

this primeval flower from a somewhat fern-like Cryptogam, of which the foliage-leaves, the envelopes of the spore-bearing leaves, the micro- and macrosporangