan off the stone, and having kindled a good fire, he sets the pan in again, and metal in it to melt. If it be a small-bodied letter, or a thin letter with great bodies, that he intends to cast, his metal must be very hot, and sometimes red-hot, to make the letter come. Then taking a ladle, of which he has several sorts, that will hold as much as will make the letter and break, he lays it at the hole where the flame bursts out: then he ties a thin leather, cut with its narrow end against the face, to the leather groove of the matrice, by whipping a brown thread twice about the leather groove, and fastening the thread with a knot. Then he puts both pieces of the mould together, and the matrice into the matrice-check; and places the foot of the matrice on the stool of the mould, and the broad end of the leather on the wood of the upper half of the mould, but not tight up, lest it hinder the foot of the matrice from sinking close down upon the stool, in a train of work. Afterwards laying a little rosin on the upper part of the mould, and having his casting-ladle hot, he, with the boiling side, melts the rosin, and presses the broad end of the leather hard down on the wood, and so fastens it thereto. Now he comes to casting; when placing the under half of the mould in his left hand, with the hook or jag forward, he holds the ends of its wood between the lower part of the ball of his thumb and his three hinder fingers: then he lays the upper half of the mould upon the under half, so as the male gages may fall into the female, and at the same time the foot of the matrice places itself upon the stool; and clapping his left-hand thumb strongly over the upper half, he nimbly catches hold of the bow or spring, with his right-hand fingers at the top of it, and his thumb under it, and places the point of it against the middle of the notch in the back-side of the matrice, pressing it forwards as well towards the mould, as downwards, by the shoulder of the notch, close upon the stool, while, at the same time, with his hinder fingers, as aforesaid, he draws the under half of the mould towards the ball of his thumb, and thrusts, by the ball of his thumb, the upper part towards his fingers, that both the registers of the mould may press against both sides of the matrice, and his thumb and fingers press both sides of the mould close together.

Then he takes the handle of his ladle in his right hand, and with the ball of it gives two or three strokes outwards upon the surface of the melted metal, to clear it of the scum; then he takes up the ladle full, and having the mould in his left hand, turns his left side a

little from the furnace, and brings the heat of his ladle to the mouth of his mould; and turns the upper part of his right hand towards him, to pour the metal into it, while, at the same instant, he puts the mould in his left hand forwards, to receive the metal with a strong shake, not only into the bodies of the mould, but, while the metal is yet hot, into the very face of the matrice, to receive its perfect form there as well as in the flask. Then he takes the upper half of the mould off, by placing his right thumb on the end of the wood next his left thumb, and his two middle fingers at the other end of the wood: he tosses the letter, break and all, out upon a sheet of waste paper, laid on a bench, a little beyond his left hand; and then is ready to cast another letter, as before, and likewise the whole number in that matrix.

Then boys, commonly employed for this purpose, separate the breaks from the flanks, and rub them on a stone, and afterwards a man cuts them all of an even height, which finishes the font for the use of the printer. See the next article.

A workman will ordinarily cast 3000 of these letters in a day. The perfection of letters thus cast, consists in their being all severally square and straight on every side; and all generally of the same height, and evenly lined, without stooping one way or other; neither too big in the foot, nor the head; well grooved, so as the two extremes of the foot contain half the body of the letter; and well ground, barbed, and scrapped, with a sensible notch, &c. See PRINTING.

FONT, or FONT, among printers, a set or quantity of letters, and all the appendages belonging thereto; as numeral characters, quadrates, points, &c. cast by a letter-founder, and sorted.

FOUNTAIN, in philosophy, a spring or source of water rising out of the earth. Among the ancients, fountains were held sacred, and even worshipped as a kind of divinities. For the phenomena, theory, and origin of fountains or springs, see SPRING.

Artificial FOUNTAIN, called also a *jet d'eau*, is a contrivance by which water is violently spouted upwards. See HYDRAULICS.

FOUNTAIN-Tree, a very extraordinary vegetable growing in one of the Canary islands, and likewise said to exist in some other places, which distils water from its leaves in such plenty as to answer all the purposes of the inhabitants who live near it. Of this tree we have the following account in Glasse's history of the Canary Islands.—"There are only three fountains of water in the whole island of Hierro, wherein the fountain-tree grows. One of these fountains is called *Acof*, which, in the language of the ancient inhabitants, signifies river; a name, however, which does not seem to have been given it on account of its yielding much water, for in that respect it hardly deserves the name of a fountain. More to the northward is another called *Hapio*; and in the middle of the island is a spring, yielding a stream about the thickness of a man's finger. This last was discovered in the year 1565, and is called the fountain of *Antou Hernandez*. On account of the scarcity of water, the sheep, goats, and swine, here do not drink in the summer, but are taught to dig up the roots of fern, and chew them to quench their thirst. The great cattle are watered at those fountains, and at a place where water distils from the leaves

of a tree. Many writers have made mention of this famous tree, some in such a manner as to make it appear miraculous: others again deny the existence of any such tree; among whom is Father Feyjoo, a modern Spanish author, in his *Theatro Critico*. But he, and those who agree with him in this matter, are as much mistaken as those who would make it appear to be miraculous. This is the only island of all the Canaries which I have not been in; but I have failed with natives of Hierro, who, when questioned about the existence of this tree, answered in the affirmative.

"The author of the *History of the discovery and conquest* has given us a particular account of it, which I shall here relate at large.

"The district in which this tree stands is called *Tigulahe*; near to which, and in the cliff, or steep rocky ascent that surrounds the whole island, is a narrow gutter or gully, which commences at the sea, and continues to the summit of the cliff, where it joins or coincides with a valley, which is terminated by the steep front of a rock. On the top of this rock grows a tree, called in the language of the ancient inhabitants, *Garfe*, "Sacred or Holy Tree," which for many years has been preserved found, entire, and fresh. Its leaves constantly distil such a quantity of water as is sufficient to furnish drink to every living creature in Hierro; nature having provided this remedy for the drought of the island. It is situated about a league and a half from the sea. Nobody knows of what species it is, only that it is called *Til*. It is distinct from other trees, and stands by itself; the circumference of the trunk is about 12 spans, the diameter four, and in height from the ground to the top of the highest branch, 40 spans: the circumference of all the branches together is 120 feet. The branches are thick and extended; the lowest commence about the height of an ell from the ground. Its fruit resembles the acorn, and tastes something like the kernel of a pine-apple, but is softer and more aromatic. The leaves of this tree resemble those of the laurel, but are larger, wider, and more curved; they come forth in a perpetual succession, so that the tree always remains green. Near to it grows a thorn which fastens on many of its branches, and interweaves with them; and at a small distance from the *garfe* are some beech-trees, bresos, and thorns. On the north side of the trunk are two large tanks or cisterns, of rough stone, or rather one cistern divided, each half being 20 feet square, and 16 spans in depth. One of these contains water for the drinking of the inhabitants; and the other that which they use for their cattle, washing, and such-like purposes. Every morning, near this part of the island, a cloud or mist arises from the sea, which the south and easterly winds force against the fore-mentioned steep cliff; so that the cloud having no vent but by the gutter, gradually ascends it, and from thence advances slowly to the extremity of the valley, where it is stopped and checked by the front of the rock which terminates the valley, and then rests upon the thick leaves and wide-spreading branches of the tree, from whence it distils in drops during the remainder of the day, until it is at length exhausted, in the same manner that we see water drip from the leaves of trees after a heavy shower of rain. This distillation is not peculiar to the *garfe*, or *til*; for the bresos, which.

Fountain.

Fouquiere

Fowling.

which grow near it, likewise drop water; but their leaves being but few and narrow, the quantity is so trifling, that though the natives have some of it, yet they make little or no account of any but what distills from the til, which, together with the water of some fountains, and what is saved in the winter season, is sufficient to serve them and their flocks. This tree yields most water in those years when the Levant or easterly winds have prevailed for a continuance; for, by these winds only the clouds or mists are drawn hither from the sea. A person lives on the spot near which this tree grows, who is appointed by the council to take care of it and its water; and is allowed a house to live in, with a certain salary. He every day distributes to each family of the district seven pots or vessels full of water, besides what he gives to the principal people of the island.

“Whether the tree which yields water at this present time be the same as that mentioned in the above description, I cannot pretend to determine: but it is probable there has been a succession of them; for Pliny, describing the Fortunate island, says, ‘In the mountains of Ombrion are trees resembling the plant ferula, from which water may be procured by pressure. What comes from the black kind is bitter, but that which the white yields is sweet and potable.’”

Trees yielding water are not peculiar to the island of Hierro; for travellers informs us of one of the same kind on the island of St Thomas, in the bight or gulph of Guiney. In Cockburn's voyages we find the following account of a dropping tree, near the mountains of Fera Paz, in America.

“On the morning of the fourth day, we came out on a large plain, where were great numbers of fine deer, and in the middle stood a tree of unusual size, spreading its branches over a vast compass of ground. Curiosity led us up to it. We had perceived, at some distance off, the ground about it to be wet; at which we began to be somewhat surpris'd, as well knowing there had no rain fallen for near six months past, according to the certain course of the season in that latitude: that it was impossible to be occasioned by the fall of dew on the tree, we were convinced, by the sun's having power to exhale away all moisture of that nature a few minutes after its rising. At last, to our great amazement as well as joy, we saw water dropping, or as it were distilling, fast from the end of every leaf of this wonderful (nor had it been amiss if I had said *miraculous*) tree; at least it was so with respect to us, who had been labouring four days through extreme heat, without receiving the least moisture, and were now almost expiring for the want of it.

“We could not help looking on this as liquor sent from heaven to comfort us under great extremity. We catch'd what we could of it in our hands, and drank very plentifully of it; and liked it so well, that we could hardly prevail with ourselves to give over. A matter of this nature could not but incite us to make the strictest observations concerning it; and accordingly we staid under the tree near three hours, and found we could not fathom its body in five times. We observed the soil where it grew to be very strong; and upon the next inquiry we could afterwards make, both of the natives of the country and the Spanish inhabitants, we could not learn there was any such tree

known throughout New Spain, nor perhaps all America over; but I do not relate this as a prodigy in nature, because I am not philosopher enough to ascribe any natural cause for it: the learned may perhaps give substantial reasons in nature for what appeared to us a great and marvellous secret.”

FOUQUIERE (James), an excellent Flemish painter of landscapes, born at Anvers. De Piles says, the difference between his pictures and those of Titian consist rather in the countries represented, than in the goodness of the pieces; the principles of both are the same, and the colouring alike good and regular. He painted for Rubens, of whom he learned the most essential part of his art. The elector Palatine employed him at Heidelberg; and thence going to Paris, he painted the Louvre, under the reign of Lewis XIII. and acquired great reputation by his pictures. He died at Paris, in 1659.

FOURCHEE, or FOURCHY, in heraldry, an appellation given to a cross forked at the ends. See HERALDRY.

FOURMONT (Stephen), professor of the Arabic and Chinese languages, and one of the most learned men of his time, was born Herblai, a village four leagues from Paris, in 1683. He studied in Mazarine college, and afterwards in the Seminary of Thirty-three. He was at length professor of Arabic in the Royal college, and was made a member of the Academy of Inscriptions. In 1738, he was chosen a member of the Royal Society in London, and of that of Berlin in 1741. He was often consulted by the duke of Orleans, first prince of the blood; who had a particular esteem for him, and made him one of his secretaries. He wrote a great number of books; the most considerable of those which have been printed are, 1. The roots of the Latin tongue, in verse. 2. Critical reflections on the histories of ancient nations, two volumes, quarto. 4. A Chinese grammar, in Latin, folio. 5. Several dissertations printed in the Memoirs of the Academy of Inscriptions, &c. He died at Paris, in 1745.

He ought not to be confounded with Michael Fourmont, his youngest brother; who took orders, was professor of the Syriac language in the Royal college, and a member of the Academy of Inscriptions. He died in 1746.

FOURTH REDUNDANT, in music. See INTERVAL. FOWEY, or FOY, a town of Cornwall in England. It is seated on an ascent, is fortified, and its haven well secured with blockhouses. It is a good trading place, and its market well supplied with corn. It sends two members to parliament. W. Long. 5°. N. Lat. 50. 27.

FWOL, among zoologists, denotes the larger sorts of birds, whether domestic or wild: such as geese, pheasants, partridges, turkey, ducks, &c.

Tame fowl make a necessary part of the stock of a country farm. See the article POULTRY.

Fowls are again distinguished into two kinds, viz. *land* and *water* fowl, the last being so called from their living much in and about water: also into those which are accounted *game*, and those which are not. See the article GAME.

FWOLING, the art of catching birds by means of bird-lime, decoys, and other devices, or the killing of them by the gun. See BIRD-Catching, BIRD-Lime,

Dr.

FOWLING, SHOOTING, and the names of the different birds in the order of the alphabet.

FOWLING, is also used for the pursuing and taking birds with hawks, more properly called **FALCONRY** or **HAWKING**. See these articles.

FOWLING-Piece, a light gun for shooting birds. That piece is always reckoned best which has the longest barrel, from 5½ to 6 feet, with a moderate bore; though every fowler should have them of different sizes, suitable to the game he designs to kill. The barrel should be well polished and smooth within, and the bore of an equal bigness from one end to the other; which may be proved, by putting in a piece of palst-board, cut of the exact roundness of the top: for if this goes down without stops or flipping, you may conclude the bore good. The bridge-pan must be somewhat above the touch-hole, and ought to have a notch to let down a little powder: this will prevent the piece from recoiling, which it would otherwise be apt to do. As to the locks, choose such as are well filed with true work, whose springs must be neither too strong nor too weak. The hammer ought to be well hardened, and pliable to go down to the pan with a quick motion.

FOX, in zoology. See **CANIS**.

The fox is a great nuisance to the husbandman, by taking away and destroying his lambs, geese, poultry, &c. The common way to catch him is by gins; which being baited, and a train made by drawing raw flesh across in his usual paths or haunts to the gin, it proves an inducement to bring him to the place of destruction.

The fox is also a beast of chase, and is taken with grey-hounds, harriers, &c. See the article **HUNTING**.

FOX (John), the martyrologist, was born at Bolton in Lincolnshire, in the year 1517. At the age of 16 he was entered a student of Brazen-nose college in Oxford: and in 1543, he proceeded master of arts, and was chosen fellow of Magdalen college. He discovered an early genius for poetry, and wrote several Latin comedies, the subjects taken from scripture, which his son assures us were written in an elegant style. Forsaking the muses, he now applied himself with uncommon assiduity to the study of divinity, particularly church-history; and, discovering a premature propensity to the doctrine of reformation, he was expelled the college as an heretic. His distress on this occasion was very great; but it was not long before he found an asylum in the house of Sir Thomas Lucy, of Warwickshire, who employed him as a tutor to his children. Here he married the daughter of a citizen of Coventry. Sir Thomas's children being now grown up, after residing a short time with his wife's father, he came to London; where finding no immediate means of subsistence, he was reduced to the utmost degree of want; but was at length, (as his son relates) miraculously relieved, in the following manner: As he was one day sitting in St Paul's church, emaciated with hunger, a stranger accosted him familiarly, and, bidding him be of good cheer, put a sum of money into his hand; telling him at the same time, that in a few days new hopes were at hand. He was soon after taken into the family of the duchess of Richmond, as tutor to the earl of Surrey's children, who, when their father was sent to the tower, were committed to her care. In this family he lived, at Ryegate in Surrey, during the latter part of

the reign of Henry VIII. the entire reign of Edward VI. and part of that of queen Mary: but at length, persecuted by his implacable enemy bishop Gardiner, he was obliged to seek refuge abroad. Basil in Switzerland was the place of his retreat, where he subsisted by correcting the press. On the death of queen Mary, he returned to England; where he was graciously received by his former pupil the duke of Norfolk, who retained him in his family as long as he lived, and bequeathed him a pension at his death. Mr secretary Cecil also obtained for him the rectory of Shipton, near Salisbury; and we are assured that he might have had considerable church-preference, had it not been for his unwillingness to subscribe to the canons. He died in the year 1587, in the 70th year of his age; and was buried in the chancel of St Giles's, Cripplegate. He was a man of great industry, and considerable learning; a zealous, but not a violent reformer; a nonconformist, but not an enemy to the church of England. He left two sons; one of which was bred a divine, the other a physician. He wrote many pieces: but his principal work is the *Acts and monuments of the church*, &c. commonly called *Fox's Book of Martyrs*. His facts are not always to be depended on, and he often loses his temper; which, considering the subject, is not much to be wondered at.

FOX (George), the founder of the sect of English Quakers, was a shoemaker in Nottingham. The accounts of those times tell us, that as he wrought at his trade, he used to meditate much on the scriptures: which, with his solitary course of life, improving his natural melancholy, he began at length to fancy himself inspired; and in consequence thereof set up for a preacher.

He proposed but few articles of faith; insisting chiefly on moral virtue, mutual charity, the love of God, and a deep attention to the inward motions and secret operations of the spirit: he required a plain simple worship, and a religion without ceremonies, making it a principal point to wait in profound silence the directions of the Holy Spirit. Fox met with much rough treatment for his zeal, was often imprisoned, and several times in danger of being knocked on the head. But all discouragements notwithstanding, his sect prevailed much, and many considerable men were drawn over to them; among whom were **BARCLAY** and **PENN**. He died in 1681. His followers were called *Quakers*, in derision of some unusual shakings and convulsions with which they were seized at their first meetings. See the article **QUAKERS**.

Fox-Glove, in botany. See **DIGITALIS**.

FRACASTOR (Jerome), a most eminent Italian poet and physician, was born at Verona in the year 1482. Two singularities are related of him in his infancy: one is, that his lips adhered so closely to each other, when he came into the world, that a chirurgeon was obliged to divide them with his incision-knife; the other, that his mother was killed with lightning, while he, though in her arms at the very moment, escaped unhurt. Fracastor was of parts so exquisite, and made so wonderful a progress in every thing he undertook, that he became eminently skilled, not only in the belles lettres, but in all arts and sciences. He was a poet, a philosopher, a physician, an astronomer, a mathematician, and what not? He was a man of vast consequence

Fracastor
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Fragaria.

quence in his time; as appears from pope Paul III.'s making use of his authority to remove the council of Trent to Bologna, under the pretext of a contagious distemper, which, as Fracastor deplored, made it no longer safe to continue at Trent. He was intimately acquainted with cardinal Bembo, Julius Scaliger, and all the great men of his time. He died of an apoplexy at Cast near Verona, in 1553: and in 1559, the town of Verona erected a statue in honour of him.

He was the author of many performances, both as a poet and as a physician; yet never man was more disinterested in both these capacities than he. Evidently so as a physician, for he practised without fees; and as a poet, whose usual reward is glory, nothing could be more indifferent. It is owing to this indifference, that we have so little of his poetry, in comparison of what he wrote; and that, among other compositions, his Odes and Epigrams, which were read in manuscript with infinite admiration, yet, never passing the press, were lost. What we have now of his, are the three books of "Siphilis, or of the French disease;" a book of Miscellaneous Poems; and two books of his poem intitled *Joseph*, which he began at the latter end of his life, but did not live to finish. And these works, it is said, would have perished with the rest, if his friends had not taken care to preserve and communicate copies of them: for Fracastor, writing merely for amusement, never troubled himself in the least about what became of his works after they once got out of his hands. Fracastor composed also a poem, called *Alcon, sive de cura canum venatorum*. His poems, as well as his other works, are written all in Latin. His medical pieces are, *De Sympthia & Antipathia*,—*De contagione & contagiosis morbis*,—*De causis criticorum dierum*,—*De vini temperatura*, &c. His works have been printed separately and collectively. The best edition of them is that of Padua 1735, in 2 vols 4to.

FRACHES, in glass-making, flat iron-pans, wherein the new-made vessels are put, to be removed gradually from the fire. See the article GLASS.

FRACTION, in arithmetic. See ARITHMETIC, n° 21. 26.

FRACTURE, in surgery, a rupture of a bone, or a solution of continuity in a bone when it is crushed or broken by some external cause. See SURGERY.

FRÆNUM, in anatomy, a term applied to some membranous ligaments of the body; as,

FRÆNUM *Lingue*. See ANATOMY, n° 403, d.

FRÆNUM *Penis*. See ANATOMY, n° 381, r.

FRAGA, a strong town with a handsome castle in the kingdom of Arragon in Spain. It is strong by situation among the mountains; having the river Cinca before it, whose high banks are difficult of access; and at its back a hill, which cannot easily be approached with large cannon. Alfonso VII. king of Arragon, and the first of that name of Castile, was killed by the Moors in 1134, when he besieged this town. E. Long. o. 23. N. Lat. 41. 28.

FRAGARIA, the STRAWBERRY; a genus of the polygynia order, belonging to the icofandria class of plants. There is but one species, viz. the vesca, or cultivated strawberry. The principal varieties are, 1. The sylvestris, or wood-strawberry, with oval sawed leaves, and small round fruit. 2. The Virginian scarlet, or Virginian strawberry, with oblong oval sawed

leaves, and a roundish scarlet-coloured fruit. 3. The molchata, or hauboy, or mulky strawberry, having oval, lanceolate, rough leaves, and large pale-red fruit. 4. The Chilensis, or Chili strawberry, with large, oval, thick, hairy leaves, large flowers, and very large, firm fruit. 5. The Alpina, Alpine, or monthly strawberry, having small oval leaves, small flowers, and moderate sized, oblong, pointed fruit.

All these varieties are hardy, low, perennials, durable in root, but the leaves and fruit-stalks are renewed annually in spring. They flower in May and June, and their fruit comes to perfection in June, July, and August; the Alpine kind continuing till the beginning of winter. They all prosper in any common garden soil, producing abundant crops annually without much trouble. They increase exceedingly every summer, both by off-sets or suckers from the sides of the plants, and by the runners or strings, all of which rooting and forming plants at every joint, each of which separately planted bears a few fruit the following year, and bear in great perfection the second summer. Those of the Alpine kind will even bear fruit the same year that they are formed. All the sorts are commonly cultivated in kitchen-gardens, in beds or borders of common earth, in rows lengthwise 15 or 18 inches distance; the plants the same distance from one another in each row. Patches of the different sorts disposed here and there in the fronts of the different compartments of the pleasure ground, will appear ornamental both in their flowers and fruit, and make an agreeable variety.

Strawberries, eaten either alone, or with sugar and milk, are universally esteemed a most delicious fruit. They are grateful, cooling, subacid, and juicy. They taken in large quantities, they seldom disagree. They promote perspiration, impart a violet smell to the urine, and dissolve the tartareous incrustations on the teeth. People afflicted with the gout or stone have found relief by using them very largely; and Hoffman says, he has known consumptive people cured by them. The bark of the root is astringent.—Sheep and goats eat the plant; cows are not fond of it; horses and swine refuse it.

FRAGUIER (Claude Francis), a polite and learned French writer, born at Paris, of a noble family, in 1666. He was educated under the Jesuits, and was even admitted into the order, though he afterwards quitted it; and being thus at liberty to follow his inclinations, he soon after assisted the Abbé Bignon in conducting the *Journal de Scavans*, having all the qualifications for such a work. His works consist of Latin poems, and a great number of very excellent dissertations. He died in 1728.

FRAIL, a basket made of rushes, or the like, in which are packed up figs, raisins, &c. It signifies also a certain quantity of raisins, about 75 pounds.

FRAISE, in fortification, a kind of defence, consisting of pointed stakes, six or seven feet long, driven parallel to the horizon into the retrenchments of a camp, a half-moon, or the like, to prevent any approach or scalade.

Fraises differ from palisades chiefly in this, that the latter stand perpendicular to the horizon, and the former jet out parallel to the horizon, or nearly so, being usually made a little sloping, or with the points hanging

Fragaria
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Fraise.

Fraife
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France.

France.

hanging down. Fraises are chiefly used in retrenchments and other works thrown up of earth; sometimes they are found under the parapet of a rampart, serving instead of the cordon of stone used in stone-works.

To *FRAISE a Battalion*, is to line the musketeers round with pikes, that, in case they should be charged with a body of a horse, the pikes being presented, may cover the musketeers from the shock, and serve as a barricade.

FRAME, in joinery, a kind of case, wherein a thing is set or inclosed, or even supported; as a window-frame, a picture-frame, &c.

FRAME is also a machine used in divers arts; as,

FRAME, among printers, is the stand which supports the cases. See CASE.

FRAME, among founders, a kind of ledge inclosing a board; which, being filled with wetted sand, serves as a mould to cast their works in. See FOUNDRY.

FRAME more particularly used for a sort of loom, whereon artificers stretch their lincins, silks, fluffs, &c. to be embroidered, quilted, or the like.

FRAME, among painters, a kind of square, consisting of four long slips of wood joined together, whose intermediate space is divided by threads into several little squares like a net; and hence sometimes called *reticula*. It serves to reduce figures from great to small; or, on the contrary, to augment their size from small to great.

FRANCE, a large kingdom of Europe, situated between 5° W. and 7° E. Long. and between 43° and 51° N. Lat. being bounded by the English channel and the Austrian Netherlands, on the north; by Germany, Switzerland, Savoy, and Piedmont, in Italy, on the east; by the Mediterranean sea, and the Pyrenean mountains, which separate it from Spain, on the south; and, by the bay of Biscay, on the west.

The kingdom of France was originally possessed by the *Celts* or *Gauls*. They were a very warlike people, and often checked the progress of the Roman arms; nor did they yield till the time of Julius Cæsar, who totally subdued their country, and reduced it to the form of a Roman province*. The Romans continued in quiet possession of Gaul, as long as their empire retained its strength, and they were in a condition to repress the incursions of the German nations, whom even in the zenith of their power they had not been able to subdue. But, in the reign of the emperor Valerian, the ancient Roman valour and discipline had begun to decline, and the same care was not taken to defend the provinces that had formerly been done. The barbarous

nations, therefore, began to make much more frequent incursions; and among the rest the *Franks*, a German nation, inhabiting the banks of the Rhine, proved particularly troublesome. Their first irruption, we are told by Valefius, happened in the year 254, the second of Valerian's reign. At this time they were but few in number; and were repulsed by Aurelian, afterwards emperor. Not discouraged by this check, they returned two years afterwards in far greater numbers; but were again defeated by Gallienus, whom Valerian had chosen for his partner in the empire. Others, however, continued to pour in from their native country in such multitudes, that Gallienus, no longer able to drive them out by force of arms, made advantageous proposals to one of their chiefs,

whom he engaged to defend the frontiers against his countrymen as well as other invaders.

This expedient did not long answer the purpose. In 260 the Franks, taking advantage of the defeat and captivity of Valerian in Persia, broke into Gaul, and afterwards into Italy, committing every where dreadful ravages. Five years afterwards they invaded Spain; which they possessed, or rather plundered, for the space of 12 years: nor could they be driven out of Gaul till the year 275, when the emperor Probus not only gave them a total overthrow in that country, but pursued them into their own, where he built several forts to keep them in awe. This intimidated them so much, that nine of their kings submitted to the emperor, and promised an annual tribute.—They continued quiet till the year 287; when, in conjunction with the Saxon pirates, they plundered the coasts of Gaul, carrying off an immense booty. To revenge this insult, the emperor Maximian entered the country of the Franks the following year, where he committed such ravages that two of their kings submitted to him; and to many of the common people who chuse to remain in Gaul, he allowed lands in the neighbourhood of Treves and Cambray.

The restless disposition of the Franks, however, did not allow them to remain long in quiet. About the year 293, they made themselves masters of Batavia, and part of Flanders; but were entirely defeated and forced to surrender at discretion, by Constantius the father of Constantine the Great, who transplanted them into Gaul. Their countrymen in Germany continued quiet till the year 306, when they renewed their depredations; but being overcome by Constantine the Great, two of their kings were taken prisoners, and thrown to the wild beasts in the shows exhibited on that occasion.

All these victories, however, as well as many others said to have been gained by the Romans, were not sufficient to prevent the incursions of this restless and turbulent nation; inasmuch that, in the year 355, they had made themselves masters of 40 cities in the province of Gaul. Soon after, they were totally defeated by the emperor Julian, and again by count Theodosius father to the emperor of that name; but, in the year 388, they ravaged the province with more fury than ever, and cut off a whole Roman army that was sent against them. As the western empire was at this time in a very low state, they for some time found more interruption from other barbarians than from the Romans, till their progress was checked by Aetius.

When the war with Aetius broke out, the Franks³ were governed by one *Pharamond*, the first of their first kings of whom we have any distinct account. He is king, supposed to have reigned from the year 417 or 418, to the year 428; and is thought by archbishop Usher, to have been killed in the war with Aetius. By some he is supposed to have compiled the Salique Laws, with the assistance of four sages named *Wisegeaf*, *Loesegaf*, *Widegaf*, and *Solegaf*. But Valefius is of opinion that the Franks had no written laws till the time of Clovis.

Pharamond was succeeded by his son Clodius, who likewise carried on a war against the Romans. He is said to have received a terrible overthrow from Aetius near the city of Lens; notwithstanding which, he advanced

Clodius.

First subdued by Julius Cæsar.

* See Gaul.

² Invaded by the Franks.

³ Pharamond
the first king.

France. vanced to Canbray, and made himself master of that city, where for some time he took up his residence. After this he extended his conquests as far as the river Somme, and destroyed the cities of Treves and Cologne, Tournay and Amiens. He died in the year 448, and was succeeded by Merovæus.

5 Merovæus. Authors are not agreed whether the new king was brother, or son, or any relation at all, to Clodio. It seems probable, indeed, that he was of a different family; as from him the first race of French kings were titled *Merovingian*. He was honoured and respected by his people, but did not greatly enlarge the boundaries of his kingdom. He died in 458.

6 Childeric. Merovæus was succeeded by his son Childeric; who being no longer kept in awe by Aëtius, made war on the Romans, and extended his conquests as far as the river Loire. He is said to have taken the city of Paris after a siege of five years, according to some, and of ten, according to others. The Roman power was now totally destroyed in Italy; and therefore *Clodovæus*, *Clovis*, or *Louis*, for his name is differently written, who succeeded Childeric, set himself about making an entire conquest of Gaul. Part of the province was still retained by a Roman named *Syagrius*, who probably had become sovereign of the country on the downfall of the Western empire in 476. He was defeated and taken prisoner by Clovis, who afterwards caused him to be beheaded, and soon after totally reduced his dominions.

7 French monarchy established by Clovis. Thus was the French monarchy established by Clovis in the year 487. He now possessed all the country lying between the Rhine and the Loire; which, though a very extensive dominion, was yet considerably inferior to what it is at present. In 493, he married Clotildis, niece to Gondebaut duke of Burgundy, and embraced the Christian religion. He reduced Armorica, or Brittany; and afterwards made war on the Burgundians, in which he had Theodoric king of the Ostrogoths for his ally. About this time; however, Alaric king of the Visigoths inhabiting Auvergne, made war upon Clovis; and a decisive battle ensuing, the former were entirely defeated, their king killed, and his dominions became a province of France.

Clovis after this destroyed all the petty kings or Christians among the Franks, which he did not accomplish without the vilest treachery; but by that means his power became absolute throughout all his dominions. Having removed the seat of his government first from Tournay to Soissons, and then to Paris, he died in 511; and was buried in the church of Sts. Peter and Paul, now Geneviève, where his tomb is still to be seen.

8 His dominions divided among his children. After the death of Clovis, his dominions were divided among his four sons. Thieri, or Theodoric, the eldest, had the eastern part of the empire; and, from his making the city of Metz his capital, is commonly called the *king of Metz*. Clodomir, the eldest son by Clotildis, had the kingdom of Orleans; Childerbart, and Clotaire, who were both infants, had the kingdoms of Paris and Soissons, under the tutelage of their mother. The prudence of Clotildis kept matters quiet in all the parts of the empire for eight years: but, about the year 520, a numerous fleet of Danes arrived at the mouth of the Meuse; and their king Cochiliac, having landed his forces, began to destroy

the country with fire and sword. Against him Thieri sent his son Theodobert, who defeated the Danish army and navy, and killed their king, forcing the rest to retire with precipitation.

In 522, Hermanfroi king of Thuringia, having destroyed one of his brethren named *Berthaire*, and seized on his dominions, applied to Thieri for assistance against his other brother Baldric, whom he intended to treat in the same manner. In this infamous enterprise Thieri embarked, on condition that he should have one half of Baldric's dominions; but after the unhappy prince was overcome and killed in battle, Hermanfroi seized all his dominions. Thieri had no opportunity of revenging himself till the year 531; when perceiving the power of the Ostrogoths, whom he much dreaded, to be considerably lessened by the death of king Theodoric, he engaged his brother Clotaire to assist him, and they accordingly entered Thuringia with two powerful armies. They joined their forces as soon as they had passed the Rhine, and were quickly after reinforced by a considerable body of troops under the command of Theodobert. The allies attacked the army of Hermanfroi, which was advantageously posted; and having totally defeated it, he was forced to fly from place to place in disguise. Soon after this the capital was taken, and Hermanfroi himself being invited to a conference by Thieri was treacherously murdered; after which his extensive dominions became feudatory to Thieri.

In the mean time, Clotildis had excited her children to make war on the Burgundians, in order to revenge the death of her father Childeric, whom Gondebaut king of Burgundy had caused to be murdered. Gondebaut was now dead, and had left his dominions to his sons Sigismund and Godemar. Sigismund's forces were quickly defeated; and he himself was soon after delivered up by his own subjects to Clodomir, who caused him to be thrown into a pit, where he perished miserably. By his death Godemar became sole master of Burgundy. Clodomir marched against him, and defeated him; but pursuing his victory too eagerly, was surrounded by his enemies and slain. After the reduction of Thuringia, however, Childerbart and Clotaire entered the kingdom of Burgundy at the head of a powerful army, and in 534 completed the conquest of it; in which, according to some, Godemar was killed; according to others, he retired into Spain, and from thence into Africa.

In 560 Clotaire became sole monarch of France. He had murdered the sons of Clodomir, who was killed in Burgundy as above related. Thieri and his children were dead, as was also Childerbart; so that Clotaire was sole heir to all the dominions of Clovis. He had five sons; and the eldest of them, named *Chramnes*, had some time before rebelled against his father in Auvergne. As long as Childerbart lived, he supported the young prince; but on his death, Chramnes was obliged to implore his father's clemency. He was at this time pardoned; but he soon began to cabal afresh, and engaged the count of Bretagne to assist him in another rebellion. The Bretons, however, were defeated, and Chramnes determined to make his escape; but perceiving that his wife and children were surrounded by his father's troops, he attempted to rescue them. In this attempt he was taken prisoner, and with his family

was

France.

9 Clotaire becomes sole monarch.

France.

was thrust into a thatched cottage near the field of battle; of which the king was no sooner informed, than he commanded the cottage to be set on fire, and all that were in it perished in the flames.

Clotaire did not long survive this cruel execution of his son, but died in 562; and after his death the French empire was divided among his four remaining sons, Caribert, Gontran, Sigebert, and Chilperic.—The old king made no division of his dominions before he died, which perhaps caused the young princes to fall out sooner than they would otherwise have done. After his death, however, they divided the kingdom by lot; when Caribert, the eldest, had the kingdom of Paris; Gontran, the second, had Orleans; Sigebert, had Metz, (or the kingdom of Austrasia); and Chilperic had Soissons. Provence and Aquitaine were possessed by all of them in common. The peace of the empire was first disturbed in 563, by an invasion of the Abares; a barbarous nation, said to be the remains of the Huns. They entered Thuringia, which belonged to the dominions of Sigebert; but by him they were totally defeated, and obliged to repair the Elbe with precipitation. Sigebert pursued them close, but readily concluded a peace with them on their first proposals. To this he was induced, by hearing that his brother Chilperic had invaded his dominions, and taken Rheims and some other places in the neighbourhood. Against him, therefore, Sigebert marched with his victorious army, made himself master of Soissons his capital, and of the person of his eldest son Theodobert. He then defeated Chilperic in battle; and not only recovered the place which he had seized, but conquered the greater part of his dominions; nevertheless, on the mediation of the other two brothers, Sigebert abandoned all his conquests, set Theodobert at liberty, and thus restored peace to the empire.

Soon after this, Sigebert married Brunehaut daughter to Athanagild, king of the Visigoths in Spain; and in a little time after the marriage died Caribert king of Paris, whose dominions were divided among his three brethren. In 567 Chilperic married Galswintha, Brunehaut's eldest sister, whom he did not obtain without some difficulty. Before her arrival, he dismissed his mistress called *Fredegonde*; a woman of great abilities and firmness of mind, but ambitious to the highest degree, and capable of committing the blackest crimes in order to gratify her ambition. The queen, who brought with her immense treasures from Spain, and made it her whole study to please the king, was for some time entirely acceptable. By degrees, however, Chilperic suffered *Fredegonde* to appear again at court, and was suspected of having renewed his intercourse with her; which gave such umbrage to the queen, that she desired leave to return to her own country, promising to leave behind her all the wealth she had brought. The king, knowing that this would render him extremely odious, found means to dissipate his wife's suspicions, and soon after caused her to be privately strangled, upon which he publicly married *Fredegonde*.

Such an atrocious action would not fail of exciting the greatest indignation against Chilperic. His dominions were immediately invaded by Sigebert and Gontran, who conquered the greatest part of them; after which they suddenly made peace, Chilperic consenting that Brunehaut should enjoy those places which on

France.

his marriage he had bestowed upon Galswintha, viz. Bourdeaux, Limoges, Cahors, Bigorre, and the town of Bearn, now called *Lascar*.

The French princes, however, did not long continue at peace among themselves. A war quickly ensued, in which Gontran and Chilperic allied themselves against Sigebert. The latter prevailed, and having forced Gontran to a separate peace, seemed determined to make Chilperic pay dear for his repeated perfidy and infamous conduct; when he was assassinated by a contrivance of *Fredegonde*, who thus saved herself and Chilperic from the most imminent danger. Immediately on his death, Brunehaut fell into the hands of Chilperic; but Gondebaud, one of Sigebert's best generals, made his escape into Austrasia with Childbert, the only son of Sigebert, an infant of about five years of age, who was immediately proclaimed king in room of his father. In a short time, however, Meroveus, eldest son to Chilperic, fell in love with Brunehaut, and married her without acquainting his father. Chilperic, on this news, immediately went to Rouen, where Meroveus and his consort were; and having seized them, sent Brunehaut and her two daughters to Metz, and carried Meroveus to Soissons. Soon after, one of his generals being defeated by Gontran, who espoused Brunehaut's cause, Chilperic in a fit of rage caused Meroveus to be shaved and confined in a monastery. From hence he found means to make his escape, and with great difficulty arrived in Austrasia, where Brunehaut would gladly have protected him; but the jealousy of the nobles was so strong, that he was forced to leave that country; and being betrayed into the hands of his father's forces, was murdered, at the instigation of *Fredegonde*, as was generally believed.

The French empire was at this time divided between Gontran king of Orleans, called also king of Burgundy, Chilperic king of Soissons, and Childbert king of Austrasia. Chilperic found his affairs in a very disagreeable situation. In 579, he had a dispute with Varoc count of Bretagne, who refused to do him homage. Chilperic dispatched a body of troops against him; who were defeated, and he was then forced to clap up a dishonourable peace. His brother and nephew lived in strict union, and had no reason to be very well pleased with him. His own subjects, being oppressed with heavy taxes, were miserably poor and discontented. His son Clovis, by a former queen named *Andovera*, hated *Fredegonde*, and made no secret of his aversion. To add to his embarrassment, the seasons were for a long time so unfavourable, that the country was threatened with famine and pestilence at the same time. The king and queen were both attacked by an epidemic disease which then raged. They recovered; but their three sons, Clodobert, Samson, and Dagobert, died; after which, the sight of Clovis became so disagreeable to *Fredegonde*, that she caused him to be murdered, and likewise his mother *Andovera*, lest Chilperic's affection for her should return after the tragical death of her son.

In 583 Chilperic himself was murdered by some unknown assassins, when his dominions were on the point of being conquered by Gontran and Childbert, who had entered into a league for that purpose. After his death *Fredegonde* implored the protection of Gontran for herself and her infant son Clotaire; which he very

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The empire
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vided.

24
Sigebert was
assassinated.

11
Infamous
conduct of
Chilperic.

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peric.

France.

France.

readily granted, and obliged Childebert to put an end to the war. He found himself, however, greatly diffcult to keep Fredegonde and Brunehaut in awe; for these two princesses having been long rivals and implacable enemies, were continually plotting the destruction of each other. This, however, he accomplished by favouring sometimes Brunehaut and sometimes Fredegonde; so that, during his life, neither of them durst undertake any thing against the other.

14
Death of
Contran.

On the 28th of March 593, died Contran, having lived upwards of 60, and reigned 32 years. Childebert succeeded to his dominions without opposition, but did not long enjoy them; he himself dying in the year 596, and his queen shortly after. His dominions were divided between his two sons Theodobert and Thierry; the first of whom was declared king of Austrasia, and the latter king of Burgundy. As Theodobert was only in the 11th year of his age, and Thierry in his 10th, Brunehaut governed both kingdoms with an absolute sway. Fredegonde, however, took care not to let slip such a favourable opportunity as was offered her by the death of Childebert, and therefore made herself mistress of Paris and some other places on the Seine. Upon this Brunehaut sent against her the best part of the forces in Austrasia, who were totally defeated; but Fredegonde died before she had time to improve her victory, leaving her son Clotaire heir to all her dominions.

15
And Fre-
degonde.

For some time Brunehaut preserved her kingdom in peace; but in the end her own ambition proved her ruin. Instead of instructing Theodobert in what was necessary for a prince to know, she took care rather to keep him in ignorance, and even suffered him to marry a young and handsome slave of his father's. The new queen was possessed of a great deal of affability and good-nature; by which means she in a short time gained the affection of her husband so much, that he readily consented to the banishment of Brunehaut. Upon this disgrace she fled to Thierry king of Burgundy, in the year 599. By him she was very kindly received; and instead of exciting jealousies or misunderstandings between the two brothers, the engaged Thierry to attempt the recovery of Paris and the other places which had been wrested from their family by Fredegonde, procuring at the same time a considerable body of auxiliaries from the Visigoths. This measure was so acceptable to Theodobert, that he likewise raised a numerous army, and invaded Clotaire's dominions in conjunction with his brother. A battle ensued, in which the forces of Clotaire were totally defeated, and himself obliged soon after to sue for peace; which was not granted, but on condition of his yielding up the best part of his dominions.

16
Brunehaut
banished.

This treaty was concluded in the year 600; but three years afterwards, it was broken by Clotaire. He was again attacked by the two brothers, and the war carried on with great vigour till the next spring. At this time Thierry having forced Landri, Clotaire's general, to a battle, gave him a total overthrow, in which the king's infant son Meroveus, whom he had sent along with Landri, was massacred; to gratify, as Clotaire pretended, the malice of Brunehaut. After this victory, Thierry marched directly to Paris; fully bent on the destruction of his cousin, which now seemed inevitable. This, however, was prevented by Theodo-

bert; who no sooner heard of the victory gained by Thierry, than he became jealous of his success, and offered Clotaire such terms of peace as he gladly accepted. The latter having then nothing to fear on the side of Austrasia, quickly compelled Thierry to listen to terms of accommodation also.

This behaviour of Theodobert greatly provoked his brother; and his resentment was highly inflamed by Brunehaut, who never forgot her disgrace in being banished from his court. A war was therefore commenced between the two brothers in 605; but it was so highly disapproved of by the nobility, that Thierry found himself obliged to put an end to it. The tranquillity which now took place, was again disturbed in 607, by Theodobert's sending an embassy to demand some part of Childebert's dominions which had been added, by the will of that monarch, to those of Burgundy. The nobility of both kingdoms were so much averse to war, that they constrained their kings to consent to a conference, attended by an equal number of troops; but Theodobert, by a scandalous breach of his faith, brought double the number, and compelled his brother to submit to what terms he pleased. This piece of treachery instantly brought on a war; for Thierry was bent on revenge, and his nobility no longer opposed him. It was necessary, however, to secure Clotaire by a negotiation; and accordingly a promise was made of restoring those parts of his dominions which had formerly been taken from him, provided he would remain quiet. This treaty being finished, Thierry entered Theodobert's dominions, defeated him in two battles, took him prisoner, used him with the utmost indignity; and having caused an infant son of his to be put to death, sent him to his grandmother Brunehaut. By her orders he was first shaved and confined in a monastery; but afterwards, fearing lest he should make his escape, the caused him to be put to death.—Clotaire, in the mean time, thought that the best method of making Thierry keep his word was to seize on those places which he had promised to restore to him, before his return from the war with Theodobert. This he accordingly did; and Thierry no sooner heard of his having done so, than he sent him a message requiring him to withdraw his forces, and, in case of his refusal, declared war. Clotaire was prepared for this; and accordingly assembled all the forces in his dominions, in order to give him a proper reception. But before Thierry could reach his enemies, he was seized with a dysentery; of which he died in the year 612, having lived 26 years, and reigned 17.

17
Death of
Thierry.

On the death of Thierry, Brunehaut immediately caused his eldest son, named *Sigibert*, then in the 10th year of his age, to be proclaimed king. It is probable that she intended to have governed in his name with an absolute sway; but Clotaire did not give her time to discover her intentions. Having great intelligence in Austrasia and Burgundy, and knowing that the nobility in both kingdoms were disaffected to Brunehaut, he declared war against her; and the being betrayed by her generals, fell into the hands of her enemies. Clotaire gave her up to the nobles; who generally hated her, and who used her in the most cruel manner. After having led her about the camp, exposed to the insults of all who had the means to insult her, she was tied by the leg and arm to the tail of an

18
Brunehaut
put to a
cruel death.

un-

untamed horse, which, setting off at full speed, quickly dashed out her brains. After this her mangled body was reduced to ashes, which were afterwards interred in the abbey of St Martin at Autun.

Thus Clotaire became sole monarch of France; and quietly enjoyed his kingdom till his death, which happened in the year 628. He was succeeded by Dagobert; who proved a great and powerful prince, and raised the kingdom of France to a high degree of splendor. Dagobert was succeeded by his sons Sigebert and Clovis; the former of whom had the kingdom of Austrasia, and the latter that of Burgundy. Both the kings were minors at the time of their accession to the throne, which gave an opportunity to the mayors of the palace (the highest officers under the crown) to usurp the whole authority. Sigebert died in 640, after a short reign of one year; leaving behind him an infant son named *Dagobert*, whom he strongly recommended to the care of Grimoalde his mayor of the palace. The minister caused Dagobert to be immediately proclaimed king, but did not long suffer him to enjoy that honour. He had not the cruelty, however, to put him to death; but sent him to a monastery in one of the Western islands of Scotland; and then, giving out that he was dead, advanced his own son Childebert to the throne. Childebert was expelled by Clovis king of Burgundy; who placed on the throne Childeric, the second son of Sigebert. Clovis died soon after the revolution, and was succeeded in his dominions by his son Clotaire; who died in a short time, without issue. He was succeeded by his brother Childeric; who, after a short reign, was murdered with his queen, at that time big with child, and an infant son named *Dagobert*; tho' another, named *Daniel*, had the good luck to escape.

The affairs of the French were now in the most deplorable situation, without king, magistrates, or law of any kind; nor did this confusion end but with the total extinction of the family of Clovis. The princes of the Merovingian race were, in fact, deprived of their power by Pepin d'Heristal, who obliged Thierry king of Austrasia to receive him as mayor of the palace. He governed every thing in the most absolute manner; but, however, conducted matters with so much prudence, that the nation was very much respected during the time of his administration, which continued 28 years. He died in 711, and was succeeded in his post by his youngest son Theudobalde, at that time but six years old. In 717, Theudobalde was expelled by Charles Martel, Pepin's son by a former wife, who compelled the nominal king at that time to own him as mayor of the palace. He was attended with surprising success in all his undertakings; defeated the Arabs who invaded the kingdom*; overthrew the Frisians, and killed their duke with his own hands. At last he was chosen by pope Gregory III. for his protector. He offered to shake off his dependence on the Greek emperor, and to make Charles consul at Rome, sending him at the same time the keys of the tomb of St Peter. But while this affair was in agitation, Charles Martel died, and was succeeded in his power by his sons Carloman and Pepin.

Though Charles had never assumed the title of *sovereign*, he divided the empire between his sons as if he had been actually king. In 746, Carloman being weary of his greatness, retired into a convent, and

thus left Pepin absolute master of the empire; who, five years afterwards, resolved to assume the title of *king*, as he had long possessed the authority of one. This prince, surnamed *le Bref*, or the *Short*, was the first of the second race of French kings named *Carlovingian*; and was one of the greatest and most prudent monarchs that ever sat on the throne of France. He protected pope Stephen III. against Astolphus king of the Lombards, who had seized the exarchate of Ravenna, and insisted upon his being acknowledged king of Rome. Pepin conducted the pope, who had come to France, with an army back into Italy; besieged Astolphus in Pavia; and obliged him to renounce, not only all claim to the sovereignty of Rome, but also the exarchate of Ravenna, and all his other conquests in Italy. The exarchate he bestowed upon the pope; who, however, did not consider it as a gift from him, but only as the restoring to him a territory which was justly his right. Pepin was no sooner gone, than Astolphus broke the treaty he had concluded, and laid siege to Rome itself. However, the king of France very soon returned, and forced him to accept of a peace on vastly worse terms than before; after which he made a tour to Rome; but finding that his stay gave great uneasiness to the Greeks, as well as to the pope himself, he quickly left the city.

After his return to his own dominions, Pepin employed himself in regulating the national affairs; but was soon obliged to take the field against the duke of Aquitaine, which country he entirely reduced in the space of nine years. Soon after this, he died of a dropy at St Denis, in the year 768, the 17th of his reign, and 54th of his life.

Pepin was succeeded by his two sons Charles and Carloman. The latter, who was the younger, died in 769, the year after their accession to the throne; and thus Charles became sole master of the French empire, which he enlarged farther than ever it was either before or since. His first expedition was against the Saxons, who had long been tributaries to France, but frequently revolted, and now thought they had a good opportunity, by the death of Pepin, of freeing themselves from that tribute, which they regarded as an intolerable grievance. Charles, however, entered their country with a great army; and having defeated them in a number of small engagements, advanced to their capital post of Erfelbourg near Paderborn; where was the temple of their god Irminful, represented as a man completely armed, with a standard in one hand, placed on a column. The Saxons made an obstinate defence; but were at last obliged to yield, and Charles employed his army three days in demolishing the monuments of pagan superstition in this place. This disheartened them to such a degree, that they submitted to whatever terms he chose to prescribe; and which were rendered easier to them than, perhaps, they would have been, by the news which Charles now received from Italy.

Didier, king of the Lombards, having seized and frightened to death pope Stephen IV. endeavoured to the utmost of his power to reduce his successor Adrian I. to a state of dependence. The pope implored the assistance of Charles against his adversaries, and this Charles was very ready of himself to grant; but the nobility were so much averse to an Italian war, that he was obliged to act with the greatest circumspection.

He

France.

France

He sent, therefore, several embassies to Didier; in which, after expressing a great desire to preserve a strict harmony between the two nations, he at length offered him a large sum of money if he would restore the places he had taken from the pope. These offers being rejected, Charles at length obtained the consent of his nobility, and set out for Lombardy with a powerful army. Didier, however, had made such excellent dispositions, that all Charles's officers reckoned it would be impossible for him to force a passage. But Didier's troops being seized with a sudden panic, abandoned all their posts, and retired with precipitation. Charles pursued them with such impetuosity, that numbers were killed. Didier with one part of the troops took shelter in Pavia; the rest, under the command of his only son Adalgisie, threw themselves into Verona. Charles formed the siege of both places at once. Both of them were taken, after making a vigorous resistance. Didier fell into the hands of Charles, who carried him prisoner into France; but Adalgisie escaped to Constantinople: after which all the other places of strength in the country submitted to the conqueror, and thus Charles became master of the whole kingdom of the Lombards in a single campaign.

22
He conquers the Lombards.

After this success the king set out for Rome, whence he was very soon recalled by the news of a fresh revolt of the Saxons. Them he quickly reduced; but was next year obliged to return into Italy, in order to subdue some of the Lombard lords who had set up for independent princes. While he was employed in subduing them, the Saxons revolted, so that Charles found himself again under a necessity of returning into Germany. They submitted in a short time, and promised to become Christians; and the king took care now to force them to keep their promises, by building forts in several parts of the country.

23
His conquests in Spain and Germany.

In 778, being invited by some Moorish lords, he made an expedition into Spain. Here he took Pompeluna and Saragossa; after which, the emirs of Huesca and Jacca voluntarily submitted to him, as did also the governor of Barcelona and Gironne. Having taken all methods in his power to secure his new conquests, he set out on his return; but the Gascons, having attacked the rear of his army, cut off great numbers of his men. In 779 and 780, he was employed in quelling new insurrections in Saxony and Italy. The Saxons he treated with the utmost cruelty, causing 4500 prisoners to be beheaded at once, because they could not deliver up Witikind, one of their chiefs who had fled into Denmark. This piece of barbarity soon excited a general revolt; and it was not till the year 785, that Charles was able totally to reduce them. This, however, he at last accomplished, after having made terrible devastation.

All the endeavours of this great monarch, however, to keep his new subjects quiet, were ineffectual. He had no sooner finished this last conquest of the Saxons, than he was called into Italy to quiet some new insurrections which had taken place there. This was no sooner accomplished, than he was obliged to take the field against the Slavonians, who harassed some of his Germans subjects. In the mean time the duchy of Bavaria was harassed by the Huns to such a degree, that after subduing the Slavonians, Charles found it necessary to turn his arms against them. But while he meditated

this expedition the Saxons again revolted, and new troubles broke out in Italy. Charles behaved with the greatest prudence and resolution. In 794, he marched against the Saxons; and so great was their fear of him, that their army began to disband as soon as he entered the country. Upon this the Saxon chiefs sued for peace; which they could obtain upon no other terms than that they should receive the Christian clergy, and deliver up a third part of the army to be sent wherever he pleased. Hard as this last article was, they complied with it; and Charles distributed these Saxon troops on the coasts of Holland and Flanders, where they proved of great use in repelling the invasions of the Normans, who about this time began to be formidable. The war with the Abares, or Huns, was conducted by Pepin son to Charles, whom he had appointed king of Italy, and who is said to have almost extirpated the nation. After this Charles himself returned into Italy; and having there quieted all disturbances, he proceeded to Rome, where he was solemnly crowned emperor of the West by pope Leo III. in the year 800. He continued to reign with uninterrupted prosperity till the year 813; when he died of a pleurisy on the 28th of January, leaving the empire to his only surviving son, Lewis king of Aquitaine, whom he had before taken for his partner in the imperial dignity.

24
Is crowned emperor of the West.

The good fortune of Charles did not descend to his children. Lewis, though a very mild and religious prince, was by no means fit for governing those turbulent nations with whom he had to do. His reign, therefore, was a continued scene of troubles. His own children conspired against him; and more than once made him prisoner, and treated him with the utmost indignity. Lothaire, the eldest, even pronounced a formal sentence of deposition against him. At last, however, this ungrateful prince was obliged to submit to his father, and ask his pardon in the most humble manner; who forgave him, and did not punish his associates with such severity as they deserved. This lenity produced a fresh cabal among his children; and before they could be reduced the emperor died, being worn out with sickness and grief for the unnatural conduct of his sons.

Lewis left behind him three sons: Lothaire, whom he had associated with himself in the empire; Lewis, king of Bavaria; and Charles, only 17 years of age, king of France, under the tuition of his mother. On the death of their father, however, Lothaire attempted to seize the whole empire for himself; but after a long and ruinous war with his two brothers, was forced to consent to a new division: by which Charles had Aquitaine and all the country between the Loire and the Meuse; Lewis had the whole of Germany; and Lothaire, besides Italy, had the whole tract of country lying within the rivers Rhone, Rhine, Saone, Meuse, and Scheld. The whole of what he held on this side of the mountains, was from him called *Lotharingia*, and by corruption *Lorraine*; though this name is now given to a duchy which contains only a small part of that kingdom.

25
Empire divided into three parts.

This division happened in the year 845; and the empire was now so much weakened by the civil wars which had preceded, that it became a prey to the barbarous nations, who invaded it in on all sides. The Spanish dominions were almost entirely lost; the Bretons revolted, and could not be subdued; and in 855, Lothaire

26
Decline of its strength.

France.

thaire died, leaving his dominions among his three sons: so that, by the setting up of so many independent sovereigns, it was next to impossible that the empire could preserve its tranquillity, which had been so dearly bought. In fact, for a long time the history of France affords nothing but an account of civil discords. Charles (furnamed the *Bald*), king of France, by deceit got himself crowned emperor in preference to Lewis, who was his elder brother; and having made himself master of Italy, he thought it would be an easy matter to seize on all the dominions of his brother Lewis, who died about the year 876. In this, however, he was deceived; being defeated with great loss, and obliged totally to abandon the enterprise. Next year he himself was poisoned by a Jewish physician named *Zedechar*; and died in the 34th year of his reign, and 54th of his age.

Charles the Bald was succeeded by his only son, named *Lewis*; and, from an impediment in his speech, furnished the *Stammerer*. He was a prince of no great abilities; and as he found the affairs of the kingdom in considerable disorder at the time of his accession, so it was not in his power to extricate them from it. He died on the 10th of April 879, while on a march to suppress some insurrections in Burgundy. He left his queen *Adelaide* pregnant; who some time after his decease was delivered of a son, named *Charles*. After his death followed an interregnum; during which a faction was formed for setting aside the children of *Lewis* the *Stammerer*, in favour of the German princes, sons to *Lewis* the brother of *Charles* the *Bald*. This scheme, however, proved abortive; and the two sons of the late king, *Lewis* and *Carloman*, were crowned kings of France. Another kingdom, however, was at that time erected by an assembly of the states, namely, the kingdom of *Provence*, which consisted of the countries now called *Lyonnois*, *Savoys*, *Dauphiny*, *Franche Comte*, and part of the duchy of *Burgundy*; and this kingdom was given to duke *Boson*, brother-in-law to *Charles* the *Bald*. In 881, both kings of France died; *Lewis*, as was suspected, by poison; and *Carloman* of a wound he received accidentally while hunting. This produced a second interregnum; which ended with the calling in of *Charles* the *Gros*, emperor of Germany. His reign was more unfortunate than that of any of his predecessors. The Normans, to whom he had given leave to settle in *Friesland*, sailed up the *Seine* with a fleet of 700 ships, and laid siege to *Paris*. *Charles*, unable to force them to abandon their undertaking, prevailed on them to depart by a large sum of money. But as the king could not advance the money at once, he allowed them to remain in the neighbourhood of *Paris* during the winter; and they in return plundered the country, thus amassing vast wealth besides the sum which *Charles* had promised. After this ignominious transaction *Charles* returned to Germany, in a very declining state of health both as to body and mind. Here he quarrelled with his empress; and being abandoned by all his friends, he was despoiled, and reduced to such distress, that he would not even have had bread to eat, had not he been supplied by the archbishop of *Mentz*, out of a principle of charity.

On the deposition of *Charles* the *Gros*, *Eudes* count of *Paris* was chosen king by the nobility during the minority of *Charles* the son of *Adelaide*, afterwards

named *Charles* the *Simple*. He defeated the Normans, and repressed the power of the nobility; on which account a faction was formed in favour of *Charles*, who was sent for, with his mother, from England. *Eudes* did not enter into a civil war; but peaceably resigned the greatest part of the kingdom to him, and contented to do homage for the rest. He died soon after this agreement, in the year 898.

During the reign of *Charles* the *Simple*, the French government declined. By the introduction of siefs, those noblemen who had got into the possession of governments, having these confirmed to them and their heirs for ever, became in a manner independent sovereigns; and as these great lords had others under them, and they in like manner had others under them, and even these again had their vassals; instead of the easy and equal government which prevailed before, a vast number of insupportable little tyrannies were erected. The Normans, too, ravaged the country in the most terrible manner, and desolated some of the finest provinces in France. At last *Charles* ceded to *Rollo*, the king or captain of these barbarians, the duchy of *Neustria*; who thereupon became Christian, changed his own name to *Robert*, and that of his principality to *Normandy*.

During the remainder of the reign of *Charles* the *Simple*, and the entire reigns of *Lewis* IV. furnished the *Stranger*, *Lothaire*, and *Lewis* V. the power of the *Carlovingian* race continually declined; till at last they were supplanted by *Hugh* *Capet*, who had been created duke of France by *Lothaire*. This revolution happened in the year 987, and was brought about much in the same manner as the former one had been by *Pepin*. He proved an active and prudent monarch, and possessed other qualities as were requisite for keeping his tumultuous subjects in awe. He died on the 24th of October 997, leaving his dominions in perfect quiet to his son *Robert*.

The new king inherited the good qualities of his father. In his reign the kingdom was enlarged by the death of *Henry* duke of *Burgundy*, the king's uncle, to whom he fell heir. This new accession of territory, however, was not obtained without a war of several years continuance, on account of some pretenders to the sovereignty of that duchy; and had it not been for the assistance of the duke of *Normandy*, it is doubtful whether the king would have succeeded.—As *Robert* was of opinion, that peace and tranquillity were preferable to wide extended dominions with a precarious tenure, he resigned the kingdom of *Italy* and the imperial crown of Germany, both which were offered him. He died on the 20th of July 1030; having reigned 33 years, and lived 60.

Robert was succeeded by his eldest son *Henry* I. who in the beginning of his reign met with great opposition from his mother. She had always hated him; and preferred his younger brother *Robert*, in whose favour she now raised an insurrection. By the assistance of *Robert* duke of *Normandy*, however, *Henry* overcame all his enemies, and established himself firmly upon the throne. In return for this, he supported *William*, *Robert's* natural son, and afterwards king of *England*, in the possession of the duchy of *Normandy*. Afterwards, however, growing jealous of his power, he not only supported the pretenders to the duchy of

France.

27
Family of
Charles the
Great sup-
planted by
Hugh *Capet*

28
Robert.

29
Henry I.

Norm

France.

Normandy secretly, but invaded that country himself in their favour. This enterprize proved unsuccessful, and Henry was obliged to make peace: but no sincere reconciliation ever followed; for the king retained a deep sense of the disgrace he had met with, and the duke never forgave him for invading his dominions. The treaty between them, therefore, was quickly broken; and Henry once more invaded Normandy with two armies, once commanded by himself, and the other by his brother. The first was harassed by continual skirmishes, and the last totally defeated; after which Henry was obliged to agree to such terms as the duke thought proper: but the rancour between them never ceased, and was in reality the cause of that implacable aversion which for a long series of years produced perpetual quarrels between the kings of France and those of the Norman race in England.

Philip.³⁰

Henry died in 1059, not without a suspicion of being poisoned; and was succeeded by his eldest son Philip, at that time in the eighth year of his age. Baldwin earl of Flanders was appointed his guardian; and died in the year 1066, about the time that William of Normandy became king of England. After the death of his tutor, Philip began to shew a very insincere, haughty, and oppressive disposition. He engaged in a war with William the Conqueror, and supported his son Robert in his rebellion against him*. But after the death of William, he assisted Robert's brothers against him, by which means he was forced to consent to a partition of his dominions.

* See
England,
no 88.

In 1092, king Philip being wearied of his queen Bertha, procured a divorce from her under pretence of consanguinity, and afterwards demanded in marriage Emma daughter to Roger count of Calabria. The treaty of marriage was concluded; and the princess was sent over, richly adorned with jewels, and with a large portion in ready money: but the king, instead of espousing her, carried off from her husband the countess of Anjou, who was esteemed the handsomest woman in France. With her he was so deeply enamoured, that not satisfied with the illegal possession of her person, he procured a divorce between her and her husband, and prevailed upon some Norman bishops to solemnize his own marriage with her. The whole of these transactions, however, were so scandalous, that the pope having caused them to be revised in a council at Autun, in the year 1094, pronounced sentence of excommunication against Philip in case he did not part with the countess. On his repentance, the censure was taken off; but as the king paid no regard to his promises, he was, in 1095, excommunicated a second time. He again professed repentance, and was absolved; but soon after, living with the countess of Anjou as formerly, he was excommunicated a third time. This conduct, so unworthy of a prince, exposed him to the contempt of the people. Too many of the nobility followed his example, and at the same time despised his authority; not only making war upon each other, but spoiling and robbing his subjects with impunity.

In the year 1110, Philip prevailed on the court of Rome to have his affair reviewed in an assembly at Poitiers; where, notwithstanding his utmost efforts, sentence of excommunication was a fourth time pronounced against him. Yet, in spite of all these sen-

France.

tences, as queen Bertha was dead, and the count of Anjou offered, for a large sum of money, to give whatever assistance was requisite for procuring a dispensation, Philip at last prevailed, and the countess was proclaimed queen of France. But tho' the king's domestic affairs were now in some measure quieted, his negligence in government had thrown the affairs of the nation into the greatest disorder. He therefore associated with him in the government his eldest son Lewis. This prince was the very reverse of his father; and by his activity and resolution, keeping constantly in the field with a considerable body of forces, he reduced the rebellious nobility to subjection, and, according to the best historians, at this time saved the state from being utterly subverted.

For these services the queen looked upon the young prince with so jealous an eye, and gave him so much disturbance, that he found it necessary to retire for some time into England; where he was received by king Henry I. with the greatest kindness. He had not been long at court, before Henry received, by an express, a letter from Philip; telling him, that, for certain important reasons, he should be glad if he closely confined his son, or even dispatched him altogether. The king of England, however, instead of complying with this infamous request, shewed the letter to Lewis, and sent him home with all imaginable marks of respect. Immediately on his return, he demanded justice; but the queen procured poison to be given him, which operated so violently that his life was despaired of. A stranger, however, undertook the cure, and succeeded; only a paleness remained in the prince's face ever afterwards, though he grew so fat that he was surmised the Grosi.

On his recovery, the prince was on the point of revenging his quarrel by force of arms; but his father having caused the queen to make the most humble submissions to him, his resentment was at length appeased, and a perfect reconciliation took place.

Nothing memorable happened in the reign of king Philip after this reconciliation. He died in the year 1108, and was succeeded by his son Lewis the Grosi.³¹ The first years of his reign were disturbed by insurrections of his lords in different places of the kingdom; and these insurrections were the more troublesome, as they were secretly fomented by Henry I. of England, that by weakening the power of France his duchy of Normandy might be the more secure. This quickly brought on a war; in which Henry was defeated, and his son William obliged to do homage to Lewis for the duchy of Normandy. As the kings of England and France, however, were rivals, and exceedingly jealous of each other, the latter espoused the cause of William the son of Robert duke of Normandy, whom Henry had unjustly deprived of that duchy. This brought on a new war; in which Lewis, receiving a great defeat from Henry, was obliged to make peace upon such terms as his antagonist thought proper. This tranquillity, however, was but of short duration. Lewis renewed his intrigues in favour of William, and endeavoured to form a confederacy against Henry. In this, however, he was disappointed. Henry found means not only to dissipate this confederacy, but to prevail upon Henry V. emperor of Germany to invade France with the whole

France.

whole strength of the empire on one side, while he prepared to attack it on the other. But, Lewis having collected an army of 200,000 men, both of them thought proper to desist. Upon this the king of France would have marched into Normandy, in order to put William in possession of that duchy. His great vassals, however, told him they would do no such thing; that they had assembled in order to defend the territories of France from the invasion of a foreign prince, and not to enlarge his power by destroying that balance which arose from the king of England's possession of Normandy, and which they reckoned necessary for their own safety. This was followed by a peace with Henry; which, as both monarchs had now seen the extent of each other's power, was made on pretty equal terms, and kept during the life of Lewis, who died in 1137, leaving the kingdom to his son Lewis VII.

34
Lewis VII.
a weak
prince.

The young king was not endowed with any of those qualities which constitute a great monarch. From the superstition common to the age in which he lived, he undertook an expedition into the Holy Land, from whence he returned without glory. In this expedition he took his queen Eleanor along with him; but was so much offended with her gallantries during her stay there, as well as her behaviour afterwards, that he divorced her, and returned the duchy of Guienne which he received with her as a portion. Six weeks after this the married Henry duke of Normandy, count of Anjou and Maine, and heir apparent to the crown of England. This marriage was a very great mortification to Lewis; and procured him the surname of *the Young*, on account of the folly of his conduct. When Henry ascended the throne of England, some wars were carried on between him and Lewis, with little advantage on either side: at last, however, a perfect reconciliation took place; and Lewis took a voyage to England, in order to visit the shrine of St Thomas of Canterbury. On his return he was struck with an apoplexy; and though he recovered for that time, yet he continued ever after paralytic on the right side. After having languished for about a year under this malady, he died on the 18th of September 1180, leaving the kingdom to his son Philip.

33
Philip the
Great.

This prince, furnished *The Gift of God*, *The Magnanimous*, and *The Conqueror*, during his lifetime; and, as if all these titles had fallen short of his merit, styled *Augustus* after his death,—is reckoned one of the greatest princes that ever sat on the throne of France, or any other.—It doth not, however, appear that these titles were altogether well founded. In the beginning of his reign he was opposed by a strong faction excited by his mother. Them indeed he repressed with vigour and spirit which did him honour; but his taking part with the children of Henry II. of England in their unnatural contests with their father, and his treacherous combination with John to seize his brother's kingdom when he was detained in prison by the emperor of Germany, must be indelible stains in his character, and for ever exclude him from the title of *Magnanimous*. As to military skill and personal valour, he was evidently inferior to Richard I. of England; nor can his recovering of the provinces held by the English in France, from such a mean and dastardly prince as king John, entitle him with any justice to

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the surname of *Conqueror*. In politics he was evidently the dupe of the Pope, who made use of him to intimidate John into a submission, by promising him the kingdom of England, which he never meant that he should enjoy. An account of these transactions, which are the principal ones of this reign, is given under the article ENGLAND, n° 119—139.

34
Reign of
Lewis IX.

Philip died in 1223, and was succeeded by his son Lewis VIII.; and he, in 1226, by Lewis IX. afterwards styled *St Lewis*. This prince was certainly possessed of many good qualities, but deeply tainted with the superstition of the times. This induced him to engage in two crusades. The first was against the Saracens in Egypt: in which he was taken prisoner by the Infidels, and treated with great cruelty; but at last obtained his ransom, on condition of paying a million of pieces of gold, and surrendering the city of Damietta. He no sooner regained his liberty, than he entered Syria with a view of doing something worthy of his rank and character. From this expedition he was obliged to return sooner than he intended, by the news of the decease of his mother queen Blanch, whom he had appointed regent in his absence, and who had managed the national affairs with the greatest prudence. The king, however, found many disorders in the kingdom upon his return; and these he set himself to reform with the utmost diligence. Having succeeded in this, he yielded to Henry III. of England, the Limousin, Quercy, Perigord, and some other places; in consideration of Henry and his son prince Edward their renouncing, in the fullest manner, all pretensions to Normandy and the other provinces of France which the English had formerly possessed.

The reputation of this monarch for candour and justice was so great, that the barons of England, as well as king Henry III. consented to make him umpire of the differences which subsisted between them. But though he decided this matter very justly, his decision was not productive of any good effect. At last the king, having settled every thing relating to his kingdom in a proper manner, set out on another crusade for Africa; where he died of the plague, on the 25th of August 1270.

During the reigns of Philip the Hardy, Philip the Fair, Lewis Hutin or the *Quarrelsome*, Philip the Tall, and Charles the Fair, the French history affords no transactions which much affected the general state of the kingdom. The government, however, seems to have declined; the nation to have been in low circumstances; and the seeds of those disorders sown, which now brought it to the brink of ruin.

35
Cause of the
war with
Edward III.
of England.

Charles the Fair died in 1328 without male issue, but leaving his queen pregnant. As it was necessary in this case to appoint a regent, Philip count of Valois offered himself. His title was founded on his being the late king's cousin-german, and his nearest heir-male descended from a male. This title was disputed by Edward III. of England; who insisted, that he, as nephew to the deceased king, was a nearer relation than Philip. He acknowledged indeed, that his own title came by a female; but though he owned that females were incapable of holding the crown of France for themselves, yet he maintained that this incapacity did not extend to their male descendants. The parliament of France, however, thought otherwise; and

17 Y

there-

therefore sustained Philip's claim to the regency, in preference to that of Edward. Soon after, the queen dowager was delivered of a princefs, and thus Philip became poffeffed of the crown; and his attaining it in this manner procured him the furname of *the Fortunate*.

Philip was crowned at Rheims on the 29th of April 1328; and next year Edward III. of England came over to France, in order to do homage for the territories he had in that country, and to lay claim to fome lands in Guienne. Great difputes arofe about the nature of the homage he was to pay: Philip, however, contented himfelf with receiving homage in general terms; and was afterwards to examine his own archives at leifure, in order to determine what the nature of it was. On thefe terms Edward did homage in the cathedral at Amiens, on the 6th of June; and very foon after returned to England.

After a reasonable delay, the king fent ambaffadors into England, in order to explain the nature of the homage which Edward had done; and Edward being at that time embarraffed with his domeftic affairs, found it requifite to own the homage to be of that nature which he knew to be agreeable to Philip. Soon after this, Edward again came over to France in order to settle fome new difputes; and in a little time returned to England in perfect friendfhip with the French monarch. This difpofition, however, was of no long duration. Philip having found it neceffary to banifh Robert de Artois his own brother-in-law, on account of fome criminal practices, the latter fled to England; where being well received by Edward, he never ceafed to incenfe him againft Philip.

As both monarchs were poffeffed of great prudence and fagacity, they foon penetrated each other's designs. Philip, under pretence of taking the crofs, began to make prodigious armaments, ftrengthening himfelf at the fame time by alliances on every fide; while Edward, determining to renew his claim to the crown of France, projected the conqueft of Scotland. This, however, he could not accomplifh; and in the mean time Philip, in order to favour the Scots, with whom he was in alliance, fuffered his fubjects to make irruptions into Guienne.

In 1337, the war broke out openly. Philip having detached a fquadron of his fleet againft the Infidels, employed the reft, confifting chiefly of Genoefe veffels, againft the Englifh. As in this war it was of great importance which fide was taken by the Flemings, thefe people were courted by both parties. Lewis count of Flanders declared for Philip, but his fubjects were more inclined to king Edward. James Arteville a brewer, the moft able and artful man in the country, governed them at that time as much as if he had been their prince; and, the advantages arifing from the Englifh commerce determining him in favour of Edward, that prince, at his request, embarked for Sluis with a numerous army. Here he landed in 1338; and on his firft landing, it was refolved that the German princes in alliance with him fhould act againft France. But for this a pretence was wanting. The vaffals of the empire could not act by Edward's orders, or even as his allies, without directions from the emperor, and he was in league with France. This difficulty, however, was foon overcome: the French had made them-

felves mafters of Cambray, and the emperor refolved that it fhould be retaken. With this view he created Edward *Vicar General of the Empire*; an empty title, but which feemed to give him a right of commanding the fervices of the princes of Germany. The Flemings, who were vaffals of France, likewise pretended scruples at invading the territories of their liege lord. To quiet thefe, Edward, by the advice of Arteville, affumed the title of *king of France*; and by virtue of this right, challenged their affiftance for dethroning Philip de Valois, the ufurper of his kingdom. This ftep, which, he feared, would beget endless animofities and jealousies, he did not take without hesitation; and, according to Mr Hume, from this time we may date the commencement of that great animofity which the Englifh have always borne to the French.

Edward's firft attempt was upon the city of Cambray, to which he laid fiege; but in a fhort time he was prevailed upon by Robert de Artois, to raife the fiege and march into Picardy. This country he entered with an army of near 50,000 men, compofed moftly of foreigners. Philip came within fight of him with an army of near 100,000, compofed chiefly of native fubjects; and it was daily expected that a battle would enfue. But the Englifh monarch was averfe to engage againft fo great a fuperiority; and Philip thought it fufficient if he eluded the attacks of his enemy, without running any unneceffary hazard. The two armies faced each other for feveral days; mutual defiance was fent; and Edward at laft retired into Flanders, and difperfed his army.

Such was the fruitlefs, and almoft ridiculous conclufion of Edward's firft expedition, which had plunged him into the greateft difficulties. He had contracted near 300,000 pounds of debt; he had anticipated all his revenue; he had pawned every thing of value which belonged either to himfelf or his queen; nay, he was obliged in fome meafure even to pawn himfelf to his creditors, by defiring their permiffion to go over to England in order to procure fupply, and by promifing on his word of honour to return in perfon if he did not remit their money. On his arrival in England, however, he procured a large fupply, fufficient to enable him to make all the neceffary preparations for a new invasion; and fo certain were the Englifh that France would now be conquered, that the parliament, before Edward's departure, protefted that they owed him no obedience as king of France, but that the two kingdoms muft remain for ever diftinct and independent.

The king of England fet out on his fecond expedition with a fleet of 240 veffels. Philip had prepared a fleet of 400 veffels, manned with 40,000 men; which he ftationed off Sluis, in order to intercept him in his paffage. The two fleets met on the 13th of June 1340; but the Englifh, either by the fuperior abilities of Edward, or the greater dexterity of his feamen, gained the wind of the enemy, and had the fun in their backs; and with thefe advantages began the action. The battle was fierce and bloody: the Englifh archers, whose force and addrefs were now much celebrated, galled the French on their approach; and when the fhips grappled together, the example of the king and the nobility who were with him fo animated the feamen and foldiers, that they maintained every where a fuperiority over the enemy. The Flemings

36
Edward's
firft expedi-
tion.

37
His fecond
expedition.

39
The French
entirely de-
feated at
(ca.)

mings, observing the battle, hurried out of their ports, and brought a reinforcement to the English; which, coming unexpectedly, had a greater effect than in proportion to its power and numbers. Two hundred and thirty French ships were taken; and 30,000 Frenchmen were killed, with two of their admirals: the loss of the English was inconsiderable, compared to the greatness and importance of the victory. None of Philip's courtiers, it is said, dared to inform him of the event; till his fool or jester gave him a hint, by which he discovered the loss he had sustained.

After this great victory, Edward landed his forces, and laid siege to Tournay. Philip marched to its relief with a very numerous army; but acted with so much caution, that Edward found himself in a manner blocked up in his camp: and the countess dowager of Hainault, sister to Philip, mother-in-law to Edward, and sister-in-law to Robert de Artois, coming out of a convent, to which she had retired, interposed with so much spirit and address, that she engaged all parties to agree to a truce for a year; and might perhaps have brought about a peace, if she had survived.

In 1341, however, Edward's ambition was once more excited by the invitation of the count de Mountfort, who had possessed himself of the province of Brittany, and applied to Edward to second his claims. An offer of this kind entirely coincided with Edward's most sanguine desires. He was happy in the promised assistance of Mountfort, an active and valiant prince, closely united to him by interest, and thus opening to him an entrance into the heart of France. These flattering prospects, however, were for a while damped by the imprisonment of Mountfort; whose aims being discovered, he was besieged in the city of Nantz, and taken. But Jane of Flanders, his wife, soon made up for the loss of her husband. This lady courageously undertook to support the falling fortunes of her family. She assembled the inhabitants of Rennes, where she then resided; and carrying her infant son in her arms, deplored her misfortunes, and attempted to inspire the citizens with an affection for her cause. The inhabitants of Nantz instantly espoused her interests, and all the other fortress of Brittany embraced the same resolution. The king of England was apprised of her efforts; and was intreated to send her succours with all possible expedition to the town of Hennebone, in which place she resolved to sustain the attacks of the enemy. Charles de Blois, Philip's general, anxious to make himself master of so important a fortress as Hennebone, and still more to take the countess a prisoner, fat down before the place with a large army, and conducted the siege with indefatigable industry. The defence was no less vigorous; several sallies were made by the garrison, in which the countess herself was still the most active, and led on to the assault. Observing one day that their whole army had quitted the camp to join in a general storm, she sallied out by a postern at the head of 300 horse, set fire to the enemies tents and baggage, put their sutlers and servants to the sword, and occasioned such an alarm, that the French desisted from the assault, in order to cut off her communication with the town. Thus intercepted, she retired to Auray, where she continued five or six days; then returning at the head of 500 horse, she fought her way through one quarter of the French camp, and returned to her faith-

ful citizens in triumph. But the besiegers had at length made several breaches in the walls; and it was apprehended that a general assault, which was hourly expected, would be fatal. A capitulation was therefore proposed, and a conference was already begun, when the countess, who had mounted on a high tower, and was looking towards the sea with great impatience, descried some ships at a distance. She immediately exclaimed that succours were arrived, and forbid any further capitulation. She was not disappointed in her wishes; the fleet she discerned carried a body of English gentlemen, with 6000 archers, whom Edward had prepared for the relief of Hennebone, but who had been long detained by contrary winds. They entered the harbour, under the conduct of Sir Walter Manny, one of the most valiant commanders of his time. This relief served to keep up the declining spirits of the Bretons, until the time appointed by the late truce with Edward was expired, on which he was at liberty to renew the war in greater form.

He accordingly soon after landed at Morbion, near Vannes, with an army of 12,000 men; and being master of the field, where no enemy dared to appear against him, he endeavoured to give lustre to his arms by besieging some of the most capital of the enemy's fortifications. The vigour of his operations led on to another truce, and this was soon after followed by a fresh infraction. The truth is, neither side observed a truce longer than it coincided with their interests; and both had always sufficient art to throw the blame of perfidy from themselves. The earl of Derby was sent by Edward to defend the province of Guienne, with instructions also to take every possible advantage that circumstances might offer. At first, therefore, his successes were rapid and brilliant; but as soon as the French king had time to prepare, he met with a very unexpected resistance; so that the English general was compelled to stand upon the defensive. One fortress after another was surrendered to the French; till at length nothing appeared but a total extinction of the power of England upon the continent. In this situation, Edward resolved to bring relief in person to his distressed subjects and allies; and accordingly embarked in 1346 at Southampton, on board a fleet of near 1000 sail, of all dimensions. He carried with him, besides all the chief nobility of England, his eldest son, the prince of Wales (afterwards surnamed the *Black Prince*); a youth of about 15 years old, and already remarkable both for understanding and valour above his age. His army consisted of 4000 men at arms, 10,000 archers, 10,000 Welsh infantry, and 6000 Irish; all which he landed safely at La Hogue, a port in Normandy, which country he determined to make the seat of the war.

The intelligence of Edward's landing, and the devastation caused by his troops, who dispersed themselves over the whole face of the country, soon spread universal consternation through the French court. The rich city of Caen was taken and plundered by the English, without mercy; the villages and towns, even up to Paris, shared the same fate; and the French had no other resource but by breaking down their bridges, to attempt putting a stop to the invader's career. In the mean time, Philip was not idle in making preparations to repress the enemy. He had stationed one of his generals,

39
Edward in-
vited into
France a
third time.

40
He lands
with an ar-
my in Nor-
mandy.

als, Godemar de Faye, with an army on the opposite side of the river Somme, over which Edward was to pass; while he himself, at the head of 100,000 fighting men, advanced to give the English battle. Edward, thus unexpectedly exposed to the danger of being inclosed and starved in an enemy's country, published a reward to any that should bring him intelligence of a passage over the river Somme. This was discovered by a peasant of the country; and Edward had just time to get his whole army over the river, when Philip appeared in his rear.

41
The battle
of Crecy.

As both armies had been for some time in sight of each other, nothing was so eagerly expected on each side as a battle: and although the forces were extremely disproportioned, the English amounting only to 30,000, the French to 120,000; yet Edward resolved to indulge the impetuosity of his troops, and put all to the hazard of a battle. He accordingly chose his ground, with advantage, near the village of Crecy; and there determined to wait with tranquillity the shock of the enemy. He drew up his men on a gentle ascent, and divided them into three lines. The first was commanded by the young prince of Wales; the second was conducted by the earls of Northampton and Arundel; and the third, which was kept as a body of reserve, was headed by the king in person. As his small army was in danger of being surrounded, he threw up trenches on his flank; and placed all his baggage in a wood behind him, which he also secured by an entrenchment. Having thus made the proper dispositions, he and the prince of Wales received the sacrament with great devotion; and all his behaviour denoted the calm intrepidity of a man resolved on conquest or death. It is said also by some, that he first made use of artillery upon this occasion; and placed in his front some pieces, which contributed not a little to throw the enemy into disorder.

On the other side, Philip, impelled by resentment, and confident of his numbers, was more solicitous in bringing the enemy to an engagement, than prudent in taking measures for the success of it. He was advised by some of his generals to defer the combat till the ensuing day, when his army would have recovered from their fatigue, and might be disposed into better order than their present hurry permitted them to observe. But it was now too late; the impatience of his troops was too great to be restrained; they pressed one upon the other, and no orders could curb their blind impetuosity. They were led on, however, in three bodies to oppose those of the English. The first line, consisting 15,000 Genoese cross-bow men, were commanded by Anthony Doria. The second body was led by the count Alençon, brother to the king; and the king himself was at the head of the third.

About three in the afternoon, the famous battle of Crecy began, by the French king's ordering the Genoese archers to charge; but they were so fatigued with their march, that they cried out for a little rest before they should engage. The count Alençon, being informed of their petition, rode up and reviled them as cowards, commanding them to begin the onset without delay. Their reluctance to begin was still more increased by an heavy shower which fell that instant and relaxed their bow-strings, so that the discharge they made produced but very little effect. On the o-

ther hand, the English archers, who had kept their bows in cases, and were favoured by a sudden gleam of sun-shine, that rather dazzled the enemy, let fly their arrows so thick, and with such good aim, that nothing was to be seen among the Genoese but hurry, terror, and dismay. The young prince of Wales had presence of mind to take an advantage of their confusion, and to lead on his line to the charge. The French cavalry, however, commanded by count Alençon, wheeling round, sustained the combat, and began to hem the English round. The earls of Arundel and Northampton now came in to assist the prince, who appeared foremost in the very shock; and, wherever he appeared, turning the fortune of the day. The thickest of the battle was now gathered round him, and the valour of a boy filled even veterans with astonishment; but, being apprehensive that some mischance might happen to him in the end, an officer was dispatched to the king, desiring that succours might be sent to the prince's relief. Edward, who had all this time, with great tranquillity, viewed the engagement from a wind-mill, demanded with seeming deliberation if his son were dead: but being answered that he still lived, and was giving astonishing instances of valour; "Then tell my generals," (cried the king), "that he shall have no assistance from me; the honour of this day shall be his; let him shew himself worthy the profession of arms, and let him be indebted to his own merit alone for victory." This speech being reported to the prince and his attendants, it inspired them with new courage: they made a fresh attack upon the French cavalry; and count Alençon, their bravest commander, was slain. This was the beginning of their total overthrow: the French, being now without a competent leader, were thrown into confusion; the Welsh infantry rushed into the midst of the conflict, and dispatched those with their long knives who had survived the fury of the former onset. It was in vain that the king of France himself seemed almost singly to maintain the combat; he endeavoured to animate his few followers, both by his voice and example, but the victory was too decisive to be resisted; while he was yet endeavouring to face the enemy, John de Hainault seized the reins of his horse, and, turning him round, carried him off the field of battle. In this engagement, 30,000 of the French were killed upon the field: and, among this number, were John king of Bohemia; James, king of Majorca; Ralph, duke of Lorraine; 9 counts, 24 bannerets, 1200 knights, 1500 gentlemen, and 4000 men at arms. There was something remarkable in the fate of the Bohemian king; who, though blind, was yet willing to share in the engagement. This unfortunate monarch, inquiring the fate of the day, was told that all was lost, and his son Charles obliged to retire desperately wounded; and that the prince of Wales bore down every thing before him. Having received this information, blind as he was, he commanded his knights to lead him into the hottest part of the battle against the young warrior; accordingly, four of them rushed with him into the thickest part of the enemy, where they were all quickly slain.

The whole French army took to flight; and were put to the sword by the pursuers without mercy, till night stopped the carnage. The next morning was foggy; and a party of the militia of Rouen coming to join

42
French to-
tally defeat-
ed.

France.

join the French army, were routed by the English at the first onset; many more also were decoyed by some French standards, which the victors placed upon the mountains, and to which the fugitives resorted, where they were cut in pieces without mercy. Notwithstanding the great slaughter of the enemy, the conquerors lost but one esquire, three knights, and a few of inferior rank. The crest of the king of Bohemia was three ostrich feathers, with this motto, *Ich Dien*; which signifies, in the German language, "I serve." This was thought to be a proper prize to perpetuate the victory; it was accordingly added to the arms of the prince of Wales, and it has been adopted by all his successors.

43
Calais taken.

Edward next laid siege to Calais, which was then defended by John de Vienne, an experienced commander, and supplied with every thing necessary for defence. It was at length taken, after a twelvemonth's siege, the defendants having been reduced to the last extremity by famine and fatigue. The obstinate resistance, made by the townsmen, was not a little displeasing to Edward; and he had often declared, that when put in possession of the place, he would take signal revenge for the numbers of men he had lost during the siege. It was with great difficulty, therefore, that he was persuaded to accept of their submission; and to spare their lives, upon condition, that six of the most considerable citizens should be sent to him, to be disposed of as he should think proper: but on these he was resolved to wreck his resentment; and he gave orders that they should be led into his camp, bare-headed and barefooted, with ropes about their necks, in the manner of criminals just preparing for instant execution. When the news of this fierce resolution was brought into the city, it spread new consternation among the inhabitants. Who should be the men, that were thus to be offered up as victims to procure the safety of all the rest, and by their deaths appease the victor's resentment? In this terrible suspense, one of the principal inhabitants, whose name was *Eustace de St Pierre*, walked forward, and offered himself as willing to undergo any tortures that could procure his fellow-citizens safety. Five more soon followed his noble example; and these, marching out like criminals, laid the keys of their city at Edward's feet: but no submissions seemed to appease his resentment; and they would in all probability have suffered death, had not the generosity of their conduct affected the queen, who interceded in their behalf, and with some difficulty obtained their pardon.

In 1350, a short truce, which had been concluded between Edward and Philip, was dissolved by the death of the latter, who was succeeded by his son John; and Edward, well pleased with the factions that then prevailed in France, was resolved to seize the opportunity of increasing its distresses. Accordingly, the Black Prince was sent into France with an army, on board a fleet of 100 sail; and landing in Gascony, carried his devastations into the heart of the country. At the same time, Edward himself made an irruption on the side of Calais, at the head of a numerous army, and ravaged all the open country. On the other hand, John, who was as yet unprepared to oppose the progress of the enemy, continued a spectator of their insults; nor was it till the summer's campaign, in 1355, that he resolved to attack

France.

the Black Prince, whose army was by this time reduced to a body of about 12,000 men. With such a trifling complement of forces had this young warrior ventured to penetrate into the heart of France, with a design of joining the duke of Lancaster in Guienne. But he soon found that his scheme was impracticable: the country before him was too well guarded to permit his advancing further; and all the bridges behind were broken down, which effectually barred a retreat. In this embarrassing situation, his perplexity was increased, by being informed, that the king of France was actually marching at the head of 60,000 men to intercept him. He at first thought of retreating; but soon finding it impossible, he determined calmly to await the approach of the enemy; and, notwithstanding the disparity of forces, to commit all to the hazard of a battle.

It was at a place called *Mauportuis*, near Poitiers, ⁴⁴ Battle of Poitiers. that both armies came in sight of each other. The French king might very easily have harried the English into any terms he thought proper to impose; but such was the impatient valour of the French nobility, and such their certainty of success, that it might have been equally fatal to attempt repressing their ardour to engage. In the mean time, while both armies were drawn out, and expecting the signal to begin, they were stopped by the appearance of the cardinal of Perigord, who attempted to be a mediator between them. However, John, who made himself sure of victory, would listen to no other terms than the restitution of Calais; with which the Black Prince refusing to comply, the onset was deferred till the next morning, for which both sides waited in anxious suspense.

During this interval, the young prince strengthened his post by new entrenchments; and placed 300 men in ambush, with as many archers, who were commanded to attack the enemy in flank during the heat of the engagement. Having taken these precautions, he ranged his army in three divisions; the van was commanded by the earl of Warwick, the rear by the earls of Salisbury and Suffolk, and the main body by himself. In like manner, the king of France arranged his forces in three divisions; the first commanded by the duke of Orleans; the second by the Dauphin, attended by his younger brothers; while he himself led up the main body, seconded by his youngest and favourite son, then about 14 years of age. As the English were to be attacked only by marching up a long narrow lane, the French suffered greatly from their archers, who were posted on each side, behind the hedges. Nor were they in a better situation upon emerging from this danger, being met by the Black Prince himself, at the head of a chosen body of troops, who made a furious onset upon their forces, already in great disorder. A dreadful overthrow ensued: those who were as yet in the lane recoiled upon their own forces; while the English troops who had been placed in ambush, took that opportunity to increase the confusion, and confirm the victory. The dauphin and the duke of Orleans were among the first that fled. The king of France himself made the utmost efforts to retrieve, by his valour, what his rashness had forfeited: but his single courage was unable to stop that conflagration, which had now become general through his army; and his cavalry soon flying, he found himself exposed to the enemy's fury.

45
French defeated.

At

France.

46
King John
taken pri-
soner.

At length, spent with fatigue, and despairing of success, he thought of yielding himself a prisoner; and frequently cried out, that he was ready to deliver himself to his cousin the prince of Wales. The honour of taking him, however, was reserved for a much more ignoble hand; he was seized by Dennis de Morbec, a knight of Arras, who had been obliged to fly his country for murder.

In April following, the prince conducted his royal prisoner through London, attended by an infinite concourse of people of all ranks and stations. His modesty upon this occasion was very remarkable: the king of France was clad in royal apparel, and mounted on a white steed distinguished by its size and beauty; while the prince himself rode by his side upon a mean little horse, and in very plain attire.

47
Decline of
the English
affairs.

Notwithstanding all this success of the English, however, the conquest of France appeared very distant; nor could all the valour of the Black Prince afterwards accomplish any thing of moment. The dauphin, being created regent of France, collected all his forces; and, by acting on the defensive, prevented Edward from gaining any considerable advantage. All the considerable towns were put into a posture of defence, and every thing valuable in the kingdom was secured in fortified places. It was therefore at last concluded, that king John should be restored to liberty upon paying a ransom of about a million and a half of our money. It was stipulated, that Edward should for ever renounce all claim to the kingdom of France: and should only remain possessed of the territories of Poitou, Saintonge, l'Agenois, Perigord, the Limousin, Quercy, Rouvergne, l'Angoumois, and other districts in that quarter, together with Calais, Guines, Montreuil, and the county of Ponthieu on the other side of France. Some other stipulations were made in favour of the allies of England, as a security for the execution of these conditions.

48
John, un-
able to pay
his ransom,
returns to
England.

Upon John's return to his dominions, he found himself very ill able to ratify those terms of peace that had been just concluded. He was without finances, at the head of an exhausted state; his soldiers without discipline, and his peasants without subordination. There had risen in great numbers; and one of the chiefs of their banditti assumed the title of *The Friend of God, and the Terror of Man*. A citizen of Sens, named *John Gouge*, also got himself, by means of his robberies, to be acknowledged king; and he soon caused as many calamities by his devastations, as the real king had brought on by his misfortunes. Such was the state of that wretched kingdom, upon the return of its captive monarch: and yet, such was his absurdity, that he immediately prepared for a crusade into the Holy Land, before he was well replaced on the throne. Had his exhausted subjects been able to equip him for this chimerical project, it is probable he would have gone through with it; but their miseries were such, that they were even too poor to pay his ransom. This was a breach of treaty that John would not submit to; and he was heard to express himself in a very noble manner upon the occasion: "Tho' (says he) good faith should be banished from the rest of the earth, yet she ought still to retain her habitation in the breast of kings." In consequence of this declaration, he actually returned to England once more; and yielded

himself a prisoner, since he could not be honourably free. It is said by some, that his passion for the countess of Salisbury was the real cause of his journey: but we want at this time the foundations for such an injurious report. He was lodged in the Savoy, the palace where he had resided during his captivity; and soon after he closed a long and unfortunate reign, by his death, which happened in the year 1384, about the 56th year of his age.

Charles, surnamed *the Wise*, succeeded his father on the throne of France; and this monarch, merely by the force of a finely conducted policy, and even tho' suffering some defeats, restored his country once more to tranquillity and power. He quelled and dissipated a set of banditti, who had associated themselves under the name of *Companions*, and who had long been a terror to the peaceable inhabitants. He had them enrolled into a body, and led them into the kingdom of Castile against Peter, surnamed *the Cruel*, whom his subjects had dethroned, and who, by means of an alliance with the English, endeavoured to get himself reinstated upon the throne. In consequence of these alliances, the English and French again came to an engagement; their armies on the one side commanded by the Black Prince; on the other, by Henry of Transtamare, and Bertrand du Guesclin, one of the most consummate generals and accomplished characters of the age in which he lived. However, the usual good fortune of the English prince prevailed; the French lost above 20,000 men, while only four knights and 40 private men on the side of the English were slain.

Nevertheless, these victories were attended with very few good effects. The English, by their frequent levies, had been quite exhausted, and were unable to continue an army in the field. Charles, on the other hand, cautiously forbore coming to any decisive engagement; but was contented to let his enemies waste their strength in attempts to plunder a fortified country. When they were retired, he then was sure to fall forth, and possess himself of such places as they were not strong enough to defend. He first fell upon Ponthieu; the citizens of Abbeville opened their gates to him; those of St Valois, Rue, and Crotoy, imitated the example; and the whole country was, in a little time, reduced to total submission. The southern provinces were, in the same manner, invaded by his generals with equal success: while the Black Prince, destitute of supplies from England, and wasted by a cruel and consumptive disorder, was obliged to return to his native country, leaving his affairs in the south of France in a desperate condition.

In this exigence, the resentment of the king of England was excited to the utmost pitch; and he seemed resolved to take signal vengeance on his enemies of the continent. But the fortunate occasion was now elapsed; and all his succeeding designs were marked with ill success. The earl of Pembroke, and his whole army, were intercepted at sea, and taken prisoners by Henry king of Castile. Sir Robert Knolles, one of his generals on the continent, at the head of 30,000 men, was defeated by Bertrand du Guesclin; while the duke of Lancaster, at the head of 25,000 men, had the mortification of seeing his troops diminished one half by flying parties, without ever coming to a battle.

France.

49
Dies, and is
succeeded
by Charles
the Wise.

50
Bad success
of the Eng-
lish.

At last, the English affairs were totally ruined by the death of the Black Prince and king Edward. On receiving this news, the armies of Charles attacked the English on all sides. One, under the command of the duke of Burgundy, entered Artois; another entered Auvergne, under the command of the duke of Berry; that which acted in Guienne was commanded by the duke of Anjou; and the forces in Bretagne were under the constable Guesclin: the king himself had a powerful body of troops, that he might be able to repair any accident which should happen through the chance of war. The constable joined the duke of Burgundy, who found it difficult to oppose Sir Thomas Felton and the Seneschal of Bourdeaux. Soon after his arrival, the constable attacked and defeated them, making both the commanders prisoners of war. This victory was followed, that, at the close of the campaign 1377, Bayonne and Bourdeaux, with the districts about them, and the fortresses of Calais with its dependencies, were all the places left to England on the continent.

51
Charles VI.

In 1379 the king died; and was succeeded by his son Charles VI. at that time 12 years old. During his minority, the public affairs fell into confusion, and the people were plundered by the nobility with impunity. In 1385, a prodigious armament was fitted out against England. A vast fleet was assembled in the harbour of Sluys, and a very numerous army in the neighbourhood. According to some writers, the armament consisted of 1200 ships, 20,000 foot differently armed, 20,000 cavalry, and 20,000 cross-bow men. There was besides a vast wooden edifice or floating-town, which was contrived for the protection of the soldiers when landed; but all these preparations were at last brought to nothing through the obstinacy of the duke of Berry; who, having been originally against this measure, carried on his part of the armament so slowly, that he did not arrive at Sluys till the middle of September, when the season was so far advanced, that no invasion was practicable. A storm that happened soon after, drove the greatest part of the fleet on shore, and beat the wooden edifice all to pieces; the remains of which the king bestowed on the duke of Burgundy, to whom he gave also the port of Sluys, which was then very commodious, and of the utmost importance.

In 1391, one P. Craon attempted to assassinate the new constable de Clisson; and, (after having, with a band of ruffians, given him 50 wounds, of all which, however, he recovered), fled to Bretagne, where he was protected by the duke of that country. The king demanded the assassin to be given up to him in chains; but the duke answered, that he knew nothing of him: to which the king giving no credit, marched with all his forces into his territories. When the army arrived at Mans, the king was seized with a flow fever; but could not be prevailed upon to rest or take physic. On the 5th of August, having marched all day in the heat of the sun, a miserable, ragged, wild-looking fellow darted from behind a tree, and laying hold of the bridle of his horse, cried out, "Stop! where are you going, king? You are betrayed;" and immediately withdrew again into the wood. The king passed on, not a little disturbed; and soon after one of the pages, who rode behind and carried his lance, overcame with heat, fell asleep, and let it fall upon the helmet which was carried by the other. The king, hearing the noise, look-

ed about; and perceiving the page lifting the lance, killed him immediately: then riding furiously with his sword drawn, he struck on every side of him, and at every person, till he broke his sword; upon which one of his gentlemen leaped up behind him and held his arm. He fell soon after, and lay as if he had been dead; so that being taken up and bound in a wagon, he was carried back to Mans, where he lay two days in a lethargy, after which he came a little to himself. From this time the king continued frantic at intervals, which gave occasion to the greatest disorders throughout the kingdom. The administration of affairs was disputed between his brother Lewis duke of Orleans, and his cousin-german John duke of Burgundy. Isabella, his queen, also had her party; and the king vainly attempted to secure one likewise in his favour. Each of these, as they happened to prevail, branded their captives with the name of traitors; and the gibbets were at once hung with the bodies of the accused and the accusers. This, therefore, was thought by Henry V. of England a favourable opportunity to recover from France those grants that had been formerly given up by treaty. But previously, to give his intended expedition the appearance of justice, he sent over ambassadors to Paris, offering a perpetual peace and alliance, on condition of being put in possession of all those provinces which had been ravished from the English during some former reigns, and of espousing Catharine, the French king's daughter, in marriage, with a suitable dowry. Though the French court was at that time extremely averse to war, yet the exorbitance of these demands could not be complied with; and Henry very probably made them in hopes of a denial. He therefore assembled a great fleet and army at Southampton; and having allured all the military men of the kingdom to attend him, from the hopes of conquest, he put to sea, and landed at Harfleur, at the head of an army of 6000 men at arms, and 24,000 foot, mostly archers.

His first operations were upon Harfleur; which being pressed hard, promised at a certain day to surrender, unless relieved before that time. The day arriving, and the garrison, unmindful of their engagement, still resolving to defend the place, Henry ordered an assault to be made, took the town by storm, and put all the garrison to the sword. From thence, the victor advanced farther into the country, which had been already rendered desolate by factions, and which he now totally laid waste. But although the enemy made a feeble resistance, yet the climate seemed to fight against the English; a contagious dysentery carrying off three parts of Henry's army. In this situation, he had recourse to an expedient common enough in that barbarous age, to inspire his troops with confidence in their general. He challenged the dauphin, who commanded in the French army, to single combat, offering to stake his pretensions on the event. This challenge, as might naturally be expected, was rejected; and the French, though disagreeing internally, at last seemed to unite, at the appearance of the common danger. A numerous army of 14,000 men at arms, and 40,000 foot, was by this time assembled under the command of count Albert, and was now placed to intercept Henry's weakened forces on their return. The English monarch, when it was too late, began to re-

repeat

53
Is seized
with lunatic
fits.

53
Invasion by
Henry V. of
England.

France.

France.

pent of his rash inroad into a country, where disease and a powerful army every where threatened destruction; he therefore thought of retiring into Calais. In this retreat, which was at once both painful and dangerous, Henry took every precaution to inspire his troops with patience and perseverance; and shewed them in his own person the brightest example of fortitude and resignation. He was continually harraressed on his march by flying parties of the enemy; and whenever he attempted to pass the river Somme, across which his march lay, he saw troops on the other side ready to oppose his passage. However, he was so fortunate as to seize by surprise a passage near St Quintin, which had not been sufficiently guarded; and there he safely carried over his army.

54
Battle of
Azincourt.

But the enemy was still resolved to intercept his retreat: and after he had passed the small river of Ternois at Blangh, he was surprised to observe from the heights the whole French army drawn up in the plains of Azincourt; and so posted, that it was impossible for him to proceed on his march, without coming to an engagement. No situation could be more unfavourable than that in which he then found himself. His army was wasted by disease; the soldiers spirits worn down with fatigue; destitute of provisions, and discouraged by their retreat. Their whole body amounted but to 9000 men; and these were to sustain the shock of an enemy near ten times their number, headed by expert generals, and plentifully supplied with provisions. This disparity, as it depressed the English, so it raised the courage of the French in proportion; and so confident were these of success, that they began to treat for the ransom of their prisoners. Henry, on the other hand, though sensible of his extreme danger, did not omit any circumstance that could assist his situation. As the enemy were so much inferior, he drew up his army on a narrow ground between two woods, which guarded each flank; and patiently expected, in that position, the attack of the enemy. The constable of France was at the head of one army; and Henry himself, with Edward duke of York, commanded the other. For a time both armies, as if afraid to begin, kept silently gazing at each other, neither being willing to break their ranks by making the onset: which Henry perceiving, with a cheerful countenance he cried out, "My friends, since they will not begin, it is ours to let them the example; come on, and the blessed Trinity be our protection." Upon this, the whole army set forward with a shout, while the French still continued to wait their approach with interdict. The English archers, who had long been famous for their great skill, first let fly a shower of arrows three feet long, which did great execution. The French cavalry advancing to repel these, 200 bow-men, who lay till then concealed, rising on a sudden, let fly among them, and produced such a confusion, that the archers threw by their arrows, and, rushing in, fell upon them sword in hand. The French at first repulsed the assailants, who were enfeebled by disease: but these soon made up the defect by their valour; and, resolving to conquer or die, burst in upon the enemy with such impetuosity, that the French were obliged to give way.

In the mean time a body of English horse, which had been concealed in a neighbouring wood, rushing out, flanked the French infantry, and a general disor-

der began to ensue. The first line of the enemy being routed, the second line began to march up to interrupt the progress of the victory. Henry, therefore, alighting from his horse, presented himself to the enemy with an undaunted countenance; and at the head of his men fought on foot, encouraging some and assisting others. Eighteen French cavaliers, who were resolved to kill him, or die in the attempt, rushing from the ranks together, advanced; and one of them stunned the king with a blow of his battle-ax. They then fell upon him in a body; and he was upon the point of sinking under their blows, when David Gam, a valiant Welshman, aided by two of his countrymen, came up to the king's assistance, and soon turned the attention of the assailants from the king to themselves, till at length, being overpowered, they fell dead at his feet. Henry had by this time recovered his senses; and fresh troops advancing to his relief, the 18 French cavaliers were slain; upon which he knighted the Welshman who had so valiantly fallen in his defence. The heat of the engagement still increasing, Henry's courage seemed also to increase; and the most dangerous situation was where he fought in person: his brother, who was stunned by a blow, fell at his feet; and while the king was endeavouring to succour him, he received another blow himself, which threw him upon his knees. But he soon recovered: and leading on his troops with fresh ardour, they ran headlong upon the enemy; and put them into such disorder, that their leaders could never after bring them to the charge. The duke of Alençon, who commanded the second line, seeing it fly, resolved by one desperate stroke to retrieve the fortune of the day, or fall in the attempt. Wherefore, running up to Henry, and at the same time crying aloud, "that he was the duke of Alençon," he discharged such a blow on his head, that it carried off a part of the king's helmet; while, in the mean time, Henry, not having been able to ward off the blow, returned it, by striking the duke to the ground, and he was soon killed by the surrounding crowd, all the king's efforts to save him proving ineffectual. In this manner, the French were overthrown in every part of the field; their number, being crowded into a very narrow space, were incapable of either flying, or making any resistance; so that they covered the ground with heaps of slain. After all appearance of opposition was over, the English had leisure to make prisoners; and having advanced with uninterrupted success to the open plain, they there saw the remains of the French rear-guard, which still maintained a show of opposition. At the same time was heard an alarm from behind, which proceeded from a number of peasants, who had fallen upon the English baggage, and were putting those who guarded it to the sword. Henry, now seeing the enemy on all sides of him, began to entertain apprehensions from his prisoners, the number of whom exceeded even that of his army. He thought it necessary, therefore, to issue general orders for putting them to death; but on the discovery of the certainty of his victory, he stopped the slaughter, and was still able to save a great number.

This battle was very fatal to France, the number of princes and nobility slain or taken prisoners. The killed are computed on the whole to have amounted to 10,000 men; and as the loss fell chiefly upon the

55
French de-
fated.

France.

cavalry, it is pretended, that of these 8000 were gentlemen. The number of prisoners are computed at 14,000. All the English who were slain did not exceed 40; a number amazingly inconsiderable, if we compare the loss with the victory.

This victory, gained on the 25th of October 1415, how great soever it might have been, was attended with no immediate effects. Henry still continued to retreat after the battle of Azincourt, out of the kingdom; and carried his prisoners to Calais, and from thence to England. In 1517, he once more landed an army of 25,000 men in Normandy; and prepared to strike a decisive blow for the crown of France, to which the English monarchs had long made pretensions. That wretched country was now in a most deplorable situation. The whole kingdom appeared as one vast theatre of crimes, murders, injustice, and devastation. The duke of Orleans was assassinated by the duke of Burgundy; and the duke of Burgundy, in his turn, fell by the treachery of the dauphin. At the same time, the duke's son, desirous of revenging his father's death, entered into a secret treaty with the English; and a league was immediately concluded at Arras, between Henry and the young duke of Burgundy, in which the king promised to revenge the murder of the late duke; and the son seemed to insist upon no further stipulations. Henry, therefore, proceeded in his conquests, without much opposition from any quarter. Several towns and provinces submitted on his approach; the city of Rouen was besieged and taken; Pontoise and Gisors he soon became master of. He even threatened Paris by the terror of his power, and obliged the court to remove to Troye. It was at this city that the duke of Burgundy, who had taken upon him the protection of the French king, met Henry in order to ratify that treaty which was formerly begun, and by which the crown of France was to be transferred to a stranger. The imbecility into which Charles had fallen, made him passive in this remarkable treaty; and Henry dictated the terms throughout the whole negotiation. The principal articles of this treaty were, That Henry should espouse the princess Catharine; that king Charles should enjoy the title and dignity of king for life; but that Henry should be declared heir to the crown, and should be intrusted with the present administration of the government; that France and England should for ever be united under one king, but should still retain their respective laws and privileges; that Henry should unite his arms with those of king Charles and the duke of Burgundy, to depress and subdue the dauphin and his partizans.

It was not long after this treaty, that Henry married the princess Catharine; after which he carried his father-in-law to Paris, and took a formal possession of that capital. There he obtained, from the estates of the kingdom, a ratification of the late compact; and then turned his arms, with success, against the adherents of the dauphin, who, in the mean time, wandered about a stranger in his own patrimony, and to his enemies successful only opposed fruitless expostulations.

Henry's supplies were not provided in such plenty as to enable him to carry on the war, without returning in person to prevail upon his parliament for fresh succours; and upon his arrival in England, though

he found his subjects highly pleased with the splendor of his conquests, yet they seemed somewhat doubtful as to the advantage of them. A treaty, which in its consequences was likely to transfer the seat of empire from England, was not much relished by the parliament. They therefore, upon various pretences, refused him a supply equal to his exigencies or his demands; but he was resolved on pursuing his schemes; and, joining to the supplies granted at home, the contributions levied on the conquered provinces, he was able once more to assemble an army of 28,000 men, and with these he landed safely at Calais.

In the mean time, the dauphin, a prince of great prudence and activity, omitted no opportunity of repairing his ruined situation, and to take the advantage of Henry's absence from France. He prevailed upon the regent of Scotland to send him a body of 8000 men from that kingdom; and with these, and some few forces of his own, he attacked the duke of Clarence, who commanded the troops in Henry's absence, and gained a complete victory.

This was the first action which turned the tide of success against the English. But it was of short duration: for Henry soon after appearing with a considerable army, the dauphin fled at his approach; while many of the places, which held out for the dauphin in the neighbourhood of Paris, surrendered to the conqueror. In this manner, while Henry was every where victorious, he fixed his residence at Paris; and while Charles had a small court, he was attended with a very magnificent one. On Whit Sunday 1421, the two kings and their two queens with crowns on their heads dined together in public; Charles receiving apparent homage, but Henry commanding with absolute authority.

In the mean time, the dauphin was chafed beyond the Loire, and almost totally dispossessed of all the northern provinces. He was even pursued into the south, by the united arms of the English and Burgundians, and threatened with total destruction. In this exigence, he found it necessary to spin out the war, and to evade all hazardous actions with a rival who had been long accustomed to victory. His prudence was every where remarkable; and, after a train of long persecutions from fortune, he found her at length willing to declare in his favour, by the death of the king of England.

Charles VI. died a short time after; and Charles VII. succeeded his father to a nominal throne. Nothing could be more deplorable than the situation of that monarch on assuming his title to the crown. The English were masters of almost all France; and Henry VI. though yet but an infant, was solemnly invested with regal power by legates from Paris. The duke of Bedford was at the head of a numerous army, in the heart of the kingdom, ready to oppose every insurrection; while the duke of Burgundy, who had entered into a firm confederacy with him, still remained steadfast, and seconded his claims. Yet, notwithstanding these favourable appearances, Charles found means to break the leagues formed against him, and to bring back his subjects to their natural interests and their duty.

However, his first attempts were totally destitute of success. Wherever he endeavoured to face the enemy he was overthrown, and he could scarcely rely on the

56
Henry
lands again
in Nor-
mandy.

57
He marries
the princess
Catharine.

France.

58
Death of
Henry and
Charles.

59
Desperate
situation of
Charles VII.

friends next his servant. His authority was insulted even by his own persons; advantage after advantage was gained against him; and a battle fought near Verneuil, in which he was totally defeated by the duke of Bedford, seemed to render his affairs altogether desperate. But from the impossibility of the English keeping the field without new supplies, Bedford was obliged to retire into England; and, in the mean time, his vigilant enemy began to recover from his late consternation. Dunois, one of his generals, at the head of 1000 men, compelled the earl of Warwick to raise the siege of Montargis; and this advantage, slight as it was, began to make the French suppose that the English were not invincible.

60
The French
affairs re-
trieved by
the Maid
of Orleans.

But they soon had still greater reason to triumph in their change of fortune, and a new revolution was produced by means apparently the most unlikely to be attended with success. In the village of Domremi, near Vaucouleurs, on the borders of Lorraine, there lived a country-girl, about 27 years of age, called *Joan of Arc*. This girl had been a servant at a small inn; and in that humble station had submitted to those hardy employments which fit the body for the fatigues of war. She was of an irreproachable life, and had hitherto testified none of those enterprising qualities which displayed themselves soon after. She contentedly fulfilled the duties of her situation, and was remarkable only for her modesty and love of religion. But the miseries of her country seemed to have been one of the greatest objects of her compassion and regard. Her mind inflamed by these objects, and brooding with melancholy steadfastness upon them, began to feel several impulses, which she was willing to mistake for the inspirations of heaven. Convinced of the reality of her own admonitions, she had recourse to one Baudricourt, governor of Vaucouleurs, and informed him of her destination by heaven to free her native country of its fierce invaders. Baudricourt treated her at first with neglect: but her importunities at length prevailed; and willing to make a trial of her pretensions, he gave her some attendants, who conducted her to the court, which at that time resided at Chinon.

The French court were probably sensible of the weakness of her pretensions; but they were willing to make use of every artifice to support their declining fortunes. It was therefore given out, that Joan was actually inspired; that she had been able to discover the king among the number of his courtiers, although he had laid aside all the distinctions of his authority; that she had told him some secrets, which were only known to himself; and that she had demanded, and minutely described, a sword in the church of St Catharine de Fierbois, which she had never seen. In this manner, the minds of the vulgar being prepared for her appearance, she was armed cap-à-pie, and shown in that martial dress to the people. She was then brought before the doctors of the university; and they, tinctured with the credulity of the times, or willing to second the imposture, declared that she had actually received her commission from above.

When the preparations for her mission were completely blazoned, the next aim was to send her against the enemy. The English were at that time besieging the city of Orleans, the last resource of Charles, and every thing promised them a speedy surrender. Joan

undertook to raise the siege; and to render herself still more remarkable, girded herself with the miraculous sword, of which she before had such extraordinary notices. Thus equipped, she ordered all the soldiers to confess themselves before they set out; the displayed in her hand a consecrated banner, and assured the troops of certain success. Such confidence on her side soon raised the spirits of the French army; and even the English, who pretended to despise her efforts, felt themselves secretly influenced with the terrors of her mission. A supply of provisions was to be conveyed into the town; Joan, at the head of some French troops, covered the embarkation, and entered Orleans at the head of the convoy which she had safely protected. While she was leading her troops along, a dead silence and astonishment reigned among the English; and they regarded with religious awe that temerity, which they thought nothing but supernatural assistance could inspire. But they were soon roused from their state of amazement by a sally from the town; Joan led on the besieged, bearing the sacred standard in her hand, encouraging them with her words and actions, bringing them to the trenches, and overpowering the besiegers in their own redoubts. In the attack of one of the forts, she was wounded in the neck with an arrow; but instantly pulling out the weapon with her own hands, and getting the wound quickly dressed, she hastened back to head the troops, and to plant her victorious banner on the ramparts of the enemy. These successes continuing, the English found that it was impossible to resist troops animated by such superior energy; and Suffolk, who conducted the attack, thinking that it might prove extremely dangerous to remain any longer in the presence of such a courageous and victorious enemy, raised the siege, and retreated with all imaginable precaution.

From being attacked, the French now in turn became the aggressors. Charles formed a body of 6000 men, and sent them to besiege Jargeau, whither the English, commanded by the earl of Suffolk, had retired, with a detachment of his army. The city was taken; Suffolk yielded himself a prisoner; and Joan marched into the place in triumph, at the head of the army. A battle was soon after fought near Patay, where the English were worsted, as before; and the generals, Scyles and Talbot, were taken prisoners.

The raising of the siege of Orleans was one part of the maid's promise to the king of France; the crowning him at Rheims was the other. She now declared, that it was time to complete that ceremony; and Charles, in pursuance of her advice, set out for Rheims at the head of 12,000 men. The towns thro' which he passed opened their gates to receive him; and Rheims sent him a deputation, with its keys, upon his approach. The ceremony of his coronation was there performed with the utmost solemnity; and the Maid of Orleans (for so she was now called) seeing the completion of her mission, desired leave to retire, alleging, that she had now accomplished the end of her calling. But her services had been so great, that the king could not think of parting with her; he pressed her to stay so earnestly, that she at length complied with his request.

A tide of successes followed the performance of this solemnity; Laon, Soissons, Chateau-Thierry, Provins,

France

France

vins, and many other fortresses in that neighbourhood, submitted to him on the first summons. On the other hand, the English, discomfited and dispirited, fled on every quarter; not knowing whether to ascribe their misfortunes to the power of sorcery, or to a celestial influence; but equally terrified at either. They now found themselves deprived of the conquests they had gained, in the same manner as the French had formerly submitted to their power. Their own divisions, both abroad and at home, unfitted them entirely for carrying on the war; and the duke of Bedford, notwithstanding all his prudence, saw himself divested of his strong-holds in the country, without being able to stop the enemy's progress. In order, therefore, to revive the declining state of his affairs, he resolved to have Henry crowned king at Paris, knowing that the natives would be allured to obedience by the splendour of the ceremony. In 1430, Henry was accordingly crowned, all the vassals that still continued under the English power swearing fealty and homage. But it was now too late for the ceremonies of a coronation to give a turn to the affairs of the English; the generality of the kingdom had declared against them, and the remainder only waited a convenient opportunity to follow the example.

An accident ensued soon after, which, though it promised to promote the English cause in France, in the end served to render it odious, and conducted to the total evacuation of that country. The duke of Burgundy, at the head of a powerful army, had laid siege to Compeign; and the Maid of Orleans had thrown herself into the place, contrary to the wishes of the governor, who did not desire the company of one whose authority would be greater than his own. The garrison, however, were rejoiced at her appearance, and believed themselves invincible under her protection. But their joy was of short duration; for Joan having the day after her arrival headed a sally, and twice driven the enemy from their intrenchments, she was at last obliged to retire, placing herself in the rear, to protect the retreat of her forces. But in the end, attempting to follow her troops into the city, she found the gates shut, and the bridge drawn up by order of the governor, who is said to have long wished for an opportunity of delivering her up to the enemy.

Nothing could exceed the joy of the besiegers, in having taken a person who had been so long a terror to their arms. The service of Te Deum was publicly celebrated on this occasion; and it was hoped, that the capture of this extraordinary person would restore the English to their former victories and successes. The duke of Bedford was no sooner informed of her being taken, than he purchased her of the count Vendome, who had made her his prisoner, and ordered her to be committed to close confinement. The credulity of both nations was at that time so great, that nothing was too absurd to gain belief, that coincided with their passions. As Joan but a little before, from her successes, was regarded as a saint, she was now, upon her captivity, considered as a sorceress, forsaken by the demon who had granted her a fallacious and temporary assistance. Accordingly it was resolved in council to send her to Rouen to be tried for witchcraft: and the bishop of Beauvais, a man wholly devoted to the English interest, presented a petition against her for

that purpose. The university of Paris was so mean as to join in the same request. Several prelates, among whom the cardinal of Winchester was the only Englishman, were appointed as her judges. They held their court in Rouen, where Henry then resided; and the Maid, clothed in her former military apparel, but loaded with irons, was produced before this tribunal. Her behaviour there noway disgraced her former gallantry; she betrayed neither weakness nor womanish submission; but appealed to God and the pope for the truth of her former revelations. In the issue, she was found guilty of heresy and witchcraft; and sentenced to be burnt alive, the common punishment for such offences.

But previous to the infliction of this dreadful sentence upon her, they were resolved to make her abjure her former errors; and at length so far prevailed upon her, by terror and rigorous treatment, that her spirits were entirely broken, by the hardships she was obliged to suffer. Her former visionary dreams began to vanish, and a gloomy distrust to take place of her late inspirations. She publicly declared herself willing to recant, and promised never more to give way to the vain delusions which had hitherto misled her, and imposed on the people. This was what her oppressors desired; and willing to shew some appearance of mercy, they changed her sentence into perpetual imprisonment, and to be fed during life on bread and water. But the rage of her enemies was not yet fatiated. Suspecting that the female dress, which she had consented to wear, was disagreeable to her, they purposely placed in her apartment a suit of men's apparel, and watched for the effect of their temptation upon her. Their cruel artifices prevailed. Joan, struck with the sight of a dress in which she had gained so much glory, immediately threw off her penitent's robes, and put on the forbidden garment. Her enemies caught her equipped in this manner; and her imprudence was considered as a relapse into her former transgressions. No recantation would suffice, and no pardon would be granted. She was condemned to be burnt alive in the market-place of Rouen; and this infamous sentence was accordingly executed with most brutal severity.

One of the first misfortunes which the English felt after this punishment, was the defection of the duke of Burgundy; who had for some time seen the error of his conduct, and wished to break an unnatural connection, that only served to involve his country in ruin. A treaty was therefore begun, and concluded, between him and Charles, in which the former agreed to assist him in driving the English out of France. This was a mortal blow to their cause; and such was its effects upon the populace of London, when they were informed of it, that they killed several of the duke of Burgundy's subjects, who happened to be among them at the time. It might perhaps also have hastened the duke of Bedford's death, who died at Rouen a few days after the treaty was concluded; and the earl of Cambridge was appointed his successor to the regency of France.

From this period, the English affairs became totally irretrievable. The city of Paris returned once more to a sense of its duty. Lord Willoughby, who commanded it for the English, was contented to stipulate

61
Henry VI.
of England
crowned
king of
France.

62
Maid of
Orleans
taken pri-
soner.

63
And cruel-
ly put to
death.

64
Affairs of
England to-
tally ruin-
ed.

France.

for the safe retreat of his troops to Normandy. Thus ground was continually, though slowly, gained by the French; and notwithstanding their fields were laid waste, and their towns depopulated, yet they found protection from the weakness and divisions of the English. At length, both parties began to grow weary of a war, which, though carried on but feebly, was yet a burden greater than either could support. But the terms of peace insisted upon by both were so wide of each other, that no hopes of an accommodation could quickly be expected. A truce, therefore, for twenty-two months, was concluded in 1443, which left every thing on the present footing between the parties. No sooner was this agreed upon, than Charles employed himself with great industry and judgment in repairing those numberless ills to which his kingdom, from the continuance of wars, both foreign and domestic, had so long been exposed. He established discipline among his troops, and justice among his governors. He revived agriculture, and repressed faction. Thus being prepared once more for taking the field, he took the first favourable occasion of breaking the truce; and Normandy was at the same time invaded by four powerful armies; one commanded by Charles himself, a second by the duke of Brittany, a third by the count of Alençon, and a fourth by the count Dunois. Every place opened their gates almost as soon as the French appeared before them. Rouen was the only one that promised to hold out a siege; but the inhabitants clamoured so loud for a surrender, that the duke of Somerset, who commanded the garrison, was obliged to capitulate. The battle, or rather the skirmish, of Fourmings, was the last stand which the English made in defence of their French dominions. However, they were put to the rout, and above a thousand were slain. All Normandy and Guienne, that had so long acknowledged subjection to England, were lost in the space of a year; and the English saw themselves entirely dispossessed of a country, which for above three centuries they had considered as annexed to their native dominions. Calais alone remained of all their conquests; and this was but a small compensation for the blood and treasure which had been lavished in that country, and only served to gratify ambition with a transient applause.

65
Death of
Charles VII.

Charles having thus expelled the English, found himself involved in domestic troubles. His son Lewis rebelled against him, and neither the king's valour nor wisdom were sufficient to bring him back to a sense of his duty. The king died in 1461, of a very strange disorder. One of his old servants intimated to him that he would do well to be cautious, since there was reason to suspect a design to poison him: which affected the king to such a degree, that he obstinately refused all sustenance for several days; and being at length persuaded to eat, it proved too late, for his bowels were collapsed, and nothing would pass. He died on the 22d of July 1461, in the 60th year of his age, and 39th of his reign.

66
Lewis XI.

Lewis XI. who succeeded his father Charles, was reckoned one of the greatest politicians that ever existed. He managed all his affairs with his neighbours, indeed, in such a manner as always to have the advantage over them, though this was often very much to the detriment of his moral character. He united to the

France.

crown of France, Burgundy, Anjou, Maine, Bar, and Provence, the best part of the county of Artois, and some great towns in Picardy; together with the counties of Rouillon, Cerdagne, and Boulogne. He first used the title of *Most Christian King* constantly, which has since passed to his successors; and he seems likewise to have been the first French monarch treated with the title of *Majesty*, in addresses to him from foreigners, as well as from his own subjects. He died in 1483, in the 61st year of his age, and 23d of his reign.

67
Charles VIII.

His successor Charles VIII. conquered Bretagne in the year 1489. The duke of this country was in alliance with Henry VII. of England. It was the interest of this monarch to have exerted himself to prevent such a conquest; but as his predominant passion was the love of money, he could not bear the thoughts of embarking in such an expensive project, till it was too late. In 1491, the king of France annexed that duchy unalienably to his crown, by marrying the young duchess, though she had been already contracted to the emperor Maximilian. By this piece of negligence, Henry suffered a great check on the power of the French monarchs to be removed; and ever since that time, England, even though united to Scotland, hath found it much harder to cope with France than before. After Bretagne was irreparably lost, however, the English monarch, urged by the clamours of his people, invaded France in 1492. He gave out that he had nothing less in view than an entire conquest of the country: nevertheless, on the third of November the same year, he made peace with Charles, on condition of his paying him 745,000 crowns, at that time, and a yearly pension of 25,000 crowns ever after.

68
His expedition
into
Italy, and
surprising
successes.

The king of France agreed to these terms the more readily, that he was impatient to undertake an expedition into Italy, in order to conquer the kingdom of Naples, to which he claimed a right. Most of his counsellors were against the expedition; but the king was inflexible, even though Ferdinand king of Naples offered to do homage for his kingdom, and pay him a tribute of 50,000 crowns a-year. He appointed Peter duke of Bourbon regent, in his absence, after which he set out on his expedition with very few troops and very little money. By the way he fell ill of the small-pox, but in a short time recovered, and entering Italy with only 6000 horse and 12,000 foot, he was attended with the most surprising success, traversing the whole country in six weeks, and becoming master of the kingdom of Naples in less than a fortnight. Such extraordinary good fortune seemed miraculous, and he was reckoned an instrument raised up by God to destroy the execrable tyrants with which Italy was at that time infested. Had Charles made use of this prepossession in his favour, and acted up to the character generally given him, he might have raised his name as high as any hero of antiquity. His behaviour, however, was of a very different nature. He amused himself with feasts and shews; and leaving his power in the hands of favourites, they abandoned it to whoever would purchase titles, places, or authority, at the rates they imposed; and the whole force he proposed to leave in his new conquered dominions amounted to no more than 4000 men.

But while Charles was thus losing his time, a league was concluded against him at Venice; into which entered

France.

tered the pope, the emperor Maximilian, the archduke Philip, Ludowick Sforza, and the Venetians. The confederates assembled an army of 40,000 men, commanded by Francis marquis of Mantua; and they waited for the king in the valley of Farnova, in the duchy of Parma, into which he defended with 9000 men. On the 6th of July 1495, he attacked the allies; and, notwithstanding their great superiority, defeated them, with the loss of only 80 of his own men. Thus he got safe to France; but his Italian dominions were lost almost as soon as he departed. Some schemes were proposed for recovering these conquests; but they were never put in execution, and the king died of an apoplexy in 1498.

69

His death.

Lewis XII. duke of Orleans, succeeded to the throne of France; and on his accession found the face of affairs in Italy very much changed to his advantage. The pope, Alexander VI. was very much in his interests, from the hopes of getting his son Cesar Borgia provided for: he had conciliated the friendship of the Venetians by promising them a part of the Milanese; he concluded a truce with the archduke Philip; and renewed his alliances with the crowns of England, Scotland, and Denmark. He then entered Italy with an army of 20,000 men; and being assisted by the Venetians, quickly conquered one part of the duchy, while they conquered the other, the duke himself being obliged to fly with his family to Inpruck. He then attacked Ferdinand of Spain with three armies at once, two to act by land, and one by sea; but none of these performing any thing remarkable, he was obliged to evacuate the kingdom of Naples in 1504.

70
Expedition
of Lewis
XII. into
Italy.

In 1506, the people of Genoa revolted; drove out the nobility; chose eight tribunes; and declared Paul Nuova, a silk-dyer, their duke: after which they expelled the French governor, and reduced a great part of the Riviera. This occasioned Lewis's return into Italy; where, in 1507, he obliged the Genoese to surrender at discretion; and, in 1508, entered into the league of Cambray, with the other princes who at that time wanted to reduce the overgrown power of the Venetians. Pope Julius II. who had been the first contriver of this league, very soon repented of it; and declared, that if the Venetians would restore the cities of Faenza and Rimini, which had been unjustly taken from him, he would be contented. This was refused; and in 1509, the forces of the republic received such an entire defeat from Lewis, that they agreed to restore not only the two cities demanded by pope Julius, but whatever else the allies required.

The pope now, instead of executing his treaties with his allies, made war on the king of France without the least provocation. Lewis called an assembly of his clergy; where it was determined, that in some cases it was lawful to make war upon the pope; upon which the king declared war against him, and committed the care of his army to the Marshal de Trivulce. He soon obliged the pope to retire into Ravenna; and in 1511, Gaston de Foix, duke of Nemours, gained a great victory at Ravenna, but was himself killed in the engagement. After his death the army disbanded for want of pay; and the French affairs in Italy, and every where else, fell into great confusion. They recovered the duchy of Milan, and lost it again in a few weeks. Henry VIII. of England invaded France, and took

France.

Terrunne and Tournay; and the Swifs invaded Burgundy with an army of 25,000 men. In this desperate situation of affairs the queen died, and Lewis put an end to the opposition of his most dangerous enemies by negotiating marriages. To Ferdinand of Spain, he offered his second daughter for either of his grandsons, Charles or Ferdinand; and to renounce, in favour of that marriage, his claims on Milan and Genoa. This proposal was accepted; and Lewis himself married the princess Mary, sister to Henry VIII. of England. This marriage he did not long survive, but died on the 2d of January 1514; and was succeeded by Francis I. count of Angoulême, and duke of Bretagne and Valois.

71

His marriage with the princess Mary of England, and death.

72

The new king was no sooner seated on the throne, Francis I. than he resolved on an expedition into Italy. In this he was at first successful, defeating the Swifs at Marignano, and reducing the duchy of Milan. In 1518, the emperor Maximilian dying, Francis was very ambitious of being his successor, and thereby restoring to France such a splendid title, which had been so long lost. But Maximilian, before his death, had exerted himself so much in favour of Charles V. of Spain, that Francis found it impossible to succeed; and from that time an irreconcilable hatred took place between the two monarchs. In 1521, this ill-will produced a war; which, however, might perhaps have been terminated if Francis could have been prevailed upon to restore the town of Fontarabia, which had been taken by his admiral Bonivet: but this being refused, hostilities were renewed with greater vigour than ever; nor were they concluded till France was brought to the very brink of destruction. The war was continued with various success, till the year 1524; when Francis, having invaded Italy, and laid siege to Pavia, he was utterly defeated before that city, and taken prisoner on the 24th of February, and taken prisoner.

Italy.

73

Defeated that city, and taken prisoner on the 24th of February, and taken prisoner.

This disaster threw the whole kingdom into the utmost confusion. The Flemish troops made continual incursions; many thousand boors assembled in Alsace, in order to make an invasion from that quarter; Henry VIII. had assembled a great army, and threatened the kingdom on that side also; and a party was formed in the kingdom, in order to dispossess the dukes of the regency, and confer it upon the duke de Vendosme. This prince, however, who, after the constable, was the head of the House of Bourbon, went on purpose to Lyons, where he assured the regent that he had no view but for her service, and that of his country; upon which she formed a council of the ablest men of the kingdom, and of this he made him president. The famous Andrew Doria sailed with the French galleys to take on board the remains of the French troops under the duke of Alva, whom he landed safely in France. Those who escaped out of the Milanese also made their way back again as well as they could. Henry VIII. under the influence of cardinal Wolsey, resolved not to oppress the oppressed: he therefore assured the regent that he had nothing to fear from him; and at the same time advised her not to consent to any treaty by which France was to be dismembered. To the emperor, however, he used another language. He told him, that the time was now come when this pious monarchy lay at their mercy; and therefore, that so favourable an opportunity should not be let slip: that, for his part, he should be content with Norman-

dy.

dy, Guienne, and Gascony, and hoped the empire would make no scruple of owning him king of France; adding, that he expected the emperor would make a right use of his victory, by entering Guienne in person, in which case he was ready to bear half the expenses of the war. He foresaw what fell out: the emperor was alarmed at these conditions, and did not care to have him for a neighbour; for which reason he agreed to a truce with the regent for six months. In Picardy the Flemings were repulsed; and the count de Guise, with the duke of Lorrain, had the good fortune, with a handful of troops, to defeat and cut to pieces the German peasants.

74
Francis I.
carried to
Madrid,
where he
signs a dis-
advanta-
geous treat-
ty;

In the mean time, Francis was detained in captivity in Italy: but being wearied of his confinement in that country, and the princes of Italy beginning to cabal for his deliverance, he was carried to Madrid; where, on the 14th of January 1525, he signed a treaty, the principal articles of which were, That he should resign to the emperor the duchy of Burgundy in full sovereignty; that he should desist from the homage which the emperor owed him for Artois and Flanders; that he should renounce all claim to Naples, Milan, Asti, Tournay, Lisle, and Hesdin, &c.; that he should persuade Henry d'Albret to resign the kingdom of Navarre to the emperor, or at least should give him no assistance; that within 40 days he should restore the duke of Bourbon and all his party to their estates; that he should pay the king of England 500,000 crowns which the emperor owed him; that when the emperor went to Italy to receive the Imperial crown, he should lend him 12 galleys, four large ships, and a land-army, or instead of it 200,000 crowns.

All these articles the king of France promised on the word and honour of a prince to execute; or, in case of non-performance, to return prisoner into Spain. But, notwithstanding these professions, Francis had already protested before certain notaries and witnesses in whom he could trust, that the treaty he was about to sign was against his will, and therefore null and void. On the 21st of February, the emperor thought fit to release him from his prison, in which he had been closely confined ever since his arrival in Spain; and after receiving the strongest assurances from his own mouth, that he would literally fulfil the terms of the treaty, sent him under a strong guard to the frontiers, where he was exchanged for his two eldest sons, who were to remain as hostages for his fidelity.

75
And breaks
it.

When the king returned to his dominions, his first care was to get himself absolved by the Pope from the oaths he had taken; after which he entered into a league with the pontiff, the Venetians, the duke of Milan, and the king of England, for preserving the peace of Italy. In the month of June, he publicly received remonstrances from the states of Burgundy; in which they told him, without ceremony, that by the treaty of Madrid he had done what he had no right to do, in breach of the laws and his coronation-oath; adding, that if he persisted in his resolution of throwing them under a foreign yoke, they must appeal to the General States of the kingdom. At these remonstrances the viceroy of Naples and the Spanish ministers were present. They perceived the end which the king aimed at, and therefore expostulated with him in pretty warm terms. At last the viceroy told

him, that he had now nothing left but to keep his royal word in returning to the castle of Madrid, as his predecessor John had done in a like case. To this the king replied, that king John acted rightly; that he returned to a king who had treated him like a king, but that at Madrid he had received such usage as would have been unbecoming to a gentleman: that he had often declared to the emperor's ministers, that the terms they extorted from him were unjust and impracticable; but, that he was still willing to do all that was fit and reasonable; and to ransom his sons, at the rate of two millions of gold, in lieu of the duchy of Burgundy.

Hitherto the treaty for the tranquillity of Italy had been kept secret, in hopes that some mitigation of the treaty of Madrid would have been obtained: but now it was judged expedient to publish it, though the viceroy of Naples and the Spanish lords were still at the French court; and the emperor was to be admitted into it, provided he accepted the king's offer of two millions for the release of his children, and left the duke of Milan and other Italian princes in quiet possession of their dominions. It is the common misfortune of all leagues, that the powers who enter into them keep only their own particular interests in view, and thus defeat the general intention of the confederacy. This was the case here. The king's great point was to obtain his children upon the terms he had proposed; and he was desirous of knowing what hopes there were of that, before he acted against the monarch who had them in his power. Thus the duke of Milan and the Pope were both sacrificed. The former was obliged to surrender to the duke of Bourbon, and the latter was surprised by the Colonnas; both of which disasters would have been prevented if the French success had entered Italy in time. See ITALY.

According to an agreement which had been made between Francis and Henry, their ambassadors went into Spain, attended each of them by a herald, in order to summon the emperor to accept the terms which had been offered him; or, in case of refusal, to declare war. It seems the emperor's answer was foreseen in the court of France: and therefore, the king had previously called together an assembly of the notables; that is, persons of the several ranks of his people in whom he could confide. To them he proposed the great question: Whether he was bound to perform the treaty of Madrid; or, Whether, if he did not perform it, he was obliged in honour to return to Spain? To both these questions, the assembly answered in the negative: they said, that Burgundy was united to the crown of France, and that he could not separate it by his own authority; that his person also was the property of the public, of which therefore he could not dispose; but for the two millions, which they looked upon as a just equivalent, they undertook that it should be raised for his service. When the ambassadors delivered their propositions, Charles treated the English herald with respect, and the French one with contempt; which produced a challenge from Francis to the emperor*. All differences, however, were at last adjusted; and a treaty was concluded at Cambray, on the 5th of August 1528. By this treaty, instead of the possession, the emperor contented himself with reserving his rights to the duchy of Burgundy, and the

* See Ducl.

76
Treaty of
Cambray.

France.

two millions of crowns already mentioned. Of these he was to receive 1,200,000 in ready money; the prince's lands in Flanders belonging to the House of Bourbon, were to be delivered up; these were valued at 400,000 more: and the remaining 400,000 were to be paid by France in discharge of the emperor's debt to England. Francis was likewise to discharge the penalty of 500,000 crowns which the emperor had incurred, by not marrying his niece the princess Mary of England; and to release a rich *seigneur* which had been many years before pawned by the house of Burgundy for 50,000 crowns. The town and castle of Hesdin were also yielded; together with the sovereignty of Flanders and Artois, and all the king's pretensions in Italy. As for the allies of France, they were abandoned to the emperor's mercy, without the least stipulation in their favour; and Francis himself protested against the validity of the treaty before he ratified it, as did also his attorney general before he registered it in parliament; but both of them with the greatest secrecy imaginable.

Nothing farther of much consequence happened during the remainder of the reign of Francis I. The war was soon renewed with Charles, who made an invasion into France, but with very bad success; nor was peace fully established but by the death of Francis, which happened on the 3d of March, 1547. He was succeeded by his son Henry II. who ascended the throne that very day on which he was 29 years of age. In the beginning of his reign, an insurrection happened in Guienne, owing to the oppressive conduct of the officers who levied the salt tax. The king dispatched against the insurgents two bodies of troops; one commanded by the duke of Aumale son to the duke of Guise, the other by the constable. The first behaved with the greatest moderation, and brought back the people to their duty without making many examples: the other behaved with the utmost haughtiness and cruelty; and though the king afterwards remitted many of his punishments, yet from that time the constable became odious to the people, while the family of Guise were highly respected.

In 1548, the king began to execute the edicts which had been made against the Protestants, with the utmost severity; and, thinking even the clergy too mild in the prosecution of heresy, erected for that purpose a chamber composed of members of the parliament of Paris. At the queen's coronation, which happened this year, he caused a number of Protestants to be burned, and was himself present at the spectacle. He was, however, so much shocked, that he could never forget it; but complained, as long as he lived, that, at certain times, it appeared before his eyes, and troubled his understanding.

In 1549, a peace being concluded with England, the king purchased Boulogne from the latter, for the sum of 400,000 crowns; one half to be paid on the day of restitution, and the other a few months after. Scotland was included in the treaty, and the English restored some places they had taken there. This was the most advantageous peace that France had hitherto made with England; the vast arrears which were due to that crown being in effect remitted; and the pension, which looked so like tribute, not being mentioned, was in fact extinguished. The earl of Warwick him-

self, who had concluded the peace, was so sensible of the disgrace suffered by his nation on this occasion, that he pretended to be sick, in order to avoid setting his hand to such a scandalous bargain.

This year, an edict was made to restrain the extravagant remittances which the clergy had been in use of making to the court of Rome, and for correcting some other abuses committed by the papal notaries. With this edict pope Julius III. was highly displeased; and the following year (1550), war was declared by the king of France against the pope and the emperor. The pretence was, that Henry protected Octavio Farnese duke of Parma, whom the pope was desirous of depriving of his dominions. In this war the king was threatened with the censures of the church, more especially when it was known that he had entered into an alliance with the Turks, and a Turkish fleet entered the Mediterranean, where they threatened the Isle of Gozo, and made descents upon Sicily. Henry, however, strongly denied any such connection, and insisted that the emperor had given them sufficient provocation: but, be this as it will, the emperor soon found himself in such danger from these new enemies, that he could not support the pope as he intended, who on that account was obliged to sue for peace. After this, the king continued the war against the emperor with success; reducing the cities of Toul, Verdun, and Metz. He then entered the country of Alsace, and reduced all the fortresses between Haguenau and Wissemburg. He failed, however, in his attempt on Strasburgh; and was soon after obliged by the German princes and the Swiss to desist from further conquests on that side. This war continued with very little interruption, and as little success on the part of the French, till the year 1557, when a peace was concluded; and soon after, the king was killed at a tournament by one count de Montgomery, who was reckoned one of the strongest knights in France, and who had done all he could to avoid this encounter with the king.

The reign of his successor Francis II. was remarkable only for the persecution of the Protestants; which became so grievous, that they were obliged to take up arms in their own defence. This occasioned several civil wars, the first of which commenced in the reign of Charles IX. who succeeded to the throne in 1560. This first war continued till the year 1562, when a peace was concluded, by which the Protestants were to have a free pardon, and liberty of conscience. In 1565, the war broke out anew, and was continued with very little interruption till 1569, when peace was again concluded upon very advantageous terms for the Protestants. After this, king Charles, who had now taken the government into his hands, cared for the Protestants in an extraordinary manner. He invited to court the admiral Coligni, who was the head of the Protestant party; and caressed him so, that he was lulled into a perfect security, notwithstanding the many warnings given him by his friends, that the king's fair speeches were by no means to be trusted: but he had soon reason to repent his confidence. On the 22d of August 1571, as he was walking from the court to his lodgings, he received a shot from a window; which carried away the second finger of his right hand, and wounded him grievously in the left arm. This he himself ascribed

France.

77
Francis dies
and is suc-
ceeded by
Henry II.

79
Henry's
success
against the
emperor.

80
He is killed
at a tourna-
ment.

78
Henry per-
secutes the
Protestants.

81
Civil wars
with the
Protestants.

79
Advanta-
geous treaty
with Eng-
land.

ascribed to the malice of the duke of Guise, the head of the Catholic party. After dinner, however, the king went to pay him a visit, and amongst others made him this compliment, " You have received the wound, but it is I who suffer;" desiring at the same time, that he would order his friends to quarter about his house, and promising to hinder the Catholics from entering that quarter after it was dark. This satisfied the admiral of the king's sincerity; and hindered him from complying with the desires of his friends, who would have carried him away, and who were strong enough to have forced a passage out of Paris if they had attempted it.

82
Dreadful
massacre of
the Prote-
stants.

In the evening, the queen-mother, Katherine de Medicis, held a cabinet-council to fix the execution of the massacre of the Protestants, which had been long meditated. The persons of which this council was composed, were, Henry duke of Anjou, the king's brother; Gonzague duke of Nevers; Henry of Angoulême, grand prior of France, and bastard brother of the king; the marshal de Tavannes; and Albert de Gondi, count de Rhetz. The direction of the whole was given to the duke of Guise, to whom the administration had been entirely confided during the former reign. The guards were appointed to be in arms, and the city-officers were to dispose the militia to execute the king's orders, of which the signal was the ringing of a bell near the Louvre. Some say, that when the hour approached, which was that of midnight, the king grew indetermined: that he expressed his horror at shedding so much blood, especially considering that the people whom he was going to destroy were his subjects, who had come to the capital at his command, and in confidence of his word; and particularly the admiral, whom he had detained so lately by his caresses. The queen-mother, however, reproached him with his cowardice, and represented to him the great danger he was in from the Protestants; which at last induced him to consent. According to others, however, the king himself urged on the massacre; and when it was proposed to him to take off only a few of the heads, he cried out, " If any are to die, let there not be one left to reproach me with breach of faith."

As soon as the signal was given, a body of Swiss troops, of the Catholic religion, headed by the duke of Guise, the chevalier d'Angoulême, accompanied by many persons of quality, attacked the admiral's house. Having forced open the doors, the foremost of the assassins rushed into his apartment; and one of them asked if he was Coligni? To this he answered that he was; adding, " Young man, respect these grey hairs:" to which the assassin replied by running him through the body with his sword. The duke of Guise and the chevalier, growing impatient below stairs, cried out to know if the business was done; and being told that it was, commanded that the body should be thrown out at the window. As soon as it fell on the ground, the chevalier, or (as some say) the duke of Guise, wiping the blood off the face kicked it with his foot. The body was then abandoned to the fury of the populace; who, after a series of indignities, dragged it to the common gallows, to which they chained it by the feet, the head being cut off and carried to the queen-mother; who, it is said, caused it to be embalmed and sent to

Rome. The king himself went to see the body hang upon the gibbet; where, a fire being kindled under it, part was burnt, and the rest scorched. In the Louvre the gentlemen belonging to the king of Navarre and the prince of Conde were murdered under the king's eye. Two of them wounded, and pursued by the assassins, fled into the bed-chamber of the queen of Navarre, and jumped upon her bed, beseeching her to save their lives; and as she went to ask this favour of the queen-mother, two more, under the like circumstances, rushed into the room, and threw themselves at her feet. The queen-mother came to the window to enjoy these dreadful scenes; and the king, seeing the Protestants who lodged on the other side of the river, flying for their lives, called for his long gun, and fired upon them. In the space of three or four days, many thousands were destroyed in the city of Paris, by the most cruel deaths which malice itself could invent. Peter Ramus, professor of philosophy and mathematics, after being robbed of all he had, his belly being first ripped open, was thrown out of a window. This so much affected Denis Lambin the king's professor, that, though a zealous Catholic, he died of terror. The first two days, the king denied it was done by his orders, and threw the whole blame on the house of Guise: but, on the 28th of August, he went to the parliament, avowed it, was complimented upon it, and directed a process against the admiral, by which he was stigmatized as a traitor. Two innocent gentlemen suffered as his accomplices in a pretended plot against the life of the king, in order to set the crown on the head of the prince of Conde. They were executed by torch-light; and the king and the queen-mother (with the king of Navarre and the prince of Conde by force), were spectators of this horrid fact; and they also assisted at the jubilee to thank God for the execution of such an infamous design.

This massacre was not confined to the city of Paris alone. On the eve of St Bartholomew, orders had been sent to the governors of provinces to fall upon the Protestants themselves, and to let loose the people upon them: and though an edict was published before the end of the week, assuring them of the king's protection, and that he by no means designed to exterminate them because of their religion, yet private orders were sent, of a nature directly contrary; in consequence of which, the massacre, or (as, in allusion to the Sicilian vespers*, it was now styled) the *Matins of Paris*,* See Sicily. were repeated in Meaux, Orleans, Troyes, Angers, Tholouse, Rouen, and Lyons; so that in the space of two months 30,000 Protestants were butchered. The next year Rochelle, the only strong fortress which the Protestants held in France, was besieged, but was not taken without the loss of 24,000 of the Catholics who besieged it. After this a pacification ensued on terms favourable to the Protestants, but to which they never trusted.

This year the duke of Anjou was elected king of Poland, and soon after set out to take possession of his new kingdom. The king accompanied him to the frontiers of the kingdom; but during the journey was seized with a slow fever, which from the beginning had a very dangerous appearance. He lingered for some time under the most terrible agonies both of body and mind; and at last died on the 30th of May 1572, ha-
after

France.

France.

ving lived 24 years, and reigned 13. It is said, that after the dreadful massacre abovementioned, this prince had a fierceness in his looks and a colour in his cheeks which he never had before. He slept little, and never found. He waked frequently in agonies, and had soft music to compose him again to rest.

84
Henry III.

During the first years of the reign of Henry III. who succeeded his brother Charles, the war with the Protestants was carried on with indifferent success on the part of the Catholics. In 1575, a peace was concluded, called by way of eminence the *Edict of Pacification*. It consisted of no fewer than 63 articles; the substance of which was, that liberty of conscience, and the public exercise of religion, were granted to the reformed, without any other restriction than that they should not preach within two leagues of Paris or any other part where the court was: Party-chambers were erected in every parliament, to consist of equal numbers of Catholics and Protestants, before whom all judgments were to be tried: The judgments against the admiral, and, in general, all who had fallen in the war or been executed, were reversed; and eight cautionary towns were given to the Protestants.

88
Catholic
league
formed.

This edict gave occasion to the Guises to form an association in defence, as was pretended, of the Catholic religion, afterwards known by the name of the *Catholic League*. In this league, though the king was mentioned with respect, he could not help seeing that it struck at the very root of his authority: for, as the Protestants had already their chiefs, so the Catholics were, for the future, to depend entirely upon the chief of the league; and were, by the very words of it, to execute whatever he commanded, for the good of the cause, against any, without exception of persons. The king, to avoid the bad effects of this, by the advice of his council declared himself head of the league; and of consequence recommenced the war against the Protestants, which was not extinguished as long as he lived.

86
Duke of
Guise murdered, and
likewise the
king.

The faction of the duke of Guise, in the mean time, took a resolution of supporting Charles cardinal of Bourbon, a weak old man, as presumptive heir of the crown. In 1584, they entered into a league with Spain, and took up arms against the king: and tho' peace was concluded the same year, yet, in 1587, they again proceeded to such extremities, that the king was forced to fly from Paris. Another reconciliation was soon after effected, but it is generally believed that the king from this time resolved on the destruction of Guise. Accordingly, finding that this nobleman still behaved towards him with his usual insolence, the king caused him to be stabbed, as he was coming into his presence, by his guards, on the 23d of December 1587. The king himself did not long survive him; being stabbed by one James Clement, a Jacobine monk, on the 1st of August 1588. His wound at first was not thought mortal: but his frequent swooning quickly discovered his danger; and he died next morning, in the 39th year of his age, and 16th of his reign.

Before the king's death, he nominated Henry Bourbon king of Navarre for his successor on the throne of France; but as he was a Protestant, or at least one who greatly favoured their cause, he was at first owned by very few except those of the Protestant party.

Vol. IV.

Met with the most violent opposition from the members of the Catholic league; and was often reduced to such straits, that he went to people's houses under colour of visits, when in reality he had not a dinner in his own. By his activity and perseverance, however, he was at last acknowledged throughout the whole kingdom, to which his abjuration of the Protestant religion contributed not a little. As the king of Spain had laid claim to the crown of France, Henry no sooner found himself in a fair way of being firmly seated on the throne, than he formally declared war against that kingdom; in which he at last proved successful, and in 1597 entered upon the quiet possession of his kingdom.

87
Henry IV.

The king's first care was to put an end to the religious disputes which had so long distracted the kingdom. For this purpose, he granted the famous edict, dated at Nantes, April 13th 1598. It re-established, in a most solid and effectual manner, all the favours that had ever been granted to the reformed by other princes; adding some which had not been thought of before, particularly the allowing them a free admission to all employments of trust, profit, and honour; the establishing chambers in which the members of the two religions were equal; and the permitting their children to be educated without constraint in any of the universities. Soon after, he concluded peace with Spain upon very advantageous terms. This gave him an opportunity of restoring order and justice throughout his dominions; of repairing all the ravages occasioned by the civil war; and abolishing all those innovations which had been made, either to the prejudice of the prerogatives of the crown, or the welfare of the people. His schemes of reformation, indeed, he intended to have carried beyond the boundaries of France. If we may believe the duke of Sully, he had in view no less a design than the new-modelling of all Europe. He imagined that the European powers might be formed into a kind of Christian republic, by rendering them as nearly as possible of equal strength; and that this republic might be maintained in perpetual peace, by bringing all their differences to be decided before a senate of wise, disinterested, and able judges: and then, he thought, it would be no difficult matter to overturn the Ottoman empire. The number of these powers was to be 15, viz. the Papacy; the empire of Germany; France, Spain; Hungary; Great Britain; Bohemia; Lombardy; Poland; Sweden; Denmark; the Republic of Venice; the States-General; the Swiss Cantons; and the Italian commonwealth, which was to comprehend the States of Florence, Genoa, Lucca, Modena, Parma, Mantua, and Monaco. In order to render the States equal, the empire was to be given to the duke of Bavaria; the kingdom of Naples to the pope; that of Sicily to the Venetians; Milan to the duke of Savoy, who, by this acquisition, was to become king of Lombardy; the Austrian Low Countries were to be added to the Dutch republic; Franche Compe, Alsace, and the country of Trent, were to be given to the Swiss. With a view, it is now thought, of executing this grand project, but under pretence of reducing the exorbitant power of the House of Austria, Henry made immense preparations both by sea and land; but if he really had such a design, he was prevented by death from

89
Edict of
Nantes.

89
The king
proposes to
new-model
the Euro-
pean
powers.

18 A

at-

France. attempting to execute it. He was stabbed in the
 90
 He is mur- coach by one Ravilliac, on the 12th of May 1608.

On the death of Henry IV. the queen-mother assumed the regency. Ravilliac was executed, after suffering horrid tortures. It is said that he made, a confession, which was so written by the person who took it down, that not one word of it could ever be read, and thus his infligators and accomplices could never be discovered. The regency, during the minority of

91
 Lewis XIII. Lewis XIII. was only remarkable for cabals and intrigues of the courtiers. In 1617, the king assumed the government himself, banished the queen-mother to Blois, and caused her favourite marshal d'Ancre to be killed. In 1620, a new war broke out between the Catholics and Protestants, which was carried on with the greatest fury on both sides; and we may judge of the spirit which actuated both parties, by what happened at Negrepisse a town in Quercy. This place was besieged by the king's troops, and it was resolved to make an example of the inhabitants. The latter, however, absolutely refused to surrender upon any terms. They defended themselves, therefore, most desperately; and the city being at last taken by storm, they were all massacred, without respect of rank, sex, or age, except ten men. When these were brought into the king's presence, he told them they did not deserve mercy: they answered, that they would not receive it; that the only favour they asked, was to be hanged on trees in their own gardens; which was granted, and the place reduced to ashes. Both parties soon became weary of such a destructive war; and a peace was concluded in 1621, by which the edict of Nantes was confirmed. This treaty, however, was of no long duration. A new war broke out which lasted till the year 1628, when the edict of Nantes was again confirmed, only the Protestants were deprived of all their cautionary towns, and consequently of the power of defending themselves in time to come. The next year, the king was attacked with a slow fever which nothing could allay, an extreme depression of spirits, and a surprising swelling in his stomach and belly. The year after, however, he recovered, to the great disappointment of his mother, who had been in hopes of regaining her power. She was arrested; but found means to escape into Flanders, where she remained during the rest of this reign. The king died in 1643, having carried on a long war with Spain with indifferent success.

92
 Lewis XIV. Lewis XIV. furnished *Le Grand*, succeeded to the throne when he was only five years of age. During his minority, the cardinal Mazarine, to whom the administration was wholly intrusted, procured a revocation of the edict of Nantes, and rendered the government absolute. This monarch brought the glory of France to the highest pitch, for which he was indebted to the famous generals who commanded his armies, the viscount Turenne, the prince of Conde, &c.; an account of whose exploits is given under the articles SPAIN, GERMANY, ITALY, UNITED-PROVINCES, &c. At last the immeasurable ambition of Lewis occasioned a general confederacy of the states of Europe against him. At the head of this confederacy was William III. king of England; but as long as he had the command of the allied army, the arms of Lewis proved successful. On his death, the war was renewed; and the allies, under the command of the duke of Marl-

borough and prince Eugene, reduced France to the lowest ebb*. When the British forces were withdrawn, it became necessary for the other contending powers to conclude a peace; which was done at Utrecht, in 1713.

Lewis XIV. died on the 1st of September 1715; and was succeeded by his son Lewis XV. at that time only six and XVI. years of age. He maintained two bloody wars with Great Britain, an account of which is given under the article BRITAIN. After a reign of 59 years, he died in 1774; and was succeeded by his son Lewis XVI. the present king of France.

The kingdom of France, according to Mr Temple-
 94
 Division of the king-
 dom.
 man, is divided into the following provinces.

Countries Names.	Square miles.	Length.	Breadth.	Chief Cities.
Orleannois	22,050	230	180	Orleans
Guienne	12,800	216	120	Bordeaux
Gascoigne	8,800	125	90	Aux or Auh
Languedoc	13,175	200	115	Thoulouse
Lyonnois	12,500	175	130	Lyons
Champagne	10,000	140	110	Rheims
Bretagne	9,100	170	105	Rennes
Normandy	8,200	155	85	Rouen
Provence	6,800	95	92	Aix
Burgundy	6,700	150	86	Dijon
Dauphine	5,820	107	90	Grenoble
Isle of France	5,200	100	85	PARIS } N. Lat. 48. 50. E. Lon. 2. 25.
French Compté	4,000	100	60	Befaugon
Picardy	3,650	120	87	Amiens
Rouffillon	1,400	56	44	Perpignan
Total—131,095				

To these may be added several fine provinces, which, since the Reformation, have been annexed to this overgrown kingdom by marriage, purchase, or conquest, viz. part of the Netherlands, which will be found under the article NETHERLANDS; the duchy of Lorrain; the countries of Alsace, Lower Navarre, and the island of Corsica: but the city of Avignon, and the Venaissin, was, in 1774, ceded to the pope.

The air is pure, healthy, and temperate. The king-
 95
 Climate, soil, inha-
 bitants, &c.
 dom is so happily seated in the middle of the temperate zone, that some make it equal to Italy, with regard to the delightfulness of the landscapes, and the fertility of the soil: however, it is certainly much more healthful. The soil produces corn, wine, oil, and flax, in great abundance; and they have very large manufactures of linen, woollen, silk, and lace. They have a foreign trade to Spain, Italy, Turkey, and to the East and West Indies. They themselves reckon that the number of the inhabitants is 20,000,000. This kingdom contains 21 universities; 18 archbishopsricks; 12 parliaments; 12 boards of accounts; 12 courts of aids; 2 courts, and 30 mints, for coining money; 2 supreme councils, besides the grand council; and 31 governors. The king has the title of *Mess Christiam*; and is an absolute prince, to whom his subjects are extremely devoted, though he rule them ever so severely. The politeness of the inhabitants is well known; but most people think them too ceremonious. In general, they are men of bright parts; and have so high an opinion of themselves, that they look upon other nations

France
||
Francfort.

nations with contempt: however, they are of a very reflexive disposition, and engaged in war more than any other country in Europe; for which reason they are generally poor, though they might certainly be very rich, if they could let their neighbours live in quiet, without attempting continually to enlarge their dominions. They are such ill observers of treaties, that *French faith* is now become a proverb; for they are bound by no ties, and never fail beginning a war when they think it is for their advantage. The king's revenue is large, his army very numerous, and he has 10,000 men always about his person. The kingdom is watered by a great number of rivers; of which the four principal are, the Loire, the Seine, the Rhone, and the Garonne, or Gironde. The parliaments have little or no share in the government; and their business now is, to pass the arrests or laws which the king is pleased to send them: however, they do not always pay a blind obedience to the king, for we have recent instances of their making a noble stand. In civil causes these parliaments are still the last resort, provided the court does not interpose. That of Paris is the most considerable, where the king often comes in person to see his royal acts recorded. It consists of the dukes and peers of France, besides the ordinary members, who purchase their places; and they only take cognizance of causes belonging to the crown. The revenues of the crown arise from the *taille* or land-tax, and the aids which proceed from the customs and duties on all merchandise except salt, for the tax upon that commodity is called the *gabelles*: besides these, there are other taxes; as, the capitation or poll-tax; the tenths of all estates, offices, and employments; besides the 15th penny, from which neither the nobility nor clergy are exempted. Add to these, the tenths and free-gifts of the clergy, who are allowed to tax themselves; and lastly, crown-rents, fines, and forfeitures, which bring in a considerable sum. All these are said to amount to 15,000,000 Sterling a-year. But the king has other resources and ways of raising money, whenever necessity obliges him. The army, in time of peace, is said to consist of 200,000 men, and in time of war of 400,000; among which are many Swiss, Germans, Scots, Irish, Swedes, and Danes. There is no religion allowed in France but the Roman Catholic, ever since the revocation of the edict of Nantz, in 1685; though they are not so devoted to the Pope as other nations of that communion, nor have they any inquisition among them.

FRANCE, *the Ile of*, a province of France, so called, because it was formerly bounded by the river Seine, Marne, Oise, Aisne, and Ourque. It comprehends, besides Paris, the Beauvoisis, the Valcis, the county of Senlis, the Vexin, the Hurepois, the Gatinois, the Multien, the Goele, and the Mantois. Paris is the capital.

FRANCESCA (Peter), an eminent Florentine painter of night-pieces and battles, was employed to paint the Vatican. He drew several portraits, and wrote on arithmetic and geometry: he died in 1458.

FRANCFORT *on the Main*, an Imperial and Hanseatic town of Franconia in Germany. It is a handsome, strong, and rich place, and has a great deal of commerce, but is built after the ancient taste. Here the golden bull is preserved, which is the original of

the fundamental laws of the empire. The emperor is generally elected here, unless the plague or war will not admit of the solemnities proper to the occasion. It is seated in a fine fertile plain, in E. Long. 8. 40. N. Lat. 49. 55.

FRANCFORT, *on the ODER*, a rich and handsome town of Germany, in the middle Marche of Brandenburg, formerly imperial, but now subject to the king of Prussia. E. Long. 15. 0. N. Lat. 52. 20.

FRANCHE-COMTE, a province of France, bounded on the south and west by Champagne and Burgundy; on the north by Lorraine; and to the east by the earldom of Mumplegard, and Switzerland. It is in length from north to south about 30 leagues, in breadth about 20. It is partly flat and partly hilly. The flat country is fruitful in grain, wine, hemp, and pasture; and the hilly country abounds in cattle, producing also some wine and corn, copper, lead, iron, and silver ores, mineral waters, and quarries of stone, marble, and alabaster.

FRANCHISE, in law. *Franchise and liberty* are used as synonymous terms; and their definition is, "a *Blackf. Comment.* royal privilege, or branch of the king's prerogative, subsisting in the hands of a subject." Being therefore derived from the crown, they must arise from the king's grant; or, in some cases, may be held by prescription, which, as has been frequently said, presupposes a grant. The kinds of them are various, and almost infinite. We shall here briefly touch upon some of the principal; premising only, that they may be vested in either natural persons or bodies-politic; in one man, or in many: but the same identical franchise, that has before been granted to one, cannot be bestowed on another, for that would prejudice the former grant.

To be a county-palatine, is a franchise vested in a number of persons. It is likewise a franchise for a number of persons to be incorporated and subsist as a body-politic; with a power to maintain perpetual succession, and do other corporate acts: and each individual member of such corporation is also said to have a franchise or freedom. Other franchises are, to hold a court-leet: to have a manor or lordship; or, at least, to have a lordship paramount: to have waifs, wrecks, estrays, treasure-trove, royal fish, forfeitures, and deodands: to have a court of one's own, or liberty of holding pleas and trying causes: to have the cognizance of pleas; which is a still greater liberty, being an exclusive right, so that no other court shall try causes arising within that jurisdiction: to have a bailiwick, or liberty exempt from the sheriff of the county; wherein the grantee only, and his officers, are to execute all process: to have a fair or market; with the right of taking toll, either there or at any other public places, as at bridges, wharfs, or the like; which tolls must have a reasonable cause of commencement, (as in consideration of repairs, or the like), else the franchise is illegal and void: or lastly, to have a forest, chase, park, warren, or fishery, endowed with privileges of royalty. See CHASE, FOREST, &c.

FRANCIA (Francesia), a celebrated Bolognese painter, born in 1450. He was first a goldsmith or jeweller, afterwards a graver of coins and medals; but applying at last to painting, obtained great reputation by his works, particularly by a piece of St Sebastian, whom he had drawn bound to a tree with his hands

Francfort
||
Francia.

Francis tied over his head. He pined himself into a consumption, by despairing to equal Raphael; and died in 1518.

FRANCIS I. king of France, the rival of the emperor Charles V. and the restorer of learning and politeness in France. See (*History of*) FRANCE.

FRANCIS of *Affisi* (St.), founder of the Franciscan friars, was born at Affisi in Italy in 1181. One of the most extraordinary things told of St Francis of Affisi is, that Jesus Christ imprinted on him the marks of his five wounds; and there is a festival in memory of those holy prints, and an office for it. His preaching to the fishes to make them Christians, and his conversion of millions of them, is famous; as is his mercy to worms and lice. The order he founded, and which bears his name, was approved by Innocent III. in 1215, and confirmed by Honorius III. in 1223. It has since branched into several others, as Minims, Ricollets, Capuchins, &c. called in Roman-Catholic countries, *Frates Minores*.

FRANCISCAN MONKS, FRIARS *Minor*, or *Grey-Friars*; religious of the order of St Francis, founded by him in the year 1209. See FRANCIS of *Affisi*.

The rule of the Franciscans, as established by St Francis himself, is briefly this: they are to live in common, to observe chastity, and to pay obedience to the pope and their superiors.

Before they can be admitted into the order, they are obliged to sell all they have, and give it to the poor: they are to perform a year's novitiate; and, when admitted, never to quit the order upon any account. They are to fast from the feast of All-saints, to the Nativity. This order has produced four popes, 42 cardinals, and an infinite number of patriarchs.

FRANCONIA, a circle of the German empire, lying between Bohemia on the east, and the electorate of Mentz on the west. Its capital is Nuremberg; and from this country the Franks, who conquered and gave name to the kingdom of France, are said to have come.

FRANGULA, in botany. See RHAMNUS.

FRANK LANGUAGE, *Lingua Franca*, a kind of jargon spoken on the Mediterranean, and particularly throughout the coasts and parts of the Levant, composed of Italian, Spanish, French, vulgar Greek, and other languages.

FRANK, or *Franc*, an ancient coin, either of gold or silver, struck and current in France. The value of the gold franc was something more than that of the gold crown; the silver franc was a third of the gold one: this coin is long out of use, tho' the term is still retained as the name of a money of account; in which sense it is equivalent to the *livre*, or 20 *sols*.

FRANK, or *Franc*, meaning literally *free* from charges and impositions, or exempt from public taxes, has various significations in the ancient English customs.

FRANK *Almoigne*, (*libera elemosyna*), or "free alms;" a tenure of a spiritual nature, whereby a religious corporation, aggregate or sole, holdeth lands of the donor to them and their successors for ever. The service which they were bound to render for these lands was not certainly defined: but only in general to pray for the souls of the donor and his heirs, dead or alive; and therefore they did no fealty, (which is incident to all other services but this), because this divine service was of a higher and more exalted nature. This

is the tenure by which almost all the ancient monasteries and religious houses held their lands; and by which the parochial clergy, and very many ecclesiastical and eleemosynary foundations hold them at this day; the nature of the service being upon the reformation altered, and made conformable to the purer doctrines of the church of England. It was an old Saxon tenure; and continued under the Norman revolution, through the great respect that was shewn to religion and religious men in ancient times. This is also the reason that tenants in frankalmoign were discharged of all other services except the *trinoda necessitas*, of repairing the highways, building castles, and repelling invasions; just as the druids, among the ancient Britons, had *omnium rerum immunitatem*. And even at present, this is a tenure of a very different nature from all others; being not in the least feudal, but merely spiritual. For, if the service be neglected, the law gives no remedy by distress, or otherwise, to the lord of whom the lands are holden; but merely a complaint to the ordinary or visitor to correct it.

FRANK-Chace is defined to be a liberty of free chase, whereby persons that have lands within the compass of the same, are prohibited to cut down any wood, &c. out of the view of the forester.

FRANK-Fee, signifies the same thing as holding lands and tenements in fee-simple; that is, to any person and his heirs, and not by such service as is required by ancient demesne, but is pleaded at common law. See FEE.

FRANK-Law, a word applied to the free and common law of the land, or the benefit a person has by it.

He that for any offence loseth this frank-law, incurs these inconveniences, viz. He may not be permitted to serve on juries, nor used as an evidence to the truth; and if he has any thing to do in the king's court, he must not approach it in person, but appoint his attorney; his lands, goods, and chattels, shall be seized into the king's lands; and his lands be estranged, his trees rooted up, and his body committed to custody.

FRANK-Marriage, in law, is where tenements are given by one man to another, together with a wife, who is the daughter or cousin to the donor, to hold in frank-marriage. By such gift, though nothing but the word *frank-marriage* is expressed, the donees shall have the tenements to them, and the heirs of their two bodies begotten; that is, they are tenants in special tail. For this one word, *frank-marriage*, denotes, *ex vi termini*, not only an inheritance, like the word *frankalmoigne*, but likewise limits that inheritance; supplying, not only words of descent, but of procreation also. Such donees in frank-marriage are liable to no service but fealty; for a rent reserved therein is void until the fourth degree of consanguinity be past between the issues of the donor and donee.

FRANK-Pledge, law, signifies a pledge or surety for the behaviour of freemen.

According to the ancient custom of England, for the preservation of the public peace, every free-born man, at the age of fourteen, except religious persons, clerks, knights, and their eldest sons, was obliged to give security for his truth and behaviour towards the king and his subjects, or else be imprisoned. Accordingly, a certain

Franked
Franks.

Frascati
Fraud.

certain number of neighbours became interchangeably bound for each other, to see each person of their pledge forthcoming at all times, or to answer for the offence of any one gone away: so that whenever any person offended, it was presently inquired in what pledge he was, and there the persons bound either produced the offender in 31 days, or made satisfaction for his offence.

FRANK Tenement. See **TENURE.**

FRANKED LETTERS. The privilege of letters coming free of postage, to and from members of parliament was claimed by the house of commons in 1660, when the first legal settlement of the present post-office was made; but afterwards dropped, upon a private assurance from the crown, that this privilege should be allowed the members. And accordingly a warrant was constantly issued to the postmaster-general, directing the allowance thereof to the extent of two ounces in weight: till at length it was expressly confirmed by 4 Geo. III. c. 24. which adds many new regulations, rendered necessary by the great abuses crept into the practice of franking; whereby the annual amount of franked letters had increased from L. 23,600 in the year 1715, to L. 170,700 in the year 1763.

FRANKEN (Franciscus), commonly called *Old Frank*, a famous Flemish painter, supposed to have been born about the year 1544: but tho' his works are well known, very few of the circumstances of his life have been transmitted to posterity. This master painted historical subjects from the Old and New Testaments; and was remarkable for introducing a great number of figures into his compositions, which he had the address to groupe very distinctly. Vandyck often commended his works, and thought them worthy of a place in any collection.

FRANKEN (Franciscus), distinguished by the name of *Young Frank*, was the son of the former, born in the year 1580. He was instructed by his father; whose style he adopted so closely, that their works are frequently mistaken. When he found himself sufficiently skilled at home, he travelled into Italy for improvement in colouring; and, on his return, his works were much coveted. The most capital performance of this painter are, a scriptural performance in the church of Notre-dame at Antwerp; and an excellent picture, in a small size, of Solomon's idolatry. *Young Frank* died in 1642.

FRANKENDAL, a strong town of Germany, in the dominions of the Elector Palatine. It was taken by the Spaniards in 1623, by the Swedes in 1632, and burnt by the French in 1688. E. Long. 8. 29. N. Lat. 49. 28.

FRANKINCENSE. See **INCENSE.**

FRANKS, FRANKIS, or Franquis, an appellation given by the Turks, and other nations of Asia, to all the people of the western parts of Europe, to which they give the name of *Frankishan*.

Frank, or *Frenc*, primarily denotes a Frenchman; and, by extension, an European, because, according to some, the French distinguished themselves above the other nations engaged in the holy war*. But Fa. Goar, in his notes on Codinus, cap. v. n. 43. furnishes another origin of the appellation *Frank*, of greater antiquity than the former.—He observes, that the Greeks at first confined the name to the *Franci*, i. e. the

German nations, who had settled themselves in France or Gaul: but afterwards they gave the same name to the Apulians and Calabrians, after they had been conquered by the Normans; and at length the name was further extended to all the Latins. In this sense, is the word used by divers Greek writers; as Comnenus, &c. who, to distinguish the French, call them the *western Franks*.

Du Cange adds, that about the time of Charlemagne, they distinguished—eastern France; western France; Latin, or Roman, France; and German France, which was the ancient France, afterwards called *Franconia*.

FRASCATI, a handsome town of Italy, seated near the same spot with the Tusculum of Cicero. Here are a great number of magnificent palaces and delightful gardens. E. Long. 11. 43. N. Lat. 41. 48.

FRATERNITY, in the Roman Catholic countries, signifies a society for the improvement of devotion.

Of these there are several sorts; as, 1. The fraternity of the rosary, founded by St Dominic. It is divided into two branches, called the *common rosary*, and the *perpetual rosary*; the former of whom are obliged to confess and communicate every first Sunday in the month, and the latter to repeat the rosary continually. See **ROSARY**.

2. The fraternity of the scapulary, whom the blessed Virgin, according to the fabbatin bull of pope John XXII. has promised to deliver out of hell the first Sunday after their death. See **SCAPULARY**.

3. The fraternity of St Francis's girdle, are clothed with a sack of a grey colour, which they tie with a cord; and, in processions, walk bare-footed, carrying in their hands a wooden cross.

4. That of St Austin's leathern girdle, comprehends a great many devotees.

Italy, Spain, and Portugal, are the countries where one sees the greatest number of these fraternities, some of which assume the name of *arch-fraternities*. Pope Clement VII. instituted the arch-fraternity of charity, which distributes bread every Sunday among the poor, and gives portions to 40 poor girls on the feast of St Jerom their patron. The fraternity of death, buries such dead as are abandoned by their relations, and causes masses to be celebrated for them.

FRATRICELLI, LITTLE BROTHERS, in church-history, a sect of heretics who appeared in Italy about the year 1293, and afterwards spread all over Europe. They wore the habit of the Franciscan order, and pretended that ecclesiastics ought to have no possessions of their own.

FRATRIAGE, the partition among brothers or coheirs, coming to the same inheritance or succession.

FRATRES ARVALES. See **ARVALES**.

FRATRICIDE, the crime of murdering one's brother. See **PARRICIDE**.

FRAUD, in law, signifies deceit in grants, or conveyances of lands, &c. or in bargains and sales of goods, &c. to the damage of another person.

A fraudulent conveyance of lands or goods to deceive creditors, as to creditors is void in law. And a fraudulent conveyance in order to defraud purchasers, is also to such purchasers void; and the persons justifying

* See *Croftade*.

Fraustadt
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Freckles.

fyng or putting off such grants as good, shall forfeit a year's value of the lands, and the full value of the goods and chattels, and likewise shall be imprisoned. See CHEATING.

FRAUSTADT, a town of Silesia, on the frontiers of Poland, remarkable for a battle gained by the Swedes over the Saxons in 1706. E. Long. 15. 50. N. Lat. 51. 45.

FRAXINUS, the Ash; a genus of the diœcia order, belonging to the polygamia class of plants. There are six species; of which the most useful is the common ash, which is so well known, that it needs no description. If a wood of these trees is rightly managed, it will turn greatly to the advantage of the owner; for, by the underwood, which will be fit to cut every eight or ten years, there will be a continual income, more than sufficient to pay the rent of the ground and all other charges; and still there will be a stock preserved for timber, which in a few years will be worth 40s. or 50s. per tree. This tree flourishes best in groves, but grows very well in rich soil in open fields. It bears transplanting and lopping. In the north of Lancashire they lop the tops of these trees to feed the cattle in autumn when the grass is on the decline; the cattle peeling off the bark as food. The wood hath the singular property of being nearly as good when young as when old. It is hard and tough, and is much used to make the tools employed in husbandry. The ashes of the wood afford very good potash. The bark is used in tanning calf-skin. A slight infusion of it appears of a pale yellowish colour when viewed betwixt the eye and the light; but when looked down upon, or placed betwixt the eye and an opaque object, appears blue. This blueness is destroyed by the addition of an acid, but recovered by alkalies. The seeds are acrid and bitter. In the church-yard of Lochaber in Scotland, Dr Walker measured the trunk of a dead ash-tree, which at five feet from the surface of the ground was 58 feet in circumference.—Horses, cows, sheep, and goats eat it; but it spoils the milk of cows, so that it should not be planted in dairy farms.

FRAY, among sportsmen. A deer is said to fray its head, when it rubs it against a tree, to cause the pills of the new horns to come off.

FREAM, a name given by farmers to ploughed lands worn out of heart, and laid fallow till it recover.

FRECKLES, LENTIGINES, spots of a yellowish colour, of the bigness of a lentile-seed, scattered over the face, neck, and hands. Freckles are either natural, or proceeding accidentally from the jaundice, or the action of the sun upon the part. Heat, or a sudden change of the weather, will often cause the skin to appear of a darker colour than natural; and thereby produce what is called *tan*, *sunburn*, and *morpheus*, which seem to differ only in degree; and usually disappear in winter.

Persons of a fine complexion, and such whose hair is red, are the most subject to freckles, especially in those parts which they expose to the air.

To remove freckles, put juice of lemons in a glass-vial, and, mixing it with sugar and borax finely powdered, let it digest eight days, and then use it. Homberg proposes bullock's gall mixed with alum, and, after the alum has precipitated, exposed three or four months to the sun in a close vial, as one of the best re-

medies known for the removing of freckles.

FREDBERG, a rich, strong, and fine town of Germany, in Misnia, remarkable for its mines, and for being the burying place of the princes of the house of Saxony. It is a delightful place, seated on the river Multa. E. Long. 13. 40. N. Lat. 51. 2.

FREDERICA, a town of North America, in Georgia, seated at the mouth of the river Altamaha, lately built and fortified by general Oglethorpe. The island it stands upon is called *St Simon's*; and is about 13 miles in length, and 4 in breadth. W. Long. 81. 35. N. Lat. 31. 0.

FREDERICKSBURG, a fort and colony of Brandenburg, on the gold-coast of Guinea, in Africa, near Cape Three-points, and about 75 miles from Cape Coast. It mounts 46 pieces of cannon on four batteries; and formerly belonged to the Prussians, but is now subject to Denmark. W. Lon. 1. 15. N. Lat. 4. 30.

FREDERICKSHALL, or FREDERICKTADT, a strong town of Norway, in the prefecture of Agerhuys, where Charles XII. king of Sweden was killed by a musket-ball in 1718, when he was besieging this town. It is seated on the coast of the Catagate, in E. Long. 10. 45. N. Lat. 59. 2.

FREDERICKSODE, a town of Denmark, in Jutland, taken by the Swedes in 1657, but now subject to Denmark. It is seated near the sea, in E. Long. 10. 0. N. Lat. 55. 42.

FREDERICKSTADT, a town of Denmark, in South Jutland, built in 1621. It is seated on the river Eyder, in E. Long. 9. 23. N. Lat. 54. 32.

FREDERICKSTADT, a town of Norway, in the province of Agerhuys, seated on a bay of the sea, near the frontiers of Sweden, in E. Long. 11. 6. N. Lat. 59. 12.

FREE, in a general sense, is used in opposition to whatever is constrained or necessitated. When applied to things endowed with understanding, it more peculiarly relates to the liberty of the will.

FREE-BENCH, signifies that estate in copy-hold which the wife, being espoused a virgin, has after the decease of her husband for her dower, according to the custom of the manor.

In regard to this free-bench, different manors have different customs: and in the manor of east and west Enbourne in the county of Berks, and in other parts of England, there is a custom, that when a copyhold tenant dies, the widow shall have her free-bench in all the deceased husband's lands, *dam sola & casa fuerit*, "whilst she lives single and chaste;" but if she is found to be guilty of incontinency, she shall forfeit her estate. Nevertheless, upon her coming into the court of the manor riding backwards on a black ram, with his tail in her hand, rehearsing a certain form of words, the steward is bound by custom to restore her to her free-bench. The words are,

Here I am,
Riding on a black Ram,
Like a whore as I am;
And for my criminal cranium
Have lost my bincum banicum,
And for my tail's game
Have done this worldly shame:
Therefore, pray, Mr Steward, let me have my land again.

FREE Fishery. See FREE-FISHERY.

FREE Warren. See WARREN.

FREE-

Fredberg
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Free.

FREE-Hold, signifies lands or tenements which a person holds in fee-simple, fee-tail, or for term of life. See **Fee** and **Tail**.

Free-Stone, a whitish stone, dug up in many parts of Britain, that works like alabaster, but is more hard and durable; being of excellent use in building, &c. It is a kind of the grit stone, but finer sand, and smoother; and is called *free*, from its being of such a constitution as to cut freely in any direction.

The qualities of the several kinds of free-stones used in the different parts of Europe are very different. They all agree in this general property indeed, that they are softer while in the quarry, than when they have been some time exposed to the air: but even this general property differs greatly in degree. They have a sort of grey free-stone in use at Paris, (of which we do not yet seem to have met with any in this country,) which has the abovementioned quality in so great a degree, that the expence of working it is in a great measure saved.

This stone lies every-where on the south-side of the river Seine, and is of a coarse and large grit. It is so soft when newly taken out of the strata, that they fashion it very conveniently with a sort of broad ax, and form as many stones for building in this manner in an hour, as an equal number of our people do in a day or two. Though this stone is as soft as dry clay when first taken up, it is found to harden so considerably in the air, that it becomes more than equal to our ordinary free-stone.

Our Portland stone of the finest kind, which is white, and of a close grit, is very fit for hewing and carving; but it will neither resist water nor fire, which is a very singular instance in so dense a stone; while the free-stone of Kent, which is less beautiful to the eye, and is of a greyish colour, and considerably close, though of a larger grain, resists the air and water very well.

The free-stone of Derbyshire, on the other hand, is so brittle as to be unfit for any fine working; and so coarse and open in its texture, that it lets water thro': yet it bears the fire extremely well, and is fit for ovens, hearths, &c.

FREEBOOTER, or **FLIBUSTER**, a name given to the pirates who scour the American seas, particularly such as make war against the Spaniards. See **BUCANEER**.

The French call them *sybustiers*, deducing the word from the English *sybote*, or *sybote*; by reason the first adventurers of this kind were the people of St Domingo, who made their excursions with sybotes, which they had taken from the English.

FREEDOM, in general, the state or quality of being free. See **LIBERTY**.

FREEDOM of a Corporation, the right of enjoying all the privileges and immunities belonging to it. See **CORPORATION**.

The freedom of cities, and other corporations, is regularly obtained by serving an apprenticeship; but it is also purchased with money, and sometimes conferred by way of compliment.

FREEDOM of Conscience. See **TOLERATION**.

FREEDOM of the Will, that power or faculty of the mind, whereby it is capable of acting or not acting, choosing or rejecting whatever it judges proper. Of this every man must be sensible, who finds in himself a

power to begin or forbear, continue or end several actions, barely by a thought or preference of the mind.

FREEZE, or **FRIEZE**, *Frize*, in commerce, a coarse kind of woollen stuff, or cloth, for winter wear; so called, as being frozen or naped on each side.

FREEZING, in philosophy, the same with congelation. See **CONGELATION** and **FROST**.

FREEZING Rain, or *Raining Ice*, a very uncommon kind of shower, which fell in the west of England, in December 1672; whereof we have divers accounts in the Philosophical Transactions.

This rain, as soon as it touched any thing above ground, as a bough or the like, immediately settled into ice; and by multiplying and enlarging the icicles, broke all down with its weight. The rain that fell on the snow, immediately froze into ice, without sinking in the snow at all.

It made an incredible destruction of trees, beyond any thing in all history. "Had it concluded with some gust of wind, (says a gentleman on the spot), it might have been of terrible consequence.

"I weighed the sprig of an ash tree, of just three quarters of a pound; the ice on which weighed 16 pounds. Some were frighted with the noise in the air; till they discerned it was the clatter of icy boughs, dashed against each other." Dr Beale observes, that there was no considerable frost observed on the ground during the whole; whence he concludes, that a frost may be very intense and dangerous on the tops of some hills, and plains; while in other places it keeps at two, three, or four foot distance above the ground, rivers, lakes, &c. and may wander about very furious in some places, and remits in others not far off. The frost was followed by glowing heats, and a wonderful forwardness of flowers and fruits. See **FROST**.

FREIGHT, in navigation and commerce, the hire of a ship, or a part thereof, for the conveyance and carriage of goods from one port or place to another; or the sum agreed on between the owner and the merchant, for the hire and use of a vessel. See **Maritime LAWS**.

FREIND (John), a most learned English physician and writer in the 18th century, was born at Croton, Northamptonshire, in 1675. In 1696, he published, in conjunction with Mr P. Foulkes, an edition of two Greek orations, one of Alcibiades against Ctesiphon, and the other of Demosthenes de *Coronâ*, with a new Latin version. In 1699, he wrote a letter to Dr Sloane concerning an *Hydrocephalus*, published in the Philosophical Transactions; and another letter in Latin to the same gentleman, *De spasmi ravior. historia*, printed in the same Transactions. In 1703, his *Emmenologia* appeared; which gained him great reputation. In 1704, he was chosen professor of chemistry in the university of Oxford. In 1705, he attended the earl of Peterborough to Spain, as physician to the army there; and upon his return in 1707, published an account of the earl's expedition and conduct. In 1709, he published his *Chemical Lectures*. In 1712, he attended the duke of Ormond in Flanders, as his physician. In 1716, he was admitted a fellow of the college of physicians in London. This year he published the first and third books of Hippocrates *De morbis popularibus*, with a Commentary on Fevers, written by himself. He sat a member for the borough of

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Launceston in Cornwall, in 1722, where he distinguished himself by his opposition to the administration. March 1722, he was committed to the tower on a charge of high-treason: and while he was under confinement, he wrote a Latin epistle to Dr Mead, *De quibusdam variorum generibus*; and began his History of Physic, the first part of which was published in 1725, and the second in 1726. Upon the accession of George II. to the throne, he was appointed physician in ordinary to the queen, who shewed the utmost regard and esteem for him. He died at London in 1728. His works were published together in Latin at London, 1733, in folio, and dedicated to the queen.

FREINSHEMIUS, a learned and elegant author, born at Ulm in 1608. He made supplements to Livy, Tacitus, and Q. Curtius, in 60 books, printed at Strasbourg in 1654. He wrote likewise Notes upon Q. Curtius, Florus, Tacitus, and some other Latin authors; and died in 1660.

FRENCH, in general, something belonging to France: thus we say, the French language, French customs, polity, &c.

The French language is made up of Latin, Greek, Teutonic, and the language spoken by the old Gauls. It is natural, and easily pronounced; and therefore used by most nations in Europe in conversing with foreigners. There are very few compound words in French; which is acknowledged to be its disadvantage. It has also few diminutives: but as to purity, easiness, and flexibility, it yields to none.

FRESCO, a method of painting in relievo on walls, so as to endure the weather.

It is performed with water-colours on fresh plaster, or on a wall laid with mortar not yet dry. This sort of painting has a great advantage by its incorporating with the mortar, and drying along with it, becomes very durable.

The compost should be made of rubbish stones mixed with well-burnt flint, or lime and water: but the saltiness of the lime must be washed out, by pouring water frequently on it. But this should not be done in moist weather.

To prevent the plaster from peeling, strike into the joints of the wall stumps of horse-nails six inches distant from each other. First plaster the walls pretty thick; then let it dry for some time, the design and colours being first ready prepared. This painting is chiefly performed on walls and vaults newly plastered with lime and sand; and the plaster is only to be put on in proportion as the painting proceeds.

Plaster the wall a second time, about the thickness of half a crown, only so much as you intend to work upon; and while it is wet, work the colours therein, which will incorporate with the plaster so as never to wash out.

The painting must be worked with a free hand, and your colours made high enough at first, as there can be no alteration made after the first painting.

In this work scarce any thing else is used but earths, which still retain their colour, defending it from the burning and salt of the lime. The colours are white, made of lime slacked some time, and white marble dust, red and yellow ocher, violet red, verditer, lapis lazuli, smalt, black Spanish brown, Spanish white, &c. all which are ground and worked up with water.

The brushes and pencils for this work must be long and soft, or else they will rake and raze the painting: the colours must be full and flowing from the brush, and the design or cartoon must be perfect in the paper-copy.

FRESNOY (Charles Alphonse du), an excellent poet and painter, was born at Paris in 1611. He was instructed there by Perrier and Simon Vouet, but did not long adhere to Vouet's manner of colouring; for as soon as he fixed himself at Rome, he made the works of Titian the models for his imitation. He was, however, more celebrated as a poet than as a painter; and bestowed more attention to the theory than to the practice of the pencil. Accordingly, he is better known by his incomparable poem *De arte graphica*, than by his performances on the canvas: and on this poem he bellowed so much pains, that he died in 1665, before it was published. It was printed afterward, with a French prose translation and notes, by M. de Piles; and was translated into English by Mr Dryden, who prefixed to it an original preface containing a parallel between painting and poetry.

FRET, or FRETTE, in architecture, a kind of knot or ornament, consisting of two lints or small fillets variously interlaced or interwoven, and running at parallel distances equal to their breadth.

FRET, in heraldry, a bearing composed of six bars, crossed, and variously interlaced. Some call it the *truelover's knot*. See HERALDRY.

FRET, in music, signifies a kind of stop on some instruments, particularly bass-viol and lutes. Frets consist of strings tied round the neck of the instrument, at certain distances, within which such and such notes are to be found.

FRET-Work, that adorned with frets. It is sometimes used to fill up and enrich flat empty spaces; but it is mostly practised in roofs, which are fretted over with plaster work.

FRIABLE, among naturalists, an appellation given to bodies that are easily crumbled to pieces: such are pumice and all calcined stones.

FRIAR, a term common to all monks of all orders; founded on this, that there is a kind of fraternity, or brotherhood, between the several religious persons of the same convent or monastery.

Friars are generally distinguished into these four principal branches, *viz.* 1. Minors, grey friars, or franciscans. 2. Augustines. 3. Dominicans, or black friars. 4. White friars, or carmelites. From these four the rest of the orders descend. See FRANCISCANS, AUGUSTINES, &c.

FRIBURG, a large town of Germany, and capital of Brisgaw; remarkable for the steeple of the great church, which, next to that of Strasbourg, is the finest in Germany; and for its university. The inhabitants are famous for polishing crystal and precious stones. It has been several times taken and retaken, particularly by the French in 1744, who demolished the fortifications. It is seated on the river Triser, ten miles east of Brisach, and 30 south of Strasbourg. E. Long. 7. 57. N. Lat. 48. 4.

FRIBURG, a town of Switzerland, and capital of the canton of the same name. The public buildings, especially the cathedral, are very handsome; and the inhabitants are Papists. It is governed in spirituals by the bishop

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Friburg
Friedland.

bishop of Laufanne, who resides there; and in temporal by a council, over which an avoyer presides. Its situation is very extraordinary; for only the western side is near plain ground, and all the rest is built among rocks and hills. The streets are clean and large; and it is divided into four parts, the town, the city, the off-land or meadow, and the hospital. In 1737, the powder-magazine, which contained 750 tons of gunpowder, was set on fire by lightning, which did considerable damage. It is seated on the river Save, in E. Long. 7. 5. N. Lat. 46. 50.

FRIEBURG (the canton of), and one of the 13 republics of Switzerland. It is surrounded on all sides by the canton of Bern. The land is fertile in corn, fruits, and pastures; and it is said the canton can fend 18,000 men into the field.

FRIEBURG (the hermitage of); a celebrated hermitage in Switzerland, three miles from the city of Friburg. It is cut in a rock; and contains a church and steeple, a vestry, a kitchen, a large hall, two rooms on each side, two pair of stairs, and a cellar. The church is 63 feet long, 36 broad, and 22 high. But the most wonderful thing of all is the steeple, which is 70 feet high above the rock. The chimney of the kitchen is also very surprising, for the passage up it is 90 feet in height. This hermitage is said to have been the work of one man with his servant, who were employed in it 25 years.

FRICENTI, an episcopal town of Italy, in the kingdom of Naples, and in the farther principato, near the river Tripalto, in E. Long. 14. 13. N. Lat. 40. 59.

FRICTION, in mechanics, the rubbing of the parts of the engines and machines against each other, by which means a great part of their effect is destroyed. See MECHANICS.

FRICTION, in medicine. See (the *Index* subjoined to) that article.

FRIDAY, the sixth day of the week; so named of Freya, a Saxon deity. By the Romans it was called *dies Veneris*. See DAY.

Good-Friday. See GOOD-FRIDAY.

FRIEDBURG, an imperial town of Germany, in Wetteravia. It is seated on a mountain, in E. Long. 8. 50. N. Lat. 50. 14. It was formerly much more considerable than at present.

FRIESTOL, mentioned, in our ancient writers, among the immunities granted to churches, signifies a seat, chair, or place of peace and security, where criminals might find safety and protection: of these there were many in England; but the most famous were that at Beverly, and that in St Peter's church at York, granted by charter of king Henry I.

FRIENDSHIP, a state of mutual good-will, or desire of doing good to each other, betwixt two or more individuals. See MORALS, n° 142, 143.

FRIESLAND, one of the united provinces of the Low Countries. It is bounded on the east by the river Lauvers, which parts it from the lordship of Groningen, on the south by Overijssel, on the west by the Zuider-Zee, and on the north by the German ocean. It is 30 miles from north to south, and 28 from east to west. The land is very fertile in corn and pasture, the horses are large, and the cows and sheep prolific. It is divided into three parts; We-

stergo to the west, Oftergo to the east, and Sevenwalden to the south. The islands of Sheling, Ameland, and other small ones, are dependent on this province. The principal towns are Leuwarden the capital, Franeker, Dockum, Harlingen, and Staveren.

FRIESLAND (East), a province of Germany, in the circle of Westphalia, lying near the German ocean. It is bounded on the south by the bishopric of Munster, on the east by the county of Oldenburg, on the west by the province of Groningen, and on the north by the sea. It is about 50 miles in length, and 30 in breadth, and was formerly called the *county of Embden*. It is a very fertile country, and feeds a great number of cattle; but it was greatly damaged by an inundation in 1717, and the repair of the dykes cost an immense sum. The principal towns are Norden, Leer, Essens, Whitmunde, and Aurick. Embden was an imperial city, and the principal place in the country; but now belongs to the king of Prussia, who bought it of the Dutch.

FRIGATE, in the navy, a light nimble ship built for the purposes of sailing swiftly. These vessels mount from 20 to 38 guns, and are esteemed excellent cruisers.

Formerly the name of *frigate* was only known in the Mediterranean, and applied to a kind of long vessel navigated in that sea with sails and oars. The English were the first who appeared on the ocean with those ships, and equipped them for war as well as commerce.

FRIGID, is applied to a jejune style, that is unanimated by any ornaments, and consequently without any force or vigour.

FRIGIDITY, in medicine, the same with IMPOTENCE.

FRIGORIFIC, in physiology, small particles of matter, which, according to Gassendus and others, being actually and essentially cold, and penetrating other bodies, produce in them that quality which we call cold. See COLD.

FRILL, in falconry. When a hawk trembles, or shivers, they say she frills.

FRINGILLA, in ornithology, a genus belonging to the order of passerines. The bill is conical, straight, and sharp-pointed. There are no less than 30 species comprehended under this genus, distinguished principally by varieties in their colour. The following are natives of Britain.

1. The *carduelis*, or GOLDFINCH, with the quill. Gold-finch. feathers red forwards, and the outermost without any spots; the two outermost are white in the middle, as the rest are at the point. The young bird, before it moults, is grey on the head; and hence it is termed by the bird-catchers a *grey-pate*. There is a variety of goldfinches called by the London bird-catchers a *cheverel*, from the manner in which it concludes its jerk. It is distinguished from the common sort by a white streak, or by two, sometimes three, white spots under the throat. Their note is very sweet; and they are much esteemed on that account, as well as for their great docility. Towards winter, they assemble in flocks; and feed on seeds of different kinds, particularly those of the thistle. It is fond of orchards, and frequently builds in an apple or pear tree: its nest is very elegantly formed of fine moss, liverworts, and bents,

Frigate
Fringilla.

Fringilla.

Fringilla.

bents, on the outside; lined first with wool and hair, and then with the goblin or cotton of the fallow. It lays five white eggs, marked with deep purple spots on the upper end.

This bird seems to have been the *χρυσωπις* of Aristotle; being the only one that we know of that could be distinguished by a golden fillet round its head, feeding on the seeds of prickly plants.

2. The *coelebs*, or CHAFFINCH, hath black limbs, and the wings white on both sides; the three first feathers of the tail are without spots, but two of the chief are obliquely spotted. It has its name from its delighting in chaff.

Chaffinch.

This species entertains us agreeably with its song very early in the year, but towards the latter end of summer assumes a chirping note: both sexes continue with us the whole year. What is very singular in Sweden, the females quit that country in September, migrating in flocks into Holland, leaving their mates behind; in the spring they return. In Hampshire Mr White has observed something of this kind; vast flocks of females with scarcely any males among them. Their nest is almost as elegantly constructed as that of the goldfinch, and of much the same materials, only the inside has the addition of some large feathers. They lay four or five eggs of a dull white colour, tinged and spotted with deep purple.

They are caught in plenty in flight-time; but their nests are rarely found, though they build in hedges and trees of all sorts. They make their nests of moss and wool, or any thing they can gather up; and have young ones thrice a-year. They are seldom bred from the nest, as being a bird not apt to learn another's song, nor to whistle; so that it is best to leave the old ones to bring them up.

The Essex finches are generally allowed to be the best sort, both for length of song and variety, ending with several notes that are very pretty. It is an hardy bird, and will live almost upon any feeds, none coming amiss to him. He is seldom subject to disease, but will be very lousy if not sprinkled with wine two or three times a-month.

3. The *domestica*, or SPARROW, hath the prime feathers of the wings and tail brown, the body variegated with grey and black, and a single white streak on the wings.

Sparrow.

These birds are proverbially falacious: they breed early in the spring; make their nests under the eaves of houses, in holes of walls, and very often in the nests of the martin, after expelling the owner. Linnæus tells us (a tale from Albertus Magnus), that this insult does not pass unrevenge: the injured martin assembles its companions, who assist in plastering up the entrance with dirt; then fly away, twittering in triumph, and leave the invader to perish miserably. See the article BRUTE.

They will often breed in plum-trees and apple-trees, in old rooks nests, and in the forks of boughs beneath them.

Siskin.

4. The *spinus*, or SISKIN, hath the prime feathers of the wings yellow in the middle, and the four first chief tail-feathers without spots; but they are yellow at the base, and black at the points.

Mr Willoughby tells us, that this is a song-bird: that in Sussex it is called the *barley-bird*, because it comes

to them in barley-feed time. We are informed that it visits these islands at very uncertain times, like the grosbeak, &c. It is to be met with in the bird-shops in London; and being rather a scarce bird, sells at a higher price than the merit of its song deserves: it is known there by the name of the *aberdavine*. The bird-catchers have a notion of its coming out of Russia. Dr Kramer informs us, that this bird conceals its nest with great art; though there are infinite numbers of young birds in the woods on the banks of the Danube, that seem just to have taken flight, yet no one could discover it.

5. The *linaria*, or LINNET, hath the bottom of the breast of a fine blood-red, which heightens as the spring advances.

Linnet.

These birds are much esteemed for their song: they feed on seeds of different kinds, which they peel before they eat: the seed of the linum or flax is their favourite food; from whence the name of the linnet tribe. They breed among furze and white thorn: the outside of their nest is made with moss and bents, and lined with wool and hair. They lay five whitish eggs, spotted like those of the goldfinch.

6. The *cannabina*, or RED-HEADED LINNET, is less than the former, and hath a blood-coloured spot on the forehead.

It is a common fraud in the bird-shops in London, when a male-bird is distinguished from the female by a red breast, as in the case of this bird, to stain or paint the feathers, so that the deceit is not easily discovered, without at least close inspection. These birds are frequent on our sea-coasts; and are often taken in flight-time near London: it is a familiar bird; and is cheerful in five minutes after it is caught.

7. The *canaria*, or CANARY-BIRD, hath a whitish body and bill, with the prime feathers of the wings and tail greenish. It was originally peculiar to those isles to which it owes its name; the same that were known to the ancients by the addition of the *fortunate*. Though the ancients celebrate the isle of Canaria for the multitude of birds, they have not mentioned any in particular. It is probable, then, that our species was not introduced into Europe till after the second discovery of these isles, which was between the 13th and 14th centuries. We are uncertain when it first made its appearance in this quarter of the globe. Belon, who wrote in 1555, is silent in respect to these birds: Gesner is the first who mentions them; and Aldrovand speaks of them as rarities; that they were very dear on account of the difficulty attending the bringing them from so distant a country, and that they were purchased by people of rank alone. Olinia says, that in his time there was a degenerate sort found on the isle of Elba, off the coast of Italy, which came there originally by means of a ship bound from the Canaries to Leghorn, and was wrecked on that island. These birds will produce with the goldfinch and linnet; and the offspring is called a *mule-bird*, because, like that animal, it proves barren. They are still found on the same spot to which we were first indebted for the production of such charming songsters; but they are now become so numerous in our own country, that we are under no necessity of crossing the ocean for them.

Canary-bird.

FRIPPERY, a French term sometimes used in our language.

language to signify the trade or traffic of old second-hand clothes and goods. The word is also used for the place where such sort of commerce is carried on, and even for the commodities themselves. The company of frippiers, or fripperers, at Paris, are a regular corporation, of an ancient standing, and make a considerable figure in that city.

FRITT, a mixture of several substances intended to be fused together for the purpose of making glass. After these substances have been mixed together, they are generally exposed during a certain time to a more or less strong heat, which is, however, incapable of completely fusing them. The intention of this operation is either to effect a slight union betwixt these matters, or to free them more perfectly from any inflammable or extraneous matter, by this calcination.

FRITH, in its most usual acceptation, signifies an arm of the sea; such are the Frith of Forth or of Edinburgh, the Frith of Clyde, Murray Frith, &c.

FRITILLARIA, FRITILLARY; a genus of the monogynia order, belonging to the hexandria class of plants. There are five species, all of them bulbous-rooted flowery perennials, producing annual stalks from about one foot to a yard or more high, terminated by large, bell-shaped, lilaceous flowers, of a great variety of colours. They are all propagated by offsets, which they furnish abundantly from the sides of their roots, and which may be separated every second or third year; they are hardy plants, and will thrive in any of the common borders.

FRIULI, a province of Italy, subject to Venice, and bounded by Carinthia in Germany on the north, by Carniola on the east, by the Gulph of Venice on the south, and by the Bellunese and Feltrin on the west.

FRIZING OF CLOTH, a term in the woollen manufactory, applied to the forming of the nap of cloth, or stuff, into a number of little hard burrs or prominences, covering almost the whole ground thereof.

Some cloths are only frized on the back side, as black cloths; others on the right side, as coloured and mixed cloths, rateens, bays, friezes, &c.

Frizing may be performed two ways; one with the hand, that is, by means of two workmen, who conduct a kind of plank that serves for a frizing instrument.

The other way is by a mill, worked either by water or a horse, or sometimes by men. This latter is esteemed the better way of frizing, by reason the motion being uniform and regular, the little knobs of the frizing are formed more equably and regularly. The structure of this useful machine is as follows.

The three principal parts are the frizer or crisper, the frizing table, and the drawer or beam. The two first are two equal planks or boards, each about 10 feet long and 15 inches broad; differing only in this, that the frizing-table is lined or covered with a kind of coarse woollen stuff, of a rough sturdy nap; and the frizer is incrustated with a kind of cement composed of glue, gum-arabic, and a yellow sand, with a little aqua-vitæ, or urine. The beam, or drawer, thus called, because it draws the stuff from between the frizer and the frizing-table, is a wooden roller, beset all over with little, fine, short points or ends of wire, like those of cards used in carding of wool.

The disposition and use of the machine is thus. The table stands immovable, and bears or sustains the cloth to be frized, which is laid with that side uppermost on which the nap is to be raised: over the table is placed the frizer, at such a distance from it as to give room for the stuff to be passed between them: so that the frizer, having a very slow semicircular motion, meeting the long hairs or naps of the cloth, twists, and rolls them into little knobs or burrs; while, at the same time, the drawer, which is continually turning, draws away the stuff from under the frizer, and winds it over its own points.

All that the workman has to do while the machine is a-going, is to stretch the stuff on the table as fast as the drawer takes it off, and from time to time to take off the stuff from the points of the drawer.

The design of having the frizing-table lined with stuff of a short, stiff, stubby nap, is that it may detain the cloth between the table and the frizer long enough for the grain to be formed, that the drawer may not take it away too readily, which must otherwise be the case, as it is not held by any thing at the other end. It were unnecessary to say any thing particular of the manner of frizing stuffs with the hand, it being the aim of the workmen to imitate, as near as they can with their wooden instrument, the slow, equable, and circular motion of the machine: it needs only be added, that their frizer is but about two feet long and one broad; and that to form the nap more easily, they moisten the surface of the stuff lightly, with water mingled with whites of eggs or honey.

FROBENIUS (John), a famous and learned printer in the 16th century, was born at Hamelburgh in Franconia, and settled at Basil. He had before studied in that university, where he acquired the reputation of being uncommonly learned; and now settling up a printing-house in that city, was the first of the German printers who brought that admirable art to any degree of perfection. Being a man of great probity and piety, as well as skill, he was particularly choice in the authors he printed; and would never, for the sake of profit, suffer libels, or any thing that might hurt the reputation of another, to go through his press. The great character of this printer was the principal motive which induced Erasmus to reside at Basil, in order to have his own works printed by him. A great number of valuable authors were printed by Frobenius, with great care and accuracy; among which were the works of St Jerome, Augustine, and Erasmus. He designed to have printed the Greek Fathers; but died in 1527, before he could execute his design. Erasmus wrote his epitaph in Greek and Latin.

John Frobenius left a son, named *Jerome Frobenius*, and a daughter married to Nicholas Episcopius; who, joining in partnership, continued Frobenius's printing-house with reputation, and printed correct editions of the Greek Fathers.

FROBISHER, or FORBISHER, (Sir Martin), an excellent navigator and sea-officer in the 16th century, was born near Doncaster in Yorkshire, and was from his youth brought up to navigation. He was the first Englishman who attempted to find a north-west passage to China; and, in 1576, he failed with two barks and a pinnacle, in order to attempt that passage.

Profisher,
Frog.

this voyage he discovered a cape, to which he gave the name of *Queen Elizabeth's Foreland*, and the next day discovered a strait to which he gave his own name. This voyage proving unsuccessful, he attempted the same passage in 1577; but discovering some ore in an island, and his commission directing him in this voyage only to search for ore, and to leave the farther discovery of the north-west to another time, he returned to England. He sailed again, with 15 ships, and a great number of adventurers, to form a settlement: but being obstructed by the ice, and driven out to sea by a violent storm, they, after encountering many difficulties, returned home, without making any settlement, but brought a large quantity of ore.—He afterwards commanded the *Aid* in Sir Francis's Drake's expedition to the West Indies, in which St Domingo in Hispaniola, Cartagena, and Santa Justina, in Florida, were taken and sacked. In 1588, he bravely exerted himself in defence of his country, against the Spanish armada, when he commanded the *Triumph*, one of the largest ships in that service; and, as a reward for his distinguished bravery, received the honour of knighthood from the lord high-admiral at sea. He afterwards commanded a squadron which was ordered to cruise on the Spanish coast; and, in 1592, took two valuable ships and a rich carrack. In 1594, he was sent to the assistance of Henry IV. king of France against a body of the Leaguers and Spaniards, who had strongly entrenched themselves at Croyzon near Brest; but in an assault upon that fort, on the 7th of November, Sir Martin was unfortunately wounded with a ball, of which he died soon after he had brought back the fleet to Plymouth, and was buried in that town.

PROFISHER'S *Strait*, lie a little to the northward of cape Farewell in West Greenland, and were discovered by Sir Martin Profisher. W. Long. 48. 16. N. Lat. 63. 12.

FROG, in zoology. See RANA.

Bull-FROG. See RANA.

FROG-Fish of Surinam, a very singular animal, of which a figure is given by Mr Edwards, *Hist. of Birds*, Vol. I. There is no specimen in the British museum, nor in any private collection, except that of Dr Fothergill. It was brought from Surinam in South America.—Frogs, both in Asia and Africa, according to Merian, change gradually from fishes to frogs, as those in Europe; but after many years revert again into fishes, though the manner of their change has never been investigated. In Surinam these fishes are called *jakjés*. They are cartilaginous, of a substance like our mustela, and exquisite food: they are formed with regular vertebrae, and small bones all over the body divided into equal parts; are first darkish, and then grey: their scales make a beautiful appearance. Whether this animal is, in its perfect state, a species of frog with a tail, or a kind of water-lizard, Mr Edward's does not pretend to determine; but observes, that when its size is considered, if it should be deemed a tadpole at first produced from spawn, and in its progress towards a frog, such an animal, when full grown, if it bears the same proportion to its tadpole as those in Europe do, must be of enormous size; for our full-grown frogs exceed the tadpoles at least 50 times. See a reduced figure on Plate CV.

FRONDESCENTIA, from *frons*, a "leaf;" the

precise time of the year and month in which each species of plants unfolds its first leaves.

All plants produce new leaves every year; but all do not renew them at the same time. Among woody plants, the elder, and most of the honey-suckles; among perennial herbs, crocus and tulip, are the first that push or expand their leaves. The time of sowing the seeds decides with respect to annuals. The oak and ash are constantly the latest in pushing their leaves: the greatest number unfold them in spring; the mosses and firs in winter. These striking differences with respect to so capital a circumstance in plants as that of unfolding their leaves, seem to indicate that each species of plants has a temperature proper or peculiar to itself, and requires a certain degree of heat to extricate the leaves from their buds, and produce the appearance in question.

This temperature, however, is not so fixed or constant as it may appear to a superficial observer. Among plants of the same species, there are some more early than others; whether that circumstance depends, as it most commonly does, on the nature of the plants, or is owing to differences in heat, exposure, and soil. In general, it may be affirmed, that small and young trees are always earlier than larger or old ones.

The pushing of the leaves is likewise accelerated or retarded according to the temperature of the season; that is, according as the sun is sooner or later in dispensing that certain degree of heat which is suitable to each species.

FRONTINUS (Sextus Julius), an ancient Roman writer, was of consular dignity, and flourished under the emperors Vespasian, Titus, Domitian, Nerva, and Trajan. He commanded the Roman armies in Britain; was made city-prefect when Vespasian and Titus were consuls; and Nerva made him curator of the aqueducts, which occasioned his writing *De aqueductibus urbis Romæ*. He wrote four books upon the Greek and Roman art of war; a piece *De re agraria*, and another *De limitibus*. These have been often separately reprinted; but were all collected together in a neat edition at Amsterdam in 1661, with notes by Robertus Kenchenius. He died under Trajan.

FRONTISPIECE, in architecture, the portrait or principal face of a building. See ARCHITECTURE.

FRONTISPIECE, is also used to signify an ornament fronting the title-page of a book, which, in some measure, should express the subject treated of.

FRONTO (Marcus Cornelius), was chosen for his eloquence to instruct the emperors Marcus Aurelius and Lucius Verus in rhetoric; in recompence of which he was promoted to the consulate, and a statue was erected to his honour. He taught Marcus Aurelius not only eloquence, but the duty of kings, and excellent morals. Some say he wrote against the Christians. A sect was formed of those who looked upon him as a model of perfect eloquence, and these were called *Frontoniani*. The Civilians, whose names were *Fronto*, mentioned in the pandects, were probably descended from him.

FROST, in physiology, such a state of the atmosphere as occasions the congelation or freezing of water and other fluids. See CONGELATION.

Under the articles COLD, CONGELATION, EVAPORATION.

Fronde-
centia.
Frost.

Frost.

PORATION, FLUIDITY, &c. it is shewn, that water and other fluids are capable of containing the element of fire, or heat, in two very different states. In the one, they seem to imbibe the fire in such a manner, that it eludes all the methods by which we are accustomed to observe it, either by our sensation of feeling, or the thermometer; in the other, it manifests itself obviously to our senses, either by the touch, the thermometer, or the emission of light.

In the first of these states, we call the body *cold*; and are apt to say that this coldness is occasioned by the *absence* of heat. But this manner of expressing ourselves is certainly improper; for, even those fluids which are coldest to the touch, contain a vast deal of heat. Thus, vapour, which is colder to the touch than the water from which it was raised, contains an immense quantity of fire, even more than sufficient to heat it red hot. The like may be said of common salt, and snow, or ice. If a quantity of each of these substances is separately reduced to the degree of 28 or 30 of Fahrenheit's thermometer, upon mixing them together, the heat which would have raised the thermometer to the degree abovementioned, now enters into the substance of them in such a manner that the mercury falls down to 0.—Here an excessive degree of cold is produced, and yet we are sure that the substances contain the very same quantity of heat that they formerly did: nay, they will even seem exceedingly cold, when they most certainly contain a great deal more heat than they originally did; for they absorb it from all bodies around them; and if a small vessel full of water is put in the middle of such a mixture, it will in a short time be full of ice.

It appears, therefore, that our senses, even when assisted by thermometers, can only judge of the state in which the element of fire is with relation to the bodies around us, without regard to the quantity contained in them. Thus, if heat flows from any part of our body into any substance actually in contact with it, the sensation of cold is excited, and we call that substance *cold*; but if it flows from any substance into our body, the sensation of heat is excited, and we call that substance *hot*, without regard to the absolute quantity contained in either case. See HEAT.

Of all known substances, the atmosphere either absorbs or throws out heat with the most remarkable facility; and in one or other of these states it always is with respect to the surface of the earth, and such bodies as are placed on or near it; for these, properly speaking, have no temperature of their own, but are entirely regulated by that of the atmosphere.—When the air has been for some time absorbing the heat from terrestrial bodies, a frost must be the undoubted consequence, for the same reason that water freezes in a vessel put into a freezing mixture; and were this absorption to continue for a length of time, the whole earth would be converted into a frozen mass. There are, however, certain powers in nature, by which this effect is always prevented; and the most violent frost we can imagine, must always as it were defeat its own purposes, and end in a thaw. To understand this subject, we must observe,

1. In that state of the atmosphere which we denominate frost, there is a most intimate union between the air and the water it contains; and therefore frosty

weather, except in very high latitudes, is generally Frost.

2. When such an union takes place, either in winter or summer, we observe the atmosphere also inclined to absorb heat, and consequently to frost. Thus in clear settled weather, even in summer, though the day may be excessively hot, by reason of the continued sunshine, yet the mornings and evenings are remarkably cold, and sometimes even disagreeably so.

3. The air being, therefore, always ready in the time of frost, or in clear weather, to absorb heat from every substance which comes into contact with it, it follows that it must also absorb part of that which belongs to the vapours contained in it.

4. Though vapour is capable of becoming much colder than water without being frozen, yet by a continued absorption it must at last part with its latent heat, *i. e.* that which essentially constitutes it vapour; and without which it is no longer vapour, but water or ice. No sooner, therefore, does the frost arrive at a certain pitch, than the vapours, every where dispersed through the air, give out their latent heat: the atmosphere then becomes clouded; the frost either totally goes off, or becomes milder by reason of the great quantity of heat discharged into the air; and the vapours descend in rain, hail, or snow, according to the particular disposition of the atmosphere at the time.

5. Even in the polar regions, where it may be thought that the frost must increase beyond measure, there are also natural means for preventing its running to extremes. The principal cause here is, the mixture of a great quantity of vapours from the more temperate regions of the globe with the air in those dreary climates. It is well known, that aqueous vapour always flies from a warm to a colder place. For this reason, the vapours raised by the sun in the more temperate regions of the earth, must continually travel northward and southward in great quantities. Thus they furnish materials for those immense quantities of snow and ice which are to be found in the neighbourhood of the poles, and which we cannot imagine the weak influence of the sun in these parts capable of raising. It is impossible that a quantity of vapour can be mixed with frosty air, without communicating a great deal of heat to it; and thus there are often thaws of considerable duration even in those climates where, from the little influence of the sun, we should suppose the frost would be perpetual.

6. We may now account with some probability for the uncertain duration of frosts. In this country they are seldom of a long continuance; because the vapours raised from the sea with which our island is surrounded, perpetually mix with the air over the island, and prevent a long duration of the frost. For the same reason, frosts are never of such long duration in maritime places on the continent, as in the inland ones. There is nothing, however, more uncertain than the motion of the vapours with which the air is constantly filled, and therefore it is impossible to prognosticate the duration of a frost with any degree of certainty. In general, we may always be certain, that if a quantity of vapour is accumulated in any place, no intense frost can subsist in that place for any length of time; and by whatever causes the vapours are driven from place to place, by the same causes the frosts are regulated throughout

Frost. throughout the whole world. See THAW, VAPOUR, &c.

Frost
||
Fructescen-
tia.

The effects of frost in several different countries, are enumerated under the article CONGELATION. In the northern parts of the world, even solid bodies are liable to be affected by frost. Timber is often apparently frozen, and rendered exceedingly difficult to saw. Marble, chalk, and other less solid terrestrial concretions, will be shattered by strong and durable frosts. Metals are contracted by frost: thus, an iron tube, 12 feet long, upon being exposed to the air in a frosty night, lost two lines of its length. On the contrary, frost swells or dilates water near one tenth of its bulk. Mr Boyle made several experiments with metalline vessels, exceedingly thick and strong; which being filled with water, close stopped, and exposed to the cold, burst by the expansion of the frozen fluid within them. Trees are frequently destroyed by frost, as if burnt up by the most excessive heat; and in very strong frosts, walnut-trees, ashes, and even oaks, are sometimes split and cleft, so as to be seen through, and this with a terrible noise, like the explosion of fire-arms.

Frost naturally proceeds from the upper parts of bodies downwards: but how deep it will reach in earth or water, is not easily known; because this depth may vary with the degree of coldness in the air, by a longer or shorter duration of the frost, the texture of the earth, the nature of the juices wherewith it is impregnated, the constitution of its more internal parts as to heat and cold, the nature of its effluvia, &c. Mr Boyle, in order to ascertain this depth, after four nights of hard frost, dug in an orchard, where the ground was level and bare, and found the frost had scarce reached three inches and a half, and in a garden nearer the house only two inches, below the surface. Nine or ten successive frosty nights froze the bare ground in the garden six inches and a half deep; and in the orchard, where a wall sheltered it from the south sun, to the depth of eight inches and a half. He also dug in an orchard, near a wall, about a week afterwards, and found the frost to have penetrated to the depth of 14 inches. In a garden at Moscow, the frost in a hard season only penetrates to two feet: and the utmost effect that Captain JAMES mentions the cold to have had upon the ground of Charlton island, was to freeze it to 10 feet deep: whence may appear the different degrees of cold of that island and Russia. And as to the freezing of water at the abovementioned island, the Captain tells us, it does not naturally congeal above the depth of six feet, the rest being by accident. Water also, exposed to the cold air in large vessels, always freezes first at the upper surface, the ice gradually increasing and thickening downwards: for which reason, frogs retire in frosty weather to the bottom of ditches; and it is said, that shoals of fish retire in winter to those depths of the sea and rivers, where they are not to be found in summer. Water, like the earth, seems not disposed to receive any very intense degree of cold at a considerable depth or distance from the air. The vast masses of ice found in the northern seas being only many flakes and fragments, which, sliding under each other, are, by the congelation of the intercepted water, cemented together.

In cold countries, the frost often proves fatal to mankind; not only producing gangrenes, but even death

itself. Those who die of it have their hands and feet first seized, till they grow past feeling it; after which the rest of their bodies is so invaded, that they are taken with a drowsiness, which if indulged, they awake no more, but die insensibly. But there is another way whereby it proves mortal, viz. by freezing the abdomen and viscera, which on dissection are found to be mortified and black.

Hoar-Frost, a cold moist vapour, that is drawn up a little way into the air, and in the night falls again on the earth, where it is congealed into icy crystals of various figures. Hoar-frost, therefore, is nothing but dew turned into ice by the coldness of the air.

Melioration of Aromatic Spirits by Frost. Mr Baume observes, that aromatic spirituous waters have less scent when newly distilled than after they have been kept about six months: and he found that the good effects of age was produced in a short time by means of cold; and that, by plunging quart-bottles of the liquor into a mixture of pounded ice and sea-salt, the spirit, after having suffered for six or eight hours the cold hence resulting, proves as grateful as that which hath been kept many years. Simple waters also, after having been frozen, prove far more agreeable than they were before. Geoffroy takes notice of this melioration by frost; *Hist. Acad.* 1713.

Melioration of Land by Frost. See AGRICULTURE, n° 30.

Frost-Bitten. See (the *Index* subjoined to) MEDICINE.

FROTH, a white, light substance, formed on the surface of fluids, by vehement agitation, consisting of little spherules or globules.

FROTH-Spit, or Cuckoo-Spit, a name given to a white froth, or spume, very common in the spring and first months of summer, on the leaves of certain plants, particularly on those of the common white field-lychnis or catch-fly, thence called by some *spatling poppy*.

All writers on vegetables have taken notice of this froth, though few have understood the cause or origin of it till of late. It is formed by a little leaping animal, called by some the *sea grass-hopper*, by applying its anus close to the leaf, and discharging thereon a small drop of a white viscous fluid, which, containing some air in it, is soon elevated into a small bubble: before this is well formed, it deposits such another drop; and so on, till it is every way overwhelmed with a quantity of these bubbles, which form the white froth which we see. Within this spume it is seen to acquire four tubercles on its back, wherein the wings are inclosed: these bursting, from a reptile it becomes a winged animal; and thus, rendered perfect, it flies to meet its mate, and propagate its kind. It has an oblong, obtuse body, and a large head with small eyes. The external wings, for it has four, are of a dusky brown colour, marked with two white spots: the head is black. It is a species of CICADA.

FRUCTESCENCIA, (from *fructus*, "fruit,") comprehends the precise time in which, after the fall of the flowers, the fruits arrive at maturity, and disperse their seeds.

In general, plants which flower in spring, ripen their fruits in summer, as rye; those which flower in summer, have their fruits ripe in autumn, as the vine; the fruit of autumnal flowers ripens in winter, or the following

Fruitful-
Fruit.

lowing spring, if kept in a stove or otherwise defended from excessive frosts. These frosts, says M. Adanson, are frequently so pernicious and violent as to destroy the greatest part of the perennial plants of Virginia and Mississippi, that are cultivated in France, even before they have exhibited their fruit. The plants which flower during our winter, such as those of the Cape of Good Hope, ripen their fruit in spring in our stoves.

FRUCTIFEROUS, signifies properly any thing that produces fruit.

FRUCTIFICATION, among botanists, in a more lax sense, includes the flower and fruit, with their several coverings. See FRUCTUS.

FRUCTUS, in botany, the FRUIT, is defined by Jungius and former botanists to be an annual part of the plant, which adheres to the flower and succeeds it; and, after attaining maturity, separates or detaches itself from the parent plant; and, being commodiously lodged in the bosom of the earth, gives birth to a new vegetable. This definition is sufficiently accurate, and so perspicuous, that it requires no illustration whatever. We shall only observe, that, in its vulgar acceptation, the word *fruit* is expressive, not of the seeds, which are doubtless the essence of every fruit; but of the case or vessel in which they are contained. Thus, when we speak of the fruit of an apple-tree, we always mean the luscious pulp which enfolds the seeds; although that, in strict propriety, is only the cover of the fruit.

Colours Extracted from FRUITS. See the article COLOUR-Making, n° 35.

FRUIT-FLIES, a name given by gardeners and others to a sort of small black flies found in vast numbers among fruit trees, in the spring season, and supposed to do great injury to them. Mr Lewenhoeck preserved some of these flies for his microscopical observations. He found that they did not live longer than a day or two, but that the females during this time laid a great number of longish eggs. The gardeners who suppose that these flies wound the leaves of the trees, are mistaken: it is true that they feed on their juices; but they have no instruments wherewith they can extract these for themselves: they feed on such as are naturally extravasated; and when there is not a sufficient quantity of these for their purpose, they haunt the places to which the pucerons resort, and feed on the juices which these little creatures extravasate by means of the holes they bore in the leaves with their trunks.

FRUIT-STONES. The mischiefs arising from the cumber which many people have of swallowing the stones of plums and other fruit are very great. The Philosophical Transactions give an account of a woman who suffered violent pains in her bowels for 30 years, returning once in a month or less. At length, a strong purge being given her, the occasion of all these complaints was driven down from the bowels to the anus; where it gave a sensation of distension and stoppage, producing a continual desire of going to stool, but without voiding any thing. On the assistance of a careful hand in this case, there was taken out with a forceps, a ball of an oval figure, of about ten drachms in weight, and measuring five inches in circumference. This had caused all the violent fits of pain which she had suffered for so many years; and, after voiding it, she became perfectly well. The ball extracted looked like a stone, and felt very hard, but it swam in water.

Fruit
Frumentaceous.

On cutting it through with a knife, there was found in the centre of it a plum-stone; round which, several coats of this hard and tough matter had gathered. Another instance given in the same papers is of a man, who, dying of an incurable colic which had tormented him many years, and baffled the effects of medicines, was opened after death; and in his bowels was found a ball similar to that above-mentioned; but somewhat larger, being six inches in circumference, and weighing an ounce and an half. In the centre of this, as of the other, there was found the stone of a common plum, and the coats were of the same nature with those of the former.

These and several other instances mentioned in the same place, sufficiently shew the folly of that common opinion that the stones of fruits are wholesome. For though by nature the guts are so defended by their proper mucus, that people very seldom suffer by things of this kind; yet if we consider the various circumvolutions of the guts, their valves and cells, and at the same time consider the hair of the skins of animals we feed on, the wool or down on herbs and fruit, and the fibres, vessels, and nerves of plants, which are not altered by the stomach; it will appear a wonder that instances of this sort of mischief are not much more common. Cherry-stones, swallowed in great quantities, have occasioned the death of many people; and there have been instances even of the seeds of strawberries collecting into a lump in the guts, and causing violent disorders, which could not be cured without great difficulty.

FRUIT-TREES. With regard to these it may be observed, 1. That the cutting and pruning them when young, scrimp their bearing, though it contributes to the richness and flavour of the fruit, as well as to the beauty of the tree. 2. That kernel-fruit trees come later to bear than stone-fruit trees: the time required by the first before they come to any fit age for bearing, being one with another five years; but when they do begin, they bear in greater plenty than stone-fruit. 3. That stone-fruit, figs, and grapes, commonly bear considerably in three or four years, and bear full crops the fifth and sixth years; and hold it for many years, if well ordered. 4. That fruit-trees in the same neighbourhood will ripen a fortnight sooner in some grounds, than in others of a different temperature. 5. That, in the same country, hot or cold summers set considerably forwards, or put backwards, the same fruit. 6. That the fruit on wall-trees generally ripen before those on standards, and those on standards before those on dwarfs. 7. That the fruit of all wall-trees planted in the south and east quarters, commonly ripen about the same time, only those in the south rather earlier than those in the east; those in the west are later by eight or ten days; and those in the north, by 15 or 20. For the planting, pruning, grafting, &c. of fruit-trees, see the articles PLANTING, TRANSPLANTING, PRUNING, GRAFTING, ORCHARD, NURSERY, &c.

FRUITERY, a place for the keeping of fruit, a fruit-house, or fruit-loft.

A fruitery should be inaccessible to any thing of moisture; and should be as much as possible free from frost.

FRUMENTACEOUS, a term applied by botanists.

nists to all such plants as have a conformity with wheat, in respect of their fruits, leaves, ears, or the like.

FRUMENTARIII, a kind of soldiers, or archers, under the western empire.

The first time we read of these officers is in the reign of the emperor Adrian, who made use of them to inform himself of whatever passed. They did not make any particular corps distinct from the rest of the forces, but there was a certain number of them in each legion. It is supposed, that they were at first a number of young persons, disposed by Augustus throughout the provinces, particularly on all the grand roads, to acquaint the emperor, with all expedition, of every thing that happened.

Afterwards they were incorporated into the troops themselves, where they still retained their ancient name. As their principal office was the giving intelligence, they were often joined with the curiosi, with whom they agreed in this part of their office.

Their name of *frumentarii* is derived from their being also a sort of purveyors to the armies, cities, &c. collecting all the corn from the several provinces to furnish the commonwealth.

FRUMENTATION, in Roman antiquity, a largess of corn bestowed on the people. This practice of giving corn to the people was very ancient among the Romans, and frequently used to soothe the turbulent humour of the populace. At first the number of those to whom this largess was given was indeterminate, till Augustus fixed it at 200,000.

FRUSH, or **RUNNING-THRUSH**. See **FARRIERY**, §. xlv.

FRUSTUM, in mathematics, a part of some solid body separated from the rest.

The frustum of a cone is the part that remains, when the top is cut off by a plane parallel to the base; and is otherwise called a *truncated cone*. See **CONIC SECTIONS**.

The frustum of a pyramid is also what remains after the top is cut off by a plane parallel to its base.

The frustum of a globe or sphere is any part thereof cut off by a plane, the solid contents of which may be found by this rule: To three times the square of the semidiameter of the base, add the square of its height; then multiply that sum by the height; and this product multiplied by .5236 gives the solidity of the frustum.

FRUTEX, a **SHRUB**. Shrubs, according to Linnæus, make a branch of the seventh family in the vegetable kingdom; and are distinguished from trees, in that they come up without buds. But this distinction is not universal, though it be generally just with regard to those of Europe. Nature hath made no absolute distinction between trees and shrubs. *Frutex*, in its general acceptation, is a plant whose trunk is perennial, gemmiparous, woody, dividing and subdividing into a great number of branches. In short, it is the epitome of a tree, exemplified in the rose-bush.

FRYTH (John), a martyr to the Protestant religion in the reign of Henry VIII. He was the son of an inn-keeper at Seven-oaks in Kent; and educated in the king's college, Cambridge, where he took the degree of bachelor of arts. Thence he removed to Oxford, and was made a junior canon of Wolfey's college. He

had not been long in this university, before he became acquainted with William Tyndale, a zealous Lutheran, with whom he conversed frequently on the abuses in religion. Fryth became a convert to Lutheranism, and publicly avowed his opinions. He was apprehended, examined by the commissary, and confined to his college. At length, having obtained his liberty, in 1528 he went over to Germany, where he continued about two years; and then returned to England, more than ever determined in his religious sentiments. Finding at that time but few associates, he wandered about from place to place, till at last he was taken up at Reading as a vagrant, and set in the stocks, where he remained till he was near expiring for want of sustenance. He was at length relieved by the humanity of Leonard Cox, a schoolmaster; who finding him a man of letters, procured his enlargement, and administered to his necessities. Fryth now set out for London, where, with more zeal than prudence, he began to make proselytes; but was soon apprehended by order of the chancellor Sir Thomas More, and sent prisoner to the Tower. Refusing to recant his opinions, he was condemned to the flames, and accordingly burnt in Smithfield, on the fourth of July 1533. He left several works behind him, which were printed in folio in 1573.

FUAGE, in old English writers, a tax of 12d. for every fire, levied in the time of Edward III.

FRY, in zoology, signifies the spawn, or rather young, of fish.

FUCUS, in botany, a genus of submarine plants, belonging to the cryptogamia class.

The fucus consists of a tough matter, formed into a kind of leaves, which are flat and variously divaricated; and which have some appearance of fructification, in punctated tubercles, covering oblong vesicles, supposed by Linnæus to be male flowers; and smooth roundish vesicles, hollow and interwoven with filaments, which appear to him to be female flowers. There are 34 species of fucus, or sea-wrack, many of them to be found on our coasts.

The ancients used a purple sea-plant to dry woollen and linen things of that colour, and called it *fucus*. The dye was very beautiful, but not lasting; for it soon began to change, and in time went wholly off. This is the account Theophrastus gives of it.

The women of those times also used something called *fucus*, to stain their cheeks red; and many have supposed, from the same word expressing both, that the same substance was used on both occasions. But this, on a strict inquiry, proves not to be the case. The Greeks called every thing *fucus*, that would stain or paint the flesh. But this peculiar substance used by the women to paint their cheeks was distinguished from the others by the name of *rizon* among the more correct writers, and was indeed a root brought from Syria into Greece. The Latins, in imitation of the Greek name, called this root *radicula*, and Pliny very erroneously confounds the plant with the *radix lunaria*, or *struthion* of the Greeks.

The word *fucus* was in those times become such an universal name for paint, that the Greeks and Romans had a *fucus metallicus*, which was the cerufs used for painting the neck and arms white; after which they used the *purpurissum*, or red fucus of the *rizzium*, to give

give the colour to the cheeks. In after-times they also used a peculiar *fucus* or paint for this purpose; prepared of the *Creta argentaria*, or silver-chalk, and some of the rich purple dyes that were in use at that time: and this seems to have been very little different from our rose-pink; a colour commonly fold at the colour-shops, and used on like occasions.

FUEGO, or **Fogo**, one of the Cape de Verd islands, in the Atlantic ocean. It is much higher than any of the rest; and seems, at sea, to be one single mountain, though on the sides there are deep valleys. There is a volcano at the top, which burns continually, and may be seen a great way off at sea. It vomits a great deal of fire and smoke, and throws out huge pieces of rock to a vast height; and sometimes torrents of melted matter run down the sides. The Portuguese, who first inhabited it, brought negro slaves with them, and a flock of cows, horses, and hogs; but the chief inhabitants now are blacks, of the Romish religion. W. Long. 24. 47. N. Lat. 15. 20.

FUEL, whatever is proper to burn or make a fire; as wood, turf, peat, bituminous earths, coal, &c.

FUGALIA, in Roman antiquity, a feast supposed by some to be the fame with the *refugium*, held on the 24th of February, in memory of the expulsion of the kings, and the abolishing of monarchical government. Others again distinguish the *fugalia* from the *refigie*. And others think, that the *fugalia* was the fame with the *poplifugia*, or the feast of Fugia, the goddess of joy, occasioned by the rout of an enemy, which was the reason the people abandoned themselves to riot and debauchery.

FUGITIVE, a person obliged to fly his country, or remove from a place where he had home abode or establishment, on account of his crimes, debts, or other occasions.

FUGUE, in music, (from the Latin *fuga*, a "chase.") A piece of music, sometimes longer and sometimes shorter, in which, agreeable to the rules of harmony and modulation, the composer treats a subject; or, in other words, what expresses the capital thought or sentiment of the piece, in causing it to pass successively and alternately from one part to another.

These are the principal rules of the fugue; of which some are peculiar to itself, and others common to it with what the French call *imitation*.

1. The subject proceeds from the tonic to the dominant, or from the dominant to the tonic, in rising or descending.

2. Every fugue finds its response in the part immediately following that which commenced.

3. That response ought to resume the subject in the interval of a fourth or fifth above or below the key, and to pursue it as exactly as the laws of harmony will admit; proceeding from the dominant to the tonic when the subject is introduced from the tonic to the dominant, and moving in a contrary direction when the subject is introduced from the dominant to the tonic. One part may likewise resume the same subject in the octave or unison of the preceding; but in that case, it is a repetition rather than a real response.

4. As the octave is divided into two unequal parts, of which the one contains four gradations ascending from the tonic to the dominant, and the other only three in continuing the ascent from the dominant to

the tonic; this renders it necessary to have some regard to this change in the expression of the subject, and to make some alterations in the response, that we may not quit the chords that are essential to the mode. It is a different case when the composer intends to alter the modulation; for there the exactness of the response itself, when taken in a different tone, produces the alteration proper for this change.

5. It is necessary that the fugue should be planned in such a manner, that the response may commence before the close of the first air, so that both the one and the other may be in part heard at the same time; that, by this anticipation, the subject may be as it were connected with itself, and that the art of the composer may discover itself in this concourse. It is absolute mockery, instead of a fugue, to impose upon the hearers the same air, merely transposed from one key to another, without any other restraint than an accompaniment afterwards formed at pleasure. This deserves at best no better name than what the French call *imitation*. See **IMITATION**.

Besides these rules, which are fundamental, there are others which, though prescribed by taste alone, are not less essential. Fugues, in general, render music more noisy than agreeable; it is for this reason that they are more agreeable in the chorus than any where else. Now, as their chief merit consists in fixing the ear on the principal air or subject, which for this reason is made to pass incessantly from part to part, and from mode to mode, the composer ought to exert his care in preserving that air always distinct; or to prevent it from being absorbed in, or confounded with, the other parts. To produce this effect, there are two different ways: one in the movement, which must be incessantly contrasted with itself; so that, if the procedure of the fugue be accelerated, the other parts move gravely and with protracted notes; or, on the contrary, if the motion of the fugue be slow and solemn, the accompaniments must have more and quicker business. The other method is to extend the harmony, by removing the parts at a greater distance one from the other; lest the others, too nearly approximated to that which contains the subject, should be confounded with it, and prevent it from being distinguished with sufficient clearness; so that what would be an imperfection any where else, becomes here a beauty.

The unity of melody should be preserved: this is the great and general rule, which must frequently be practised by different means. The chords must be chosen, and the intervals, so that one particular sound may produce the chief effect; this can only result from the unity of the melody. It will sometimes be necessary to employ voices and instruments of different kinds, that the part which ought to prevail may be most easily distinguished: this again shews the necessity of preserving the unity of the melody. Another object of attention no less necessary, is, in the different connections of modulation which are introduced by the procedure and progress of the fugue, to cause all these modulations to correspond at the same time in all the parts, to connect the whole in its progress by an exact conformity of modes; lest, if one part be in one mode, and another in another, the general harmony should be in none at all, and for that reason should no longer be able to produce simple effects upon the ear, nor simple

Fulcrum
Fulica.

Fuliginosus
Fuller.

ideas in the mind: which is another reason for preferring unity of melody. In a word, in every fugue the confusion of melodies and modulations is at once what a composer has most to fear, and will find the greatest difficulty in avoiding; and as this kind of music never produces a pleasure above mediocrity, one may say that a fine fugue is, though the masterpiece of an excellent harmonist, ungrateful to his toil.

* See Canon. There are still several other kinds of fugues; such as the perpetual fugue *, the double fugue, the inverted fugue.

The inverted fugue is a manner of composition, in which the flying part proceeds in a contrary direction to the other fugue, which had been formerly fixed in the same piece of music. Thus, when the first fugitive part is heard in ascending from the tonic to the dominant, or from the dominant to the tonic, the counter fugue ought to be heard in descending from the dominant to the tonic, or from the tonic to the dominant, and *vice versa*. Its other rules are exactly like those of the common fugue.

FULCRUM, in mechanics, the prop or support by which a lever is sustained.

FULDE, a considerable town of Germany, in the circle of the upper Rhine, and in the Buchow, with a celebrated abbey; whose abbot is primate of the abbeys of the empire, perpetual chancellor of the emperor, and sovereign of a small territory lying between Hesse, Franconia, and Thuringia. It is seated on the river Fulde, 55 miles south of Cassel, and 58 north-east of Francfort. E. Long. 9. 53. N. Lat. 50. 40.

FULICA, the coot, in ornithology, a genus of birds, of the order of gallæ. It has a convex bill, with the upper mandible forked over the lower at the edge; the lower mandible is gibbous behind the tip. The forehead is bald; and the feet have four toes, a little lobated. There are four species.

1. The *atra*, or COMMON COOT, hath a bald forehead, a black body, and lobated toes. They frequent lakes and still rivers; making their nest among the rushes, with grass, reeds, &c. floating on the water, so as to rise and fall with it. They lay five or six large eggs, of a dirty whitish hue, sprinkled over with minute deep rust-coloured spots; and it is said, that sometimes they will lay 14 or more eggs. The young when just hatched are very deformed, and the head mixed with a red coarse down. In winter they often repair to the sea, and the channel near Southampton is sometimes observed almost covered with them. They are often brought to that market, where they are exposed to sale without their feathers, and scalded like pigs.

2. The *chloropus*, or COMMON GALLINULE, hath a bald forehead, and toes without webs. It gets its food on grassy banks, and borders near fresh waters, and in the very waters if they be weedy. It builds upon low trees and shrubs by the water-side; breeding twice or thrice in a summer; and, when the young are grown up, drives them away to shift for themselves. They lay seven eggs of a dirty white, thinly spotted with rust-colour. This bird strikes with its bill like a hen, and in the spring has a shrill call. In flying, it hangs down its legs; in running, it often flirts up its tail, and shews the white feathers. We may observe, that the bottoms of its toes are so very flat and broad (to enable

it to swim), that it seems to be the bird which connects the cloven-footed aquatics with the next tribe, *viz.* the fin-toed.

3. The FULICA with a bald forehead, a violet-coloured body, and toes without webs, is the purple water-hen of Edwards; and it inhabits Asia and America.

4. The FULICA with a carunculated head, a variegated body, spinous shoulders, and toes without webs; but the nail on the hinder toe is exceeding long. It is the spur-winged water-hen of Edwards, and is an inhabitant of South America. The nail on the hind toe is straight, and longer than a man's finger. The pollex rests upon one joint, and the wings are green.

FULIGINOSUS, whatever proceeds from a thick, sooty smoke; such as litharge and lamp-black.

FULIGNO, a city of Italy, in the pope's territories, 10 miles north of Spoleto.

FULIGO, in natural history, a species of pumice-stone. See PUMICE.

FULK (William), a learned and eminent divine of the church of England, in the 16th century. He was patronized by the earl of Leicester, who, in 1571, presented him to the living of Warley in Essex, and soon after to that of Diddington in Suffolk. He attended Leicester, when he went ambassador to France; and on his return was made master of Pembroke-hall, and Margaret professor of divinity at Cambridge. His works are very numerous, levelled chiefly at the Papists; the most considerable of them is his Comment on the Rhemish Testament. He died in 1589.

FULLER (Nicholas), prebendary of Salisbury, and a learned English critic; who published, in 1617, *Miscellanea Theologica*, in four books; and afterward two more of *Miscellanea Sacra*. He died in 1623; and there are some MSS of his remaining in the Bodleian library, that shew his great skill in Hebrew and philosophy.

FULLER (Dr Thomas), a learned English divine; was born at Allwinckle, near Oundle, in Northamptonshire, about the year 1608, and studied at Cambridge. He was chosen minister of St Bennet's there; and at about 23 years of age, his merit procured him a fellowship in Sidney college, and a prebend in Salisbury cathedral. He was soon after presented to the rectory of Broad Windsor, in Dorsetshire; and afterwards was made lecturer of the Savoy in London; but upon the pressing of the covenant, he retired to Oxford; and soon after accompanied Sir Ralph Hopton as his chaplain in the army, which he attended in their marches from place to place. After the death of king Charles I. he obtained the living of Waltham-abbey, and was appointed lecturer of St Clement's; and shortly after removed to the lecture of St Bride's, Fleet-street. Upon the restoration, he recovered his prebend in the cathedral of Salisbury, was appointed chaplain extraordinary to his majesty, and created doctor of divinity. It is said his memory was so amazingly tenacious and comprehensive, that he could make use of a sermon *verbatim*, if he once heard it. He once undertook, in passing to and from Temple-bar to the Poultry, to tell at his return every sign as it stood in order on both sides of the way, repeating them either backwards or forwards; and this task he actually performed. He wrote, 1. A history of the holy war. 2. The church-history of Britain, in folio. 3. Andronicus,

or the unfortunate politician, in 8vo. 4. A Pisgah sight of Palestine. 5. A history of English worthies; and other works. He died in August 1664; and was interred in the chancel of Cranford church, in Middlesex, whither his body was attended by at least 200 of his brethren of the ministry.

FULLER, a workman employed in the woollen manufactories, to mill or scour cloths, ferges, and other stuffs, in order to render them more thick, compact, and durable. See CLOTH.

FULLER'S Earth, in natural history, a soft, greyish, brown, dense, and heavy marle: when dry, it is of a greyish ash-coloured brown, in all degrees from very pale to almost black, and it has generally something of a greenish cast: it is very hard and firm, of a compact texture, of a rough and somewhat dusty surface that adheres slightly to the tongue: it is very soft to the touch, not staining the hands, nor breaking easily between the fingers: it has a little harshness between the teeth, and melts freely in the mouth: thrown into water, it makes no ebullition or hissing; but swells gradually in bulk, and falls into a fine soft powder. It makes no effervescence with aqua fortis.

The greatest quantity, and the finest earth of this kind in the world, is dug in the pits at Wavedon, near Woburn in Bedfordshire. The strata in these pits lie thus: From the surface to the depth of six feet, there are several layers or beds of sand, all reddish, but some lighter-coloured than others. Under these there is a thin stratum of a sand-stone, which they break through, and then there is the fuller's earth. The upper stratum of this is about a foot thick: the workmen call it *cledge*, and throw it aside as useless; being commonly fouled with the sand which originally covered it, and which insinuates itself a good way into it. After this, they come to the fine fuller's earth for sale, which lies to the depth of eight feet more. The matter of this is divided into several layers, there being commonly about a foot and an half between one horizontal fissure and another. Of these several layers, the upper half, where the earth breaks itself, is tinged red; which seems to be owing to the running of the water upon it from among the sands above; some of which are probably of a ferruginous nature, or have ferruginous matter among them. This reddish fuller's earth the workmen call *crop*; and between the *cledge* and this there is a thin stratum of matter, of less than an inch, which in taste, colour, and external appearance, resembles the terra Japonica of the shops. The lower half of the strata of fuller's earth they call *wall-earth*. This is untinted with the red colour of the other, and seems the most proper for fulling. Under the fuller's earth there is a stratum of white and coarse stone about two feet thick. They seldom dig thro' this; but if they do, they find more strata of sand.

This earth is of great use in scouring cloths, stuffs, &c. imbibing all the grease and oil used in preparing, dressing, &c. of the wool; for which reason it is exported a contraband commodity, and is not to be made under the penalty of 1s. for every pound weight. See FULLING.

FULLER'S Weed, in botany. See DIPSACUS.

FULLERY, a place where cloths, &c. are fulled. See the next article.

FULLING, the art or act of cleansing, scouring,

and pressing cloths, stuffs, and stockings, to render them stronger, closer, and firmer: called also *milling*. Pliny, (*lib. vii. cap. 56.*) assures, that one Nicias, the son of Hermias, was the first inventor of the art of fulling: and it appears by an inscription, quoted by Sir G. Wheeler, in his travels thro' Greece, that this same Nicias was a governor in Gece in the time of the Romans.

The fulling of cloths and other stuffs is performed by a kind of water-mill, thence called a *fulling* or *scouring* mill.

These mills, excepting in what relates to the mill-stones and hopper, are much the same with corn-mills. And there are even some which serve indifferently for either use; corn being ground, and cloths fulled, by the motion of the same wheel. Whence, in some places, particularly in France, the fullers are called *millers*; as grinding corn, and milling stuffs, at the same time.

The principal parts of the fulling-mill are, The wheel, with its trundle; which gives motion to the tree, or spindle, whose teeth communicate it to the pestles, or stampers, which are hereby raised and made to fall alternately according as its teeth catch on or quit a kind of latch in the middle of each pestle. The pestles and troughs are of wood; each trough having at least two, sometimes three pestles, at the discretion of the master, or according to the force of the stream of water. In these troughs are laid the cloths, stuffs, &c. intended to be fulled: then, letting the current of water fall on the wheel, the pestles are successively let fall thereon, and by their weight and velocity stamp and press the stuffs very strongly, which by this means become thickened and condensed. In the course of the operation, they sometimes make use of urine, sometimes of fuller's earth, and sometimes of soap. To prepare the stuffs to receive the first impressions of the pestle, they are usually laid in urine; then in fuller's earth, and water; and lastly in soap, dissolved in hot water. Soap alone would do very well; but this is expensive: though fuller's earth, in the way of our dressing, is scarce inferior thereto; but then it must be well cleared of all stones and grittinesses, which are apt to make holes in the stuff. As to urine, it is certainly prejudicial, and ought to be entirely discarded; not so much on account of its ill smell, as of its sharpness and saltness, which qualities are apt to render the stuffs dry and harsh.

The true method of fulling with soap is delivered by Monsr. Colinet, in an authentic memoir on that subject, supported by experiments made by order of the marquis de Lonois, then superintendent of the arts and manufactories of France; the substance of which we shall here subjoin.

Method of FULLING cloths and woollen stuffs with Soap.—A coloured cloth, of about 45 ells, is to be laid in the usual manner, in the trough of a fulling-mill; without first soaking it in water, as is commonly practised in many places. To full this trough of cloth, 15 pounds of soap are required; one half of which is to be melted in two pails of river or spring water, made as hot as the hand can well bear it. This solution is to be poured by little and little upon the cloth, in proportion as it is laid in the trough: and thus it is to be fulled for at least two hours; after which, it is to be taken out and stretched. This done, the cloth is imme-

Fulmar
Fulmaria.

diately returned into the same trough, without any new soap; and there fullled two hours more. Then taking it out, they wring it well, to expels all the grease and filth. After the second fulling, the remainder of the soap is dissolved as in the former, and cast four different times on the cloth; remembering to take out the cloth every two hours, to stretch it, and undo the plaits and wrinkles it has acquired in the trough. When they perceive it sufficiently fullled, and brought to the quality and thickness required, they scour it for good in hot water, keeping it in the trough till it be quite clean. As to white cloths; in regard these full more easily and in less time than coloured ones, a third part of the soap may be spared.

FULLING OF *Stockings, Caps, &c.* should be performed somewhat differently; viz. either with the feet or the hands; or a kind of rack, or wooden machine, either armed with teeth of the same matter, or else horses or bullocks teeth. The ingredients made use of herein are urine, green soap, white soap, and fuller's earth. But the urine also is reckoned prejudicial here. Woven stockings, &c. should be fullled with soap alone: for those that are knit, earth may be used with the soap. Indeed, it is frequent to full these kinds of works with the mill, after the usual manner of cloth, &c. But that is too coarse and violent a manner; and apt to damage the work, unless it be very strong.

FULMAR, in ornithology. See PROCELLARIA.

FULMINATING, something that thunders, or resembles thunder.

FULMINATING Gold. See CHEMISTRY, n° 256.

FULMINATING Powder. See CHEMISTRY, n° 475.

FULMINATION, in chemistry, the same with detonation. See NITRE.

FULMINATION, in the Romish canon law, a sentence of a bishop, official, or other ecclesiastic appointed by the pope, by which it is decreed that some bull sent from the pope shall be executed.

FUMARIA, FUMITORY; a genus of the hexandria order, belonging to the diadelphia class of plants. There are a number of different species; all of them low, shrubby, and deciduous and evergreen plants, growing from two to six or seven feet high, adorned with small simple leaves, and papilionaceous flowers of different colours. The most remarkable is the officinalis, or common fumitory; which grows naturally in shady cultivated grounds, and produces spikes of purplish flowers in May and June. It is very juicy, of a bitter taste, without any remarkable smell.—The medical effects of this herb are, to strengthen the tone of the bowels, gently loosen the belly, and promote the urinary and other natural secretions. It is principally recommended in melancholic, scorbutic, and cutaneous disorders, for opening obstructions of the viscera, attenuating and promoting the evacuation of viscid juices. Frederic Hoffman had a very great opinion of it as a purifier of the blood; and assures us, that in this intention scarce any plant exceeds it.—Cows and sheep eat the plant; goats are not fond of it; horses and swine refuse it.

FUMIGATION, in chemistry, a kind of calcination, when metals, or other hard bodies, are corroded, or softened, by receiving certain fumes for that purpose.

FUMIGATION, in medicine. By the subtle fumes that are inspired as well as inhaled into our bodies, much benefit or prejudice is produced, according to the nature of the matter, and the constitution into which it is received; as is evident from the palsies produced among workers in lead-mines, &c. and the benefits received in many cases when the air is impregnated with salutary materials. Catarrhs and catarrhus coughs are relieved by fumes received with the breath; and, by the same method, expectoration is assisted in humoral asthma; and even ulcers in the lungs are said to have been healed by this method. The advantage of mercurial fumigations in the cure of venereal ulcers is known to every practitioner.

FUMITORY, in botany. See FUMARIA.

FUNAMBULUS, among the Romans, was what we call a *rape-dancer*, and the Greeks *schenobates*. See *Rope-DANCER*.

There was a funambulus, it seems, who performed at the time when the Hecyra of Terence was acted; and the poet complains, that the spectacle prevented the people from attending to his comedy. *Ille populus studio stupidus in funambulo, animum occupat.*

At Rome, the funambuli first appeared under the consulate of Sulpicius Peticus and Licinius Stolo, who were the first introducers of the scenic representations. It is added, that they were first exhibited in the island of the Tyber, and that the censors Messala and Cassius afterwards promoted them to the theatre.

FUNCHAL, an episcopal town of Madeira, in an island of the Atlantic Ocean, over-against the coast of Morocco. It is large, strong, handsome, and populous, with fine churches. The principal trade consists in sweetmeats and wines. It belongs to the Portuguese; and is seated in a fertile valley, at the foot of a mountain from whence several streams proceed. W. Long. 14. 30. N. Lat. 31. 30.

FUNCTION, the act of fulfilling the duties of any employment.

FUNCTION, being also applied to the actions of the body, is by physicians divided into vital, animal, and natural. The *vital* functions are those necessary to life, and without which the individual cannot subsist; as the motion of the heart, lungs, &c. The *natural* functions are such as it cannot subsist any considerable time without; as the digestion of the aliment, and its conversion into blood. Under *animal* functions are included the senses of touching, tasting, &c. memory, judgment, and voluntary motion; without any or all of which an animal may live, but not very comfortably.

The animal-functions perform the motion of the body by the action of the muscles; and this action consists chiefly in the shortening the fleshy fibres, which is called *contraction*, the principal agents of which are the arteries and nerves distributed in the fleshy fibres.

All parts of the body have their own functions, or actions, peculiar to themselves. Life consists in the exercise of these functions, and health in the free and ready exercise of them.

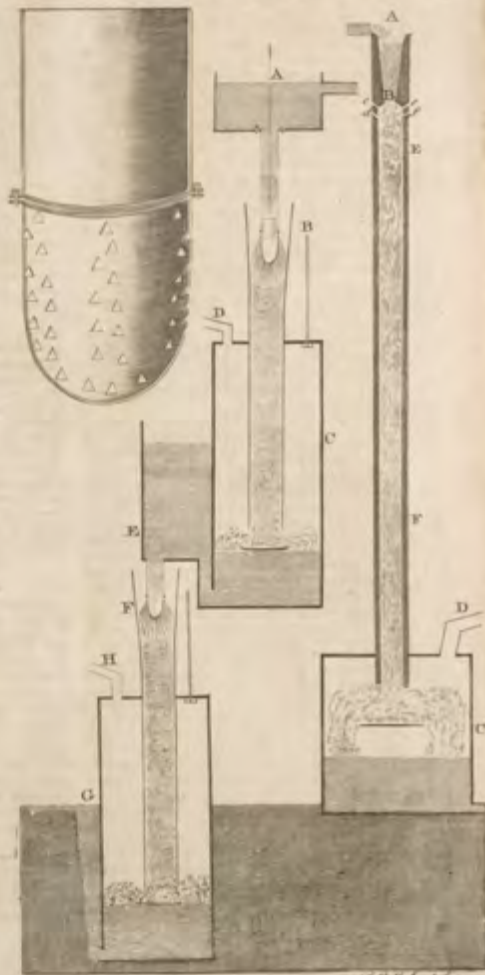
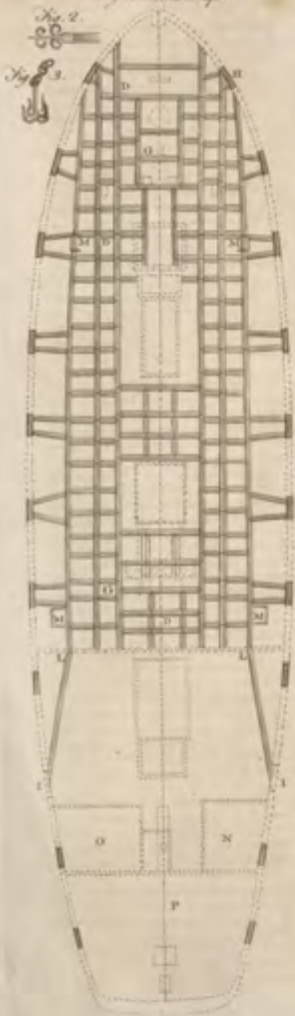
FUND, in general, signifies any sum of money appropriated for a particular purpose. Thus, that part of the national revenue which is set aside for the pay-

Funigation
Funds.

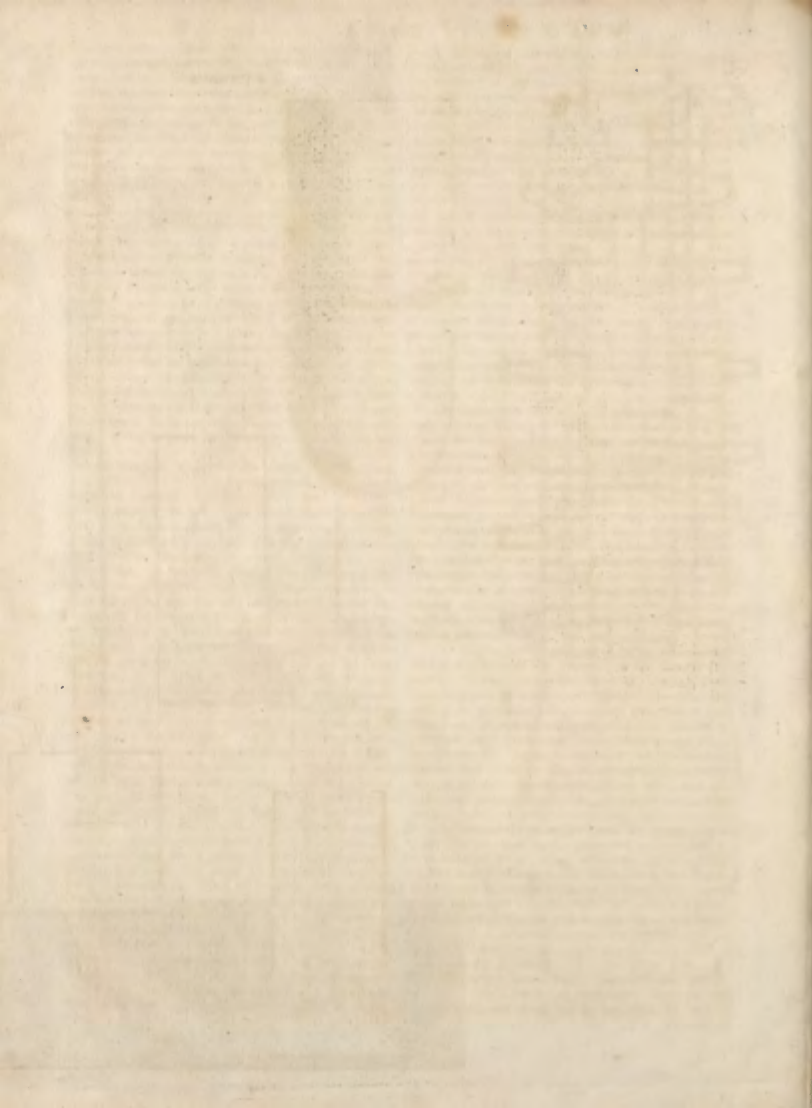
Fig. 1. FIRE SHIP.

Plate CXIV.

Fig. 2.
Machine for Blowing Air into
FURNACE &c.



A Bellows!



Funds.

ment of the national debt, is called the *sinking fund*. But, when we speak of the *funds*, we generally mean the large sums which have been lent to government, and constitute the national debt; and for which the lenders, or their assignees, receive interest from revenues allotted for that purpose. The term *stock* is used in the same sense, and is also applied to the sums which form the capital of the bank of England, the East India and South-Sea companies; the proprietors of which are entitled to a share of the profits of the respective companies.

The practice of funding was introduced by the Venetians and Genoese in the 16th century, and has been adopted since by most of the nations in Europe. Princes had often borrowed money, in former times, to supply their exigencies, and sometimes mortgaged their territories in security: but these loans were generally extorted, and their payment was always precarious; for it depended on the good faith and success of the borrower, and never became a regular burden on posterity. The origin of funds is derived from the peculiar manners and circumstances of modern Europe. Since the invention of gun-powder, and the progress of commerce, the military occupation has become a distinct employment in the hands of mercenaries; the apparatus of war is attended with more expence; and the decision of national quarrels has often been determined by command of money, rather than by national bravery. Ambitious princes have therefore borrowed money, in order to carry on their projects with more vigour. Weaker states have been compelled, in self-defence, to apply to the same resource; the wealth introduced by commerce has afforded the means; and the regularity of administration, established in consequence of the progress of civility, has increased the confidence of individuals in the public security; the complicated system of modern policy has extended the scenes of war, and prolonged their duration; and the colonies established by the mercantile nations have rendered them vulnerable in more points, and increased the expence of defending them.

When a greater sum has been required for the annual expence, than could easily be supplied by annual taxes, the government have proposed terms, to their own subjects, or foreigners, for obtaining an advance of money, by mortgaging the revenue of future years for their indemnification. This mortgage may either be for a limited period, or perpetual. If the sum allotted annually for the benefit of those who advance the money, be considerably greater than the interests of the sums advanced, they may agree to accept of such allowance, for a limited time, as a full equivalent. Thus, they may either agree for the casual produce of the revenue assigned; or a fixed annuity for a greater or less number of years; or a life-annuity to themselves or nominees; or an annuity for two or more lives; or an annuity, with the benefit of survivorship, called a *tontine*, in which scheme, the whole sum to which the original annuitants were entitled continues to be distributed among the survivors.

When the sum allotted to the creditors of the public is only equivalent to the interest of the money advanced, the grant must be perpetual, unless the debt be redeemed by payment of the principal.

The establishment of the funds was introduced in

Britain at the revolution; and has since been gradually enlarged, and carried to an amazing extent. The various methods above mentioned have been used in their various forms; but perpetual annuities have been granted for the greatest part; and, even when the money was originally advanced on other conditions, the lenders have been sometimes induced, by subsequent offers, to accept of perpetual annuities, instead of the former terms. The debt for which perpetual annuities are granted, is called the *redeemable debt*, and the other is called the *irredeemable debt*. Although the debts thus contracted by government are seldom paid for a long term of years; yet, any creditor of the public may obtain money for what is due him when he pleases, by transferring his property in the funds to another; and regular methods are appointed for transacting these transfers, in an easy manner. By means of this, the stocks become a kind of circulating capital; and have the same effect, in some respects, as the circulating money in the nation. When a stockholder transfers his share, he may sometimes be able to obtain a greater price than the original value, and at other times be obliged to accept of a less one. The value of the funds depends on the proportion between the interest they bear, and the benefit which may be obtained by applying the money to other purposes. It is influenced by the plenty or scarcity of money, and by the quantity of the public debt; and it is impaired by any event which threatens the safety, or weakens the credit, of the government.

The business of stock-jobbing is founded on the variation of the prices of stock. Persons possessed of real property may buy or sell stock, according to their notion that the value is likely to rise or fall, in expectation of making profit by the difference of price. And a practice has taken place among persons who often possess no property in the funds, to contract for the sale of stock against a future day, at a price now agreed on. For instance: A agrees to sell B 1000 *l.* of bank-stock, to be transferred, in 20 days, for 1200 *l.* A has, in fact, no such stock; but, if the price of bank-stock, on the day appointed for the transfer, should be only 118 *per cent.* A may purchase as much as will enable him to fulfil his bargain for 1180 *l.*, and thus gains 20 *l.* by the transaction; on the contrary, if the price of bank-stock be 125 *per cent.* he will lose L. 50. The business is generally settled without any actual purchase or transfer of stock, by A paying to B, or receiving from him, the difference between the current price of the stock on the day appointed, and the price bargained for.

This practice, which is really nothing else than a wager concerning the price of stock, is contrary to law; yet it is carried on to a great extent. In the language of Exchange-alley, where matters of this kind are transacted, the buyer is called a *bull*, and the seller a *bear*. As neither party can be compelled by law to implement these bargains, their sense of honour, and the disgrace and loss of future credit, which attend a breach of contract, are the principles by which the business is supported. When a person declines to pay his loss, he is called a *lame duck*, and dare never afterwards appear in the Alley. This odious treatment, however, is not bestowed on those whose failure is owing to want of ability, providing they make

Funds.

make the same surrender of their property voluntarily, which the law would have exacted if the debt had been entitled to its sanction.

The interest or dividend on the stock is paid half-yearly; and the purchaser has the benefit of the interest due on the stock he buys, from the last term to the time of purchase. Therefore the prices of the stocks rise gradually, *ceteris paribus*, from term to term, and fall at the term when the interest is paid. In comparing the prices of the different stocks, it is necessary to advert to the term when the last interest was paid; and, allowance being made for this circumstance, the prices of all the government stocks, which bear interest at the same rate, must be nearly the same, as they all depend on the same security.

When a loan is proposed, such terms must be offered to the lenders, as may render the transaction beneficial; and this is now regulated by the prices of the old stocks. If the stocks, which bear interest at 4 per cent. fell at par, or rather above, the government may expect to borrow money at that rate; but, if these stocks are under par, the government must either grant a higher interest, or some other advantage to the lenders, in compensation for the difference. For this purpose, besides the perpetual annuity, another annuity has sometimes been granted for life, or for a term of years. Lotteries have frequently been employed to facilitate the loan, by entitling the subscribers to a certain number of tickets, for which no higher price is charged than the exact value distributed in prizes, though their market-price is generally L. 2 or L. 3 higher. Sometimes an abatement of a certain proportion of the capital has been granted, and a lender entitled to hold L. 100 stock, though in reality he advanced no more, perhaps, than L. 95.

It belongs to the Chancellor of the Exchequer to propose the terms of the loan in parliament; and he generally makes a previous agreement with some wealthy merchants, who are willing to advance the money on the terms proposed. The subscribers to the loan deposit a certain part of the sum subscribed; and are bound to pay the rest by instalments, or stated proportions, on appointed days, under pain of forfeiting what they have deposited. For this they are entitled, perhaps, not only to hold their share in the capital, but to an annuity for 10 years, and to the right of receiving a certain number of lottery-tickets on advantageous terms. They may sell their capital to one person, their annuity to a second, and their right to the tickets to a third. The value of all these interests together is called *omnium*; and, in order to obtain a ready subscription, it ought to amount to L. 102, or upwards, on L. 100 of capital. This difference is called the *bonus* to the subscribers.

When a loan is made, a new tax is imposed to defray the annuities. For some time, each tax was particularly appropriated for the payment of annuities then created: but the method was found inconvenient, as some of the taxes fell short of the sum expected, while others exceeded it; and the multiplicity of funds produced confusion. This gave occasion to unite the various branches of the revenue into a few funds. The *South-Sea Fund* was established in the year 1711, for payment of the annuities due to that company. The *Aggregate Fund* was established in

1715, and the *General Fund* in 1717, for the payment of other annuities. All the other branches of the revenue then subsisting, except the annual land and malt tax, and the branches applied for the support of the civil government, were appropriated to one or other of these funds. And, as these revenues were considerably greater than the charges for which the funds were answerable, the overplus was appointed to be collected together, and remain at the disposal of parliament; and is known by the name of the *Sinking Fund*, because intended for the discharge of the national debt. At the beginning of the present reign, the revenues appropriated to the civil list were added to the aggregate fund, and that fund charged with the nett sum of L. 800,000, since increased to L. 900,000, in place of the same. When money has been borrowed since the establishment of these funds, the sinking fund is made a collateral security, in case the tax imposed for the payment of the annuity should prove deficient; and sometimes the new taxes have been directly paid into that fund, and the annuities charged on the same; and the faith of parliament is pledged to corroborate the security. The sinking fund has yielded an annual overplus, for many years, of more than two millions Sterling; which, in time of war, is applied to the current services; and, even in time of peace, a considerable part is diverted to the same purpose; as the annual land and malt tax, the only other unappropriated funds, are insufficient for defraying the charge of a peace-establishment.

The terms of the government loans have been very different, according to the circumstances under which they took place. The interest has generally been lower than the current interest of the nation, because it is punctually paid; and the government security is esteemed preferable to any of a private kind. Sometimes, however, when the exigencies were pressing, and the national resources, in some measure, exhausted by the continuance of war, a higher interest has been granted than was current in private debts. But, as the prices of such stocks rose above par in peaceable times, advantage was taken of that circumstance to prevail on the holders to consent to a reduction of the interest, by offering payment of the principal, in case they refused. Thus, the interest on the greater part of the national debt, contracted before the late war with France, was reduced to 3 per cent. and the stocks were united under the names of *reduced* and *consolidated* annuities. Part of the consolidated annuities bear interest at 4 per cent. till the year 1781, when it falls, like the rest, to 3 per cent. In subsequent loans, the faith of parliament has sometimes been engaged, that the debt shall not be redeemed, and, of consequence, the interest not reduced, for a number of years condensed on.

The rise of the terms of the public loans, during the continuance of war, will appear from the following abstract of those which was made during the late war with France and Spain, and the present contest with America.

Loans for French War.

1755. At 3 per cent, by lottery	L. 900,000
1756. At 3½ per cent.	1,500,000
At 3 per cent. by lottery	500,000
	1757. At

Funds.	1757. At 3 per cent. and an additional life-annuity of 1 per cent.	3,100,000
	1758. At $3\frac{1}{2}$ per cent.	4,500,000
	At 3 per cent. by lottery	500,000
	1759. At 3 per cent. and a premium of 15 per cent. additional capital.	7,590,000
	1760. At 4 per cent. irredeemable for 20 years, and 3 per cent. thereafter, with a premium of 3 per cent. additional capital	8,240,000
	1761. At 3 per cent. irredeemable for 20 years, besides ann. of L. 1 : 2 : 6 per L. 100 for 99 years	11,400,000
	At 3 per cent. by lottery	600,000
	1762. At 4 per cent. irredeemable for 20 years, and an annuity of 1 per cent. for 98 years	12,000,000
	The remaining debt, not provided for at the peace, was partly paid off in the subsequent years, and the rest funded at 3 per cent.	
	<i>Loans for American war.</i>	
	1776. At 3 per cent. with premium of 8 per cent. additional capital, and benefit of lottery	L. 2,160,000
	1777. At 4 per cent. irredeemable for 10 years, with an annuity of 1 per cent. for 10 years, and benefit of lottery	5,500,000
	1778. At 3 per cent. perpetual annuity, with an additional annuity of 2 per cent. for 30 years, and benefit of lottery	6,000,000
	1777. At 3 per cent. perpetual annuity, and L. 3 : 15 s. per cent. annuity for 29 years, and benefit of lottery	7,000,000

The capital advanced to the public, in the form of transferable stocks, and bearing interest from taxes appropriated for that purpose, is called the *funded debt*. Besides, there is generally a considerable sum due by government, which is not disposed of in that manner, and therefore is distinguished by the appellation of the *unfunded debt*. This may arise from any sort of national expence, for which no provision has been made, or for which the provision has proved insufficient. The forms of the unfunded debts are various, according to the circumstances by which it is occasioned. But there are two regular branches of this debt, which always subsist, to a greater or lesser extent.

1st, *Exchequer Bills*. These are issued from the exchequer, generally by appointment of parliament, and sometimes without such appointment, when exigencies require. They bear interest from the time when issued, and are taken in by the bank of England, which promotes their circulation.

2d, *Navy-Bills*. The sums annually granted for the navy have always fallen short of what that service required. To supply that deficiency, the admiralty issues bills in payment of victuals, stores, and the like, which bear interest six months after the time issued. The debt of the navy thus contracted is discharged, from time to time, by parliament.

In time of war, the public expences, since the revolution, have always been much greater than the annual revenue; and large sums have consequently been borrowed. In time of peace, the revenue exceeds the expence, and part of the public debts have frequently been paid off. But, though there have been more years of peace than of war since the funds were established, the debts contracted during each war have much exceeded the payments during the subsequent peace. This will appear by the following abstract of the progress of the national debt.

Debt at peace of Ryfwick, 1697	L.	21,515,472
Debt at the beginning of war 1701		16,394,701
Discharged during peace 1697 to 1701		5,121,071
Debt at peace of Utrecht 1714, including value of annuities afterwards subscribed to South-Sea stock		55,282,978
Contracted in war 1701 to 1714		38,888,277
Debt at beginning of war 1740, including L. 1,000,000, charged on civil list		47,954,623
Discharged during peace 1714 to 1739		7,328,355
Debt at Peace of Aix-la-Chapelle, 1748		79,193,313
Contracted during war 1740 to 1748		31,238,690
Debt at beginning of war 1756		73,289,673
Paid off during peace 1748 to 1756		5,903,640
Debt funded at the peace 1763, including L. 9,839,597 then owing, which was funded in the subsequent years		133,957,270
Besides this, there was about L. 6,000,000 of debt paid off, without ever being funded.		
Funded debt, 1775		125,00,000
Paid off during peace 1763 to 1775, besides unfunded debt above mentioned		8,959,270
Funded debt contracted during the American war 1776 to 1779, inclusive		20,600,000

FUNDAMENT, in anatomy, the lowest part of the intestinum rectum, called by anatomists the *anus*. See ANATOMY, n° 354.

FUNDAMENTAL, in general, something that serves as a base or foundation for another.

FUNDAMENTAL, in music. A *fundamental sound* is that which forms the lowest note of the CHORD, and from whence are deduced the harmonical relations of the rest; or, which serves for a key to the tone*. The *fundamental bass* is that which serves for a foundation to the harmony. A *fundamental chord* is that whose bass is fundamental, and in which the sounds are ranged in the same order as when they are generated, according to the experiment so often repeated by M. d'Alembert, in his Preliminary Discourse and Elements of Music†. But as this order removes the parts to an extreme distance one from the other, they must be approximated by combinations or inversions; but if the bass remains the same, the chord does not for this reason cease to bear the name of *fundamental*. Such an example is this chord, *ut mi sol*, included in the interval of a fifth: whereas, in the order of its generation, *ut sol mi*, it includes a tenth, and even a seventeenth; since the fundamental *ut* is not the fifth of *sol*, but the octave of that fifth.

FUNDAMENTAL Bass. This part in music is, according to Rousseau, and indeed according to all authors

* See Tonic.

† See Music.

thors who have proceeded upon M. Rameau's experiment, in its primary idea, that bass which is formed by the fundamental notes of every perfect chord that constitutes the harmony of the piece; so that under each chord it causes to be heard, or understood, the fundamental found of that particular chord; that is to say, the found from whence it is derived by the rules of harmony. From whence we may see, that the fundamental bass can have no other contexture than that of a regular and fundamental succession, without which the procedure of the upper parts would be illegitimate.

To understand this well, it is necessary to be known, that, according to the system of Rameau, which Rousseau has followed in his Dictionary, every chord, tho' composed of several sounds, can only have one which is its fundamental, *viz.* that which produces this chord, and which is its bass according to the direct and natural order. Now, the bass which prevails under all the other parts, does not always express the fundamental sounds of the chords: for amongst all the sounds which form a chord, the composer is at liberty to transfer to the bass that which he thinks preferable; regard being had to the procedure of that bass, to the beauty of the melody, and above all to the expression, as may afterwards be explained. In this case the real fundamental found, instead of retaining its natural station, which is in the bass, will either be transferred to some of the other parts, or perhaps even entirely suppressed, and such a chord is called an *inverted* chord.

In reality, says Rameau, a chord inverted does not differ from the chord in its direct and natural order from which it was produced: but as these sounds form different combinations, these combinations have long been taken for fundamental chords; different names have been given them, (which may be seen at the word *Accord*, in Rousseau's Dictionary). These names, by the persons who bestowed them, were thought to create and sanctify their distinctions; as if a difference in names could really produce a difference in the species.

Mr Rameau in his Treatise of Harmony has shown, and M. D'Alembert in his Elements of Music has still more clearly evinced, that many of these pretendedly different chords were no more than inversions of one single chord. Thus the chord of the sixth is no more than the perfect chord of the third transferred to the bass; by adding a fifth, we shall have the chord of the sixth and fourth. Here there are three combinations of a chord, which only consists of three sounds; those which contain four sounds are susceptible of four combinations, since each of these sounds may be transferred to the bass. But in adding beneath this another bass which, under all the combinations of one and the same chord, always presents the fundamental found; it is evident, that consonant chords are reduced to the number three, and the number of dissonant chords to four. Add to this all the chords by supposition, which may likewise be reduced to the same fundamentals, and you will find harmony brought to a degree of simplicity in which no person could ever hope to see it whilst its rules remained in that state of confusion where M. Rameau found them. It is certainly, as that author observes, an astonishing occurrence, that the practice of this art could be carried so far as it really was, without knowing its foundation; and that all the rules

were so exactly found, without having discovered the principle on which they depended.

After having shown what is the fundamental bass beneath the chords, let us now speak of its procedure, and of the manner in which it connects these chords among themselves. Upon this point the precepts of the art may be reduced to the six following rules.

1. The fundamental bass ought never to sound any other notes than those of the series or tone in which the composer finds himself, or at least those of the series or tone to which he chooses to make a transition. This of all the rules for the fundamental bass is the first and most indispensable.

2. By the second, its procedure ought to be so implicitly subjected to the laws of modulation, as never to suffer the idea of a former mode to be lost till that of a subsequent one can be legitimately assumed; that is to say, that the fundamental bass ought never to be devious, or suffer us to be one moment at a loss in what mode we are.

3. By the third, it is subjected to the connection of chords and the preparation of dissonances: a manoeuvre which, as we shall afterwards see, is nothing else but a method of producing this connection, and which of consequence is only necessary when the connection cannot subsist without it. See CONNECTION, PREPARATION.

4. By the fourth, it is necessitated, after every dissonance, to pursue that career which the resolution of the dissonance indispensably prescribes. See RESOLUTION.

5. By the fifth, which is nothing else but a consequence of the former, the fundamental bass ought only to move by consonant intervals; except alone in the operation of a broken cadence, or after a chord of the seventh diminished, where it rises diatonically. Every other motion of the fundamental bass is illegitimate.

6. By the sixth, in short, the fundamental bass or harmony ought not to be syncopeated; but to distinguish the bars and the times which they contain, by changes of chords properly marked with cadences; in such a manner, for instance, that the dissonances which ought to be prepared may find their preparation in the imperfect time, but chiefly that all the repose may happen in the perfect time. This sixth rule admits of an infinite number of exceptions; but the composer ought however to be attentive to it, if he would form a music in which the movements are properly marked, and in which the bars may end gracefully.

Wherever these rules are observed, the harmony shall be regular and without fault: this, however, will not hinder the music from being detectable. See COMPOSITION.

A word of illustration on the fifth rule may not be useless. Whatever turn may be given to a fundamental bass, if it is properly formed, one of these alternatives must always be found: either, perfect chords moving by consonant intervals, without which these chords would have no connexion; or, dissonant chords in operations of cadence: in every other case, the dissonance can neither be properly placed nor properly resolved.

From thence it follows, that the fundamental bass cannot move regularly but in one of these three manners. $\frac{1}{2}$, To rise or descend by a third or by a sixth. $\frac{2}{3}$, By a fourth or a fifth. $\frac{3}{4}$, To rise diatonically

by means of the dissonance which forms the connection, or by a licence upon a perfect chord. With respect to a diatonic descent, it is a motion absolutely prohibited to the fundamental bass; or, at most, merely tolerated in cases where two perfect chords are in succession, divided by a close expressed or understood. This rule has no other exception: and it is from not discerning the foundation of certain transitions, that M. Rameau has caused the fundamental bass to descend diatonically under chords of the seventh; an operation which is impracticable in legitimate harmony. See CADENCE, DISSONANCE.

The fundamental bass, which they add for no other reason than to serve as a proof of the harmony, must be retrenched in execution, and often in practice it would have a very bad effect; for it is, as M. Rameau very properly observes, intended for the judgment and not for the ear. It would at least produce a monotony extremely nauseous by frequent returns of the same chord, which they disguise and vary more agreeably by combining it in different manners upon the continued bass, without reckoning upon the different inversions of harmony which furnish a thousand means of adding new beauties to the music, and new energy to the expression. See CHORD, INVERSION.

But it will be objected, If the fundamental bass is not useful in composing good music, if it must even be retrenched in practice, what good purpose, then, can it serve? We answer, that, in the first place, it serves for a rule to scholars, upon which they may learn to form a regular harmony, and to give to all the parts such a diatonic and elementary procedure as is prescribed them by that fundamental bass. It does more, as we have already said: it proves whether a harmony already formed be just and regular; for all harmony which cannot be subjected to the test of a fundamental bass, must according to all rules be bad. Finally, it serves for the investigation of a continued bass under a given air: tho' in reality, he who cannot directly form a continued bass, will scarcely be able to form a fundamental bass, which is better; and much less still will he be able to transform that fundamental bass into a legitimate continued bass. These which follow are, however, the principal rules which M. Rameau prescribes for finding the fundamental bass of a given air.

1. To ascertain with precision the mode in which the composer begins, and thence through which he passes. There are also rules for investigating the modes; but so long, so vague, so incomplete, that, with respect to this, the ear may be formed long before the rules are acquired; and the dunce who should try to use them, would gain no improvement but the habit of proceeding always note by note, without even knowing where he is.

2. To try in succession under each note the principal chords of the mode, beginning by those which are most analogous, and passing even to the most remote, when the composer feels himself under a necessity of doing so.

3. To consider whether the chord chosen can suit the upper part in what precedes and in what follows, by a just fundamental succession; and when this is impracticable, to return the way he came.

3. Not to change the note of the fundamental bass till after having exhausted all the notes which are al-

lowed in succession in the upper part, and which can enter into its chord; or till some syncopated note in the air may be susceptible of two or a greater number of notes in the bass, to prepare the dissonance which may be afterwards resolved according to rule.

5. To study the intertexture of the phrases; the possible succession of cadences, whether full or avoided; and above all, the pauses which for ordinary return at the end of every four, or of every two bars, so that they may always fall upon perfect and regular cadences.

6. In short, to observe all the rules formerly given for the composition of the fundamental bass.—These are the principle observations to be made for finding one under any given air; for there are sometimes several different ones which may be investigated. But, whatever may be said to the contrary, if the air has accent and character, there is only one just fundamental bass which can be adapted to it.

After having given a summary explication of the manner in which a fundamental bass should be composed, it should remain to suggest the means of transforming it into a continued bass; and this would be easy, if it were only necessary to regard the diatonic procedure and the agreeable air of this bass. But let us not imagine, that the bass, which is the guide and support of the harmony, the soul, and as it were the interpreter, of the air, should be limited to rules so simple: there are others which depend upon principles more certain and more radical; fruitful, but latent principles, which have been felt by every artist of genius, without having been detected by any one. Rousseau hopes, that in his letter upon French music he insinuated this principle. For those who understand him, he imagines he has said enough concerning it, and can never say enough of it for those who do not. See *Rousseau's Miscellanies*, Vol. II. p. 1.

He does not here mention the ingenious system by M. Serre of Geneva, nor his double fundamental bass; because the principles, which, with a sagacity meritorious of praise, he had half detected, have afterwards been unfolded by M. Tartini, in a work of which Rousseau has given an account in his article SYSTEM.

FUNDY-BAY, a bay seated between New-England and Acadia or New-Scotland, in which there is an excellent fishery.

FUNEN, or FIONIA, a considerable island in Denmark, seated on the Baltic sea, and separated from Jutland by a strait called the *Lesser Belt*, and from the island of Zealand by another called the *Great Belt*. It is fertile in wheat and barley; and abounds in cattle, horses, game of all sorts, and fish. Odensee is the capital town.

FUNERAL RITES, ceremonies accompanying the interment or burial of any person.

These rites differed among the ancients according to the different genius and religion of each country. The Egyptians, among the rest of their funeral rites, embalmed their dead.

Among the ancient Greeks it was usual sometimes, before the interment, to put a piece of money into the mouth of the deceased, which was thought to be Charon's fare for waiving the departed soul over the infernal river. This ceremony was not used in those countries which were supposed to be situated in the neigh-

Funeral:

bourhood of the infernal regions, and to lead thither by a ready and direct road. The corpse was likewise furnished with a cake, composed of flour, honey, &c. which was designed to appease the fury of Cerberus the door-keeper of hell, and to procure the ghost a safe and quiet entrance.

During the time the corpse continued in the house, there stood before the door a vessel of water: the design of which was, that those concerned about the body might purify themselves by washing; it being the opinion of the Greeks, as well as of the Jews, that pollution was contracted by touching a dead body.

The ceremonies by which they expressed their sorrow for the death of their friends, were various; but it seems to have been a constant rule to recede as much as possible in habit and behaviour from their ordinary customs. For this reason they abstained from banquets and entertainments; they divested themselves of all ornaments; they tore, cut off, or shaved their hair, which they cast into the funeral pile, to be consumed with the body of their deceased friend. Sometimes they threw themselves on the ground, and rolled in the dust, or covered their head with ashes; they beat their breasts, and even tore their flesh with their nails, upon the loss of a person they much lamented. When persons of rank, such as public magistrates or great generals, died, the whole city put on a face of mourning; all public meetings were intermitted; the schools, baths, shops, temples, and all places of concourse, were shut up.

Interring or laying the dead on the ground, seems to have been the most ancient practice among the Greeks; though burning came afterwards to be generally used among them. It was customary to throw into the funeral pile, those garments the deceased usually wore. The pile was lighted by one of the deceased's nearest relations or friends, who made prayers and vows to the winds to assist the flames, that the body might quickly be reduced to ashes; and during the time the pile was burning, the dead person's friends stood by it, pouring libations of wine, and calling upon the deceased.

When Numa reformed the religion of Rome, he ordered that the pontiffs should have the care of the funeral ceremonies; which, in most respects, were like those of the Greeks already described.

The funeral rites among the Hebrews were solemn and magnificent. When any person was dead, his relations and friends rent their cloths; which custom is but faintly imitated by the modern Jews, who only put off a bit of their garment, in token of affliction. It was usual to bend the dead person's thumb into the hand, and fasten it in that posture with a string; because the thumb then having the figure of the name of God, they thought the devil would not dare to approach it. When they came to the burying place, they made a speech to the dead in the following terms: "Blessed be God, who has formed thee, fed thee, maintained thee, and taken away thy life. O dead! he knows your numbers, and shall one day restore your life, &c." Then they spoke the eulogium, or funeral oration, of the deceased; after which they said a prayer, called the *righteousness of judgment*; then turning the face of the deceased towards heaven, they called out, "Go in peace."

The ancient Christians testified their abhorrence of the Pagan custom of burning the dead ; and always deposited the body entire in the ground : and it was usual to bestow the honour of embalming upon the martyrs at least, if not upon others. They prepared the body for burial, by washing it with water, and dressing it in a funeral attire. The exportation or carrying forth of the body was performed by near relations, or persons of such dignity as the circumstances of the deceased required. Palmody, or singing of psalms, was the great ceremony used in all funeral processions among the ancient Christians.

In the Romish church, when a person is dead, they wash the body, and put a crucifix in its hand. At its feet stands a vessel full of holy water, and a sprinkler, that they who come in may sprinkle both themselves and the deceased. In the mean time some priest stands by the corpse, and prays for the deceased till it is laid in the earth. In the funeral procession, the exorcist walks first, carrying the holy water; next the cross-bearer, afterwards the rest of the clergy, and last of all the officiating priest. They all sing the *miserere*, and some other psalms; and at the end of each psalm a *requiem*. We learn from Alex's ritual, that the faces of deceased laymen must be turned towards the altar, when they are placed in the church; and those of the clergy, towards the people. The corpse is placed in the church surrounded with lighted tapers: after the office for the dead, mass is said; then the officiating priest sprinkles the corpse thrice with holy water, and as often throws incense on it. The body being laid in the grave, the friends and relations of the deceased sprinkle the grave with holy water.

The funeral ceremonies of the Greek church, are much the same with those of the Latin. It needs only be observed, that, after the funeral service, they kiss the crucifix, and salute the mouth and forehead of the deceased : after which each of the company eats a bit of bread and drinks a glass of wine in the church, wishing the soul a good repose, and the afflicted family all consolation.

FUNERAL-Games, a part of the ceremony of the ancient funerals.

It was customary for persons of quality, among the ancient Greeks and Romans, to institute games, with all sorts of exercises, to render the death of their friends more remarkable. This practice was generally received, and is frequently mentioned by ancient writers. Patroclus's funeral games take up the greatest part of one of Homer's *Iliads*; and Agamemnon's ghost is introduced by the same poet telling the ghost of Achilles, that he had been a spectator at a great number of such solemnities.

The celebration of these games among the Greeks, mostly consisted of horse-races; the prizes were of different sorts and value, according to the quality and magnificence of the person that celebrated them. The garlands, given to victors on this occasion, were usually of parsley, which was thought to have some particular relation to the dead.

Those games, among the Romans, consisted chiefly of processions; and sometimes of mortal combats of gladiators around the funeral pile. They, as well as the Greeks, had also a custom, though very ancient, of cutting the throats of a number of captives, before

Funeral.

before the pile, as victims to appease the manes of the deceased. Cæsar relates, that the Gauls had this custom.

The funeral games were abolished by the emperor Claudius.

FUNERAL-Oration, a discourse pronounced in praise of a person deceased, at the ceremony of his funeral.

This custom is very ancient, both among the Greeks and Romans. Before the company departed from the sepulchre, they were often entertained with a panegyric upon the dead person, always pronounced by a near relation, or one of the public magistrates.

FUNGI (from *fungus*; fungus), one of the seven families or tribes of the vegetable kingdom, according to Linnæus, comprehending all those who are of the mushroom kind, and which in Tournefort constitute the 2d, 3d, 4th, 5th, 6th, 7th, and 8th genera of the first section in the class xvii.

FUNGI, an order of plants in the *fragmenta methodi naturalis* of Linnæus. See **BOTANY**, p. 1317.

FUNGIBLES, in Scots law, are such things as are estimated by number, weight, or measure; as, coin, butter, ale, &c.

FUNGITÆ, in natural history, a kind of fossil coral, of a conic figure, though sometimes flattened and striated longitudinally.

FUNGUS, in surgery, denotes any spongy excrescence. See **SURGERY**.

FUNNEL of a CHIMNEY, the shaft or finallest part of the waste, where it is gathered into its least dimensions.

Palladio directs, that the funnels of chimneys be carried through the roof four or five feet at least, that they may carry the smoke clear from the house into the air. See the article CHIMNEY.

He also advises, that chamber-chimneys be not made narrower than 10 or 11 inches, nor broader than 15: for if too narrow, the smoke will not be able to make its way; and, if too wide, the wind will drive it back into the room.

FUR, or **FURR**, in commerce. See **FURR**.

FURBISHER, a person who furbishes, polishes, or cleans arms, as guns, swords, pistols, &c.; which is chiefly performed with emery. See the article **EMERY**.

FURCA, in antiquity, a piece of timber resembling a fork, used by the Romans as an instrument of punishment.

The punishment of the furca was of three kinds: the first only ignominious, when a master, for small offences, forced a servant to carry a furca on his shoulders about the city. The second was penal, when the party was led about the circus, or other place, with the furca about his neck, and whipped all the way. The third was capital, when the malefactor having his head fastened on the furca, was whipped to death.

FURCHE, in heraldry, a cross forked at the ends.

FURIES, in Pagan antiquity, certain goddesses whose office it was to punish the guilty after death. They were three in number: *Alæto*, *Megara*, and *Tiphone*; who were described with snakes instead of hair, and eyes like lightning, carrying iron chains and whips in one hand, and in the other flaming torches; the latter to discover, and the former to punish, the guilty: and they were supposed to be constantly hovering over such persons as had been guilty of any

enormous crime.

Mythologists suppose, that *Tiphone* punished the crimes which sprang from hatred or anger; *Megara*, those from envy; and *Alæto*, those from an insatiable pursuit after riches and pleasure. They were worshipped at *Casina* in *Arcadia*, and at *Carmia* in *Peloponnesus*. They had a temple at *Athens*, near the *Areopagus*, and their priests were chosen from amongst the judges of that court. At *Telphusia*, a city in *Arcadia*, a black ewe was sacrificed to them.

FURIUS (*Bibaculus*), a Latin Poet, flourished about 103 B. C. He wrote annals in verse, of which *Macrobius* recites some fragments. *Suetonius* also relates some verses of his on *Valerius Cato*, in his *Illustrious Grammarians*.

FURLING, in the sea language, signifies the wrapping up and binding any sail close to the yard; which is done by hauling upon the clew-lines, buntlines, &c. which wraps the sail close together, and being bound fast to the yard the sail is furled.

FURLONG, a long measure, equal to one eighth of a mile, or 40 poles.

It is also used in some law-books, for the eighth part of an acre.

FURLOUGH, in the military language, a licence granted by an officer to a soldier, to be absent for some time from his duty.

FURNACE, an utensil, or vessel, proper to contain fire, or to raise and maintain a vehement fire in, whether of coal or wood.—Of these there are a great variety, according to the different uses to which they are applied.

An *Essay on Cupelling FURNACE* is made in the following manner. 1. Make with iron plates a hollow quadrangular prism, eleven inches broad and nine inches high (*aa, bb*), ending at top in a hollow quadrangular pyramid (*bb, cc*) seven inches high, terminating in an aperture at top seven inches square. This prism must be closed at bottom with another iron plate, which serves as a basis or bottom to it (*a a*).

2. Near the bottom make a door (*c*), three inches high, and five inches broad, that leads to the ash-hole. 3. Above this door, and at the height of six inches from the basis, make another door (*f*), of the figure of a segment of a circle, four inches broad at its basis, and three inches and a half high in the middle. 4. Then fasten three iron plates on the forepart of this furnace. Let the first of them (*gg*), eleven inches long and half an inch high, be fastened, so that its lower edge shall rest against the bottom of the furnace, with three or four rivets; and in such a manner, that there may be between the upper edge of the said plate and the side of the furnace a groove so wide, as that the sliders of the lower door (*h h*) may be put into it, and freely move backwards and forwards therein: these must be made of a thicker iron-plate. The second iron-plate (*h h*), eleven inches long, three inches high, and perfectly parallel to the foregoing plate, must be fastened in the space between the two doors, in such manner that both the upper and the lower edges of it may form a hollow groove with the side of the furnace. One of these grooves, which is turned downwards, serves to receive the upper edge of the sliders that shut the lower door (No. 2). The other, that turns upwards, is to receive the inferior edges of the sliders of the

Plate
CVIII.
fig. 4.

Cramer's
Art of
Assaying.

Furnace.

small door above (No. 3). The third plate (*ii*), which is like the first, must be rivetted close above the upper door, in such manner, that it may form a groove turning downwards, and contiguous to the upper edge of the upper door (No. 3.) 5. In order to shut both doors (No. 2, 3.), you must adapt to each of them two sliders made of iron-plates, that may move within the above-mentioned grooves (*kk*, *ll*). But the two sliders belonging to the upper door (No. 3.) must have each a hole near the top; that is, one a small hole one fifth part of an inch broad, and one inch and a half long (*m*); and the other a semicircular aperture, one inch high and two inches broad (*n*). Let, besides, each slider have a handle, that they may be laid hold of when they are to be moved. 6. Moreover, let five round holes, one inch broad, be bored in the furnace; two of which must be made in the fore-part of the furnace (*oo*), two others in the back part; all at the height of five inches from the bottom, but three inches and a half distant from each side, of the furnace; and, finally, a fifth hole (*p*), at the height of one inch above the upper edge of the upper door (*f*). 7. In short, let the inside of the furnace be armed with iron-hooks, jetting out half an inch, and about three inches distant from each other, to fasten the lute with which the furnace is to be covered over within. 8. Let then an iron, moveable, hollow, quadrangular pyramid (*q*), three inches high, be adapted to the upper aperture (*d*) of the furnace, at the basis seven inches broad, ending upwards in a hollow tube (*r*), three inches in diameter, two inches high, almost cylindrical, though somewhat convergent at top. This prominent tube serves to support a funnel or flue, which is almost cylindrical, hollow, made of iron-plates, and two foot high; and which, when a very strong fire is required, is put perpendicularly upon the shorter tube, in such a manner, that it enters close into it, one inch and a half or two inches deep, and may again be taken off at pleasure, when there is no need of so strong a fire. But this pyramidal cover (*q*) must besides have two handles (*ss*) adapted to it, that it may be laid hold of, and thus be taken away or put on again: and that this, being put on the aperture (*d*) of the furnace, may not be easily thrown down, let an iron plate be rivetted to the right and left upper edge of the furnace (*cc*), and be turned down towards the inside, so as to make a furrow open before and behind, into which the lateral edges of the cover may enter and be fastened, and at pleasure be moved backwards and forwards, whenever it must be put on, or moved. 9. Let a square ledge, made of a thick iron-plate, be fastened at top of the upper edge of the lower door (*r*): this is designed to support the grate and the lute; but it must be made of two pieces, that it may be easily introduced into the cavity of the furnace. Thus you will have an assay-oven, which must afterwards be covered over on the inside with lute. This you are to do as follows:

That the fire may be better confined, and that the iron may not be destroyed by growing red-hot, the whole inside of the furnace must be covered over with lute, one finger or one finger and a half thick. The lute fit for this is described under the article *ЧЕМИСТКА*, n° 73, 81. But before you cover the inside of your furnace with this lute, you must first put within

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the furnace small iron bars, equal in length to the diameter of the oven, quadrangular, prismatical, half an inch thick, having their extremities supported by a square iron ledge, and three fourths of an inch distant from each other; and you must fasten them so, that their flat sides may be oblique with regard to the transverse section of the furnace, and that the two opposite angles may look one upwards and the other downwards: the bars must not be laid flat, but edge-wise; by which situation you hinder the ashes of the fuel of the fire from being detained too long between the interstices of the said iron-bars, and from making an obstruction that would oppose the free draught of the air. The furnace being then covered over with lute, and dried up by a gentle heat, is at last fit for doctrinal operations, and especially for such as must be performed in the assay-oven.

If then an operation is to be made in the furnace hitherto described, you must let through the four lower holes above described of the furnace (*oo*) placed before and behind, and directly opposite to each other, two iron-bars one inch thick, and long enough that their extremities on every side may jut out of the holes a small matter. These serve to support the muffle and its bottom. You then introduce the muffle through the upper aperture of the furnace (*d*), and place it upon the above described iron-bars, in such a manner, that the open fore-side of it be contiguous to the inward border of the upper door (*f*). The fuel of the fire is introduced through the top of the furnace (*d*); the cover of which (*q*), on this account, must be moveable and not very heavy. The best fuel for the fire is charcoal made of the hardest wood, especially of beech, broken into small pieces of the bigness of an inch, wherewith the muffle must be covered over some inches high. We then reject larger bits of coals, because they cannot fall thro' the narrow interstices, between the sides of the muffle and those of the furnace, and cannot of course sufficiently surround the circumference of the muffle. Whence it happens, that there are on every side places void of fuel, and the fire is either not strong enough or unequal. But if, on the contrary, you use coals too small, then a great part fall immediately through the interstices of the grate into the ash-hole; and the tenderest particles of them turn too soon into ashes, and, by increasing the heap of ashes, obstruct the free draught of the air, which is here greatly requisite.

A perfect management of the fire is most commonly necessary in the performing of operations in this furnace; therefore the chemical reader must give attention to what follows. If the door of the ash-hole (*e*) is quite open; and the sliders of the upper door (*r*) drawn towards each other, so as to touch one another in the middle of the door; and if, besides, the cover (*q*), and the funnel adapted to its tube (*r*), is upon the top (*q*) of the furnace; the fire will be then in the highest degree possible; though, in the mean time, it is hardly ever necessary to put the funnel on, except in a very cold season: but if, after having disposed the furnace in the manner just described, you put red burning coals into the open upper door (*f*) of it, the fire is still more increased thereby: however, this artifice is never, or very seldom, necessary. When you shut the upper door with only that slider that has a narrow ob-

long

long hole in it (*m*), then the heat becomes a little less; but it diminishes still more when you shut the door with the other slider that has in it the semicircular hole (*n*), which is larger than that of the first slider: nay, the heat again is less when you take away the funnel put at the top of the cover: finally, the door of the ash-hole being either in part or totally shut, the heat is still diminished; because the draught of air so necessary to excite the fire, is thereby hindered: but if, besides all these, you likewise open the upper door quite, then the cold air, rushing into the muffle, cools the bodies put under it, that are to be changed, to a degree never required in any operation, and such as will entirely hinder the boiling of lead. If, during the operation, the fire begins to decay, or to grow unequal, it is a sign that there are places void of coals between the sides of the furnace and those of the muffle: therefore, in this case, you must stir your coals on every side with an iron-rod, which is to be introduced through the upper hole (*p*) of the furnace, that they may fall together, and thus act in a proper manner and equality.

However, you are to observe concerning the regimen of the fire just described, that though the apparatus is made with all the exactness mentioned, nevertheless the effect does not always answer it. The cause of which difference has most commonly its origin in the various dispositions of the air: for as every fire is more excited by coals in proportion as the air, more condensed, and more quickly agitated, strikes them more violently (which the effect of the bellows plainly shews); it thence appears, that in warm and wet weather, when the atmosphere is light, the fire must be less efficacious in furnaces; that likewise, when several furnaces, situated near each other, are burning at the same time, the fire is in part suffocated, because the ambient air is thereby rendered more rare and lighter. The same effect is produced by the sun, especially in summer-time, when it shines upon the place where the furnace is situated. The atmosphere, on the contrary, being heavier in cold dry weather, excites a very great fire.

The heat of the fire acts the stronger upon the bodies to be changed, as the muffle put in the furnace is less; as the said muffle has more and larger segments cut out of it; as the sides of this muffle are thinner; in short, as there are more vessels placed in the hinder part of the muffle; and on the contrary. In this case, when many of the conditions requisite for the exciting of fire are wanting, then indeed the artificer, with all his skill, will hardly be able to excite the fire to a sufficient degree, in order to perform operations well, in common assay-ovens, even though he uses bellows, and puts coals into the upper door of the furnace. For this reason, the grate ought to be put almost three inches below the muffle, lest the air, rushing through the ash-hole, should cool the bottom of the muffle, which happens in common assay-ovens; and again, that the smaller coals, almost already consumed, and the ashes, may more easily fall through the interstices of the grate, and the larger coals still fit to keep up the fire be retained. Lastly, The above-mentioned funnel is added, that the blowing of the fire being, by means of it, increased as much as possible, this might at last be carried to the requisite degree; for the fire may always be

diminished, but not always be increased at pleasure, without the assistance of a proper apparatus.

Fig. 5. Represents a longitudinal section of a *Reverberatory FURNACE* used in the smelting of ores. 1. The masonry. 2. The ash-hole. 3. A channel for the evaporation of the moisture. 4. The grate. 5. The fire-place. 6. The inner part of the furnace. 7. A basin formed of sand. 8. The cavity where the melted metal is. 9. A hole through which the scoria is to be removed. 10. The passage of the flame and smoke, or the lower part of the chimney; which is to be carried up to a height of about 30 feet. 11. A hole in the roof, through which the ore is thrown into the furnace. This furnace is 18 feet long, 12 feet broad, and 9½ high.

Fig. 6. Represents a longitudinal section of the *Refining FURNACE*. 1. The masonry of the pillars and walls surrounding the furnace. 2. The channels for carrying off the moisture. 3. Other small channels which join in the middle of the basin. 4. The basin made of bricks. 5. A bed of ashes. 6. The hollow or basin in which the metal is melted and refined. 7. The great flame-hole. 8. The two openings for the entry of the tuyeres of the bellows. 9. The vault or dome of the furnace. 10. The fire-place. 11. The grate. 12. The draught-hole. 13. A hole in the vault, which, being opened, serves to cool the furnace.

Portable FURNACE. See CHEMISTRY, n° 98, 99. *Melting FURNACE.* *Ibid.* n° 101.

Lamp FURNACE. *Ibid.* 2^d 102.

Machines for Blowing Air into FURNACES. The earliest method of animating large fires in the furnaces where ores were smelted, seems to have been by exposing them to the wind. Such was the practice of the Peruvians before the arrival of the Spaniards among them. Alonso Barba relates, that their furnaces, called *guairas*, were built on eminences, where the air was freest; that they were perforated on all sides with holes, through which the air was driven in when the wind blew, which was the only time when the work could be carried on; that under each hole was made a projection of the stone-work, on which were laid burning coals, to heat the air before it entered the furnace. Some authors speak of several thousands of these *guairas* burning at once on the sides and tops of the hills of Potosi; and several remains of this practice are to be found in different parts of Great Britain.

This method of supplying air being found excessively ineffectual and precarious, the instruments called *bellows* succeeded. These were at first worked by the strength of men; but as this was found to be very laborious and expensive, the force of running water was employed to give motion to these machines. Thus a much greater quantity of metal could be procured than formerly, and the separation was likewise more complete; inasmuch, that in many places the slags or cinders from which the iron had formerly been extracted were again used as fresh ore, and yielded plenty of metal.

But, though this method was found to be greatly preferable to the others, yet great improvements were still wanted. In order to melt very large quantities of ore at a time, it was necessary to use bellows of an immense size; and in proportion to their size they stood in need of the more frequent and expensive repairs.

Furnace.

The oil, also, which the bellows required in large quantity, becoming rancid, was found to generate a kind of inflammable vapour, which sometimes burst the bellows with explosion, and thus rendered them totally useless. A new method, therefore, of blowing up fire, by means altogether free from the abovementioned inconveniences was fallen upon by means of water. It depends on the following principle, viz. That a stream of water, running through a pipe, if by any means it is mixed with air at its entrance into the pipe, will carry that air along with it, and part with it again as soon as it comes out of the pipe; and if the air is then collected by a proper apparatus, it may with success be used for exciting the most violent degrees of heat.

Machines of this kind are represented on Plate CXIV. fig. 4. In the right-hand machine, AB represents a stream of water falling into the funnel, whose throat is contracted at B; after which the stream runs thro' the perpendicular pipe EF, in the upper part of which there are some small holes represented by *cdef*. Through these holes the air has access to mix itself with the descending water, which being dashed against the sides of the pipe is reduced to froth, and thus fills the whole cavity of the pipe EF, which is considerably larger than the throat of the funnel B. When this frothy stream enters the vessel C, the air extricates itself from the water; and as it cannot return through the pipe EF because it is continually filled with a stream of liquid matter, it flies off with considerable force through the smaller pipe D, by which it is conveyed to the furnace.

From this description, it is evident that the principal thing to be kept in view in the construction of these machines is, to mix the descending stream of water with as great a quantity of air as possible. For this purpose the contrivance represented in the left-hand machines answers much better than the former. By this the water descending from the reservoir A, falls into a kind of cullender B, perforated with a great number of holes in its sides. Thus the water being forced out in a number of small streams is very effectually dashed against the sides of the wide descending pipe, when it enters the condensing vessel C, and is sent off by the pipe D, as in the former.

In some machines of this kind the constructors seem to have been of opinion, that a great height was required in the water-fall: but Dr Lewis, who hath made a great number of experiments upon the subject, shews, that an excess in height can never make up for a deficiency in the quantity of the water. Four or five feet, he thinks, is a sufficient height for the water-fall; where there is a greater height, however, it may be rendered useful, by joining two or more machines together in the manner represented in the plate; where the water, after having once emitted its air in the condensing vessel C, flows out into a new reservoir E. From thence it descends through another cullender F, and descending from it into a condensing vessel G, the air is extricated, and carried off through the pipe H. The upper figure represents the cullender, with the shapes of the holes and their proportional distances, according to Dr Lewis.

Thus, with very little expence, where there is a sufficient quantity of water, as strong a blast of air as can be desired may be readily obtained; for several ma-

chines may be constructed, and joined together in a manner somewhat similar to that above mentioned, until all the quantity of water is employed. It is proper to observe, however, that as by this method the air is loaded with moisture, it is proper to make the condensing vessel as high as conveniently may be, that the air may arrive at the furnace in as dry a state as possible.—The long slender pipes in the left-hand machines represent a glass filled with mercury or water, by which the strength of the blast may be determined.

FUROR UTERINUS, a disorder peculiar to women. See (the *Index* subjoined to) MEDICINE.

FURR, in commerce, signifies the skin of several wild beasts, dressed in alum with the hair on; and used as a part of drefs, by princes, magistrates, and others. The kinds most in use are those of the ermine, sable, castor, hare, coney, &c.

FURSTENBURGH, a town and castle of Germany, the capital of a county of the same name, 30 miles north-west of Constance. E. Long. 8. 30. N. Lat. 47. 50.

FURTHCOMING, in law, the name of an action competent to any person who has used arrestment in the hands of his debtor's creditor, for having the subject arrested declared his property.

FURUNCLE, or BOIL, in surgery, a small resisting tumour, with inflammation, redness, and great pain, arising in the adipose membrane, under the skin. See SURGERY.

FURZE, in botany. See ULEX; AGRICULTURE, n° 46.; and FENCE.

FUSAROLE, in architecture, a moulding or ornament placed immediately under the echinus, in the Doric, Ionic, and Composite capitals.

FUSE, or FUZE, in artillery. See FUSEE.

FUSEE, in clock-work, is that conical part drawn by the spring, and about which the chain or string is wound; for the use of which, see CLOCK and WATCH.

FUSER, or FIRELOCK. See MUSQUET.

FUSEE, Fuze, or Fufe, of a bomb or granado, is that which makes the whole powder or composition in the shell take fire, to do the designed execution.

Fuzes are chiefly made of very dry beech-wood, and sometimes of hornbeam, taken near the root. They are turned rough, and bored at first, and then kept for several years in a dry place; the diameter of the hole is about $\frac{1}{2}$ of an inch; the hole does not come quite through, leaving about $\frac{1}{2}$ of an inch at the bottom; and the head is made hollow, in the form of a bowl.

The composition for fuzes is saltpetre 3, sulphur 1, and mealed powder 3, 4, and sometimes 5. This composition is drove in with an iron driver, (whose ends are capped with copper to prevent the composition from taking fire), and equally hard as possible; the last shovel-full being all mealed powder, and two stands of quickmatch laid across each other being drove in with it, the ends of which are folded up into the hollow top, and a cap of parchment tied over it till used.

When these fuzes are driven into the loaded shell, the lower end is cut off in a slope, so that the composition may inflame the powder in the shell: the fuze must have such a length as to continue burning all the time the shell is in its range, and to set fire to the powder as soon as it touches the ground, which instantly bursts into many pieces. When the distance of

Furor
Fusce.Phil. Com.
of Arts,
p. 267.Military
Diſ. voce
Laboratory.

the battery from the object is known, the time of the shell's flight may be computed to a second or two; which being known, the fuze may be cut accordingly, by burning two or three, and making use of a watch or a string by way of a pendulum to vibrate seconds.

FUSIBILITY, in natural philosophy, that quality of bodies which renders them fusible.

FUSIL, in heraldry, a bearing of a rhomboidal figure, longer than the lozenge, and having its upper and lower angles more acute and sharp than the other two in the middle. It is called in Latin *fusus*, "a spindle," from its shape.

FUSILIERS, FUSILEERS, or *Fuzileers*, in the military art, are soldiers armed as the rest of the infantry, but wearing caps like the grenadiers, though somewhat shorter. There are three regiments in the British service: the royal regiment of Scots fuzileers, raised in 1678; the royal regiment of English fuzileers, raised in 1685; and the royal regiment of Welsh fuzileers, raised in 1688-9.

FUSION, the state of a body rendered fluid by fire. See FLUIDITY; and CHEMISTRY, n° 35.

FUST, or FAUSTUS, a citizen of Mentz, and one of the earliest printers. He had the policy to conceal his art; and to this policy we are indebted for the tradition of "The Devil and Dr Faustus," handed down to the present times. Fuft, about 1460, associated with John of Gottenburgh: their types were cut in wood, and fixed, not moveable as at present. Having printed off a considerable number of copies of the Bible, to imitate those which were commonly sold in MS, Fuft undertook the sale of them at Paris, where the art of printing was then unknown. As he sold his printed copies for 60 crowns, while the scribes demanded 500, this created universal astonishment; but when

he produced copies as fast as they were wanted, and lowered the price to 30 crowns, all Paris was agitated. The uniformity of the copies increased the wonder; informations were given into the police against him as a magician; his lodgings were searched; and a great number of copies being found, they were seized: the red ink with which they were embellished was said to be his blood; it was seriously adjudged that he was in league with the devil; and if he had not fled, most probably he would have shared the fate of those, whom ignorant and superstitious judges condemned, in those days, for witchcraft. Fuft died at Mentz in 1466. See (History of) PRINTING.

FUSTIAN, in commerce, a kind of cotton stuff, which seems as it were whaled on one side.

Right fustians should be altogether made of cotton-yarn, both woof and warp; but a great many are made, the warp of which is flax, or even hemp.

There are fustians made of several kinds, wide, narrow, fine, coarse; with flag or nap, and without it.

FUSTIAN, is also used for a bombast style, or a high swelling kind of writing made up of heterogeneous parts.

FUSTICK, or FUSTOCK, a yellow wood, that grows in all the Caribbee islands, used in dying yellow. It pays no duty on importation.

FUSTIGATIO, in the Roman customs, a punishment inflicted by beating with a cudgel. This punishment was peculiar to freemen: for the slaves were scourged or lashed with whips.

FUTTOCKS, in a ship, the timbers raised over the keel, or the encompassing timbers that make her breadth.

FUZES, or FUSEES, in artillery. See FUSEE.
FUZILEERS. See FUSILEERS.

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N. B. ERRATA, OMISSIONS, &c. noticed and supplied in the APPENDIX at the end of the Work.

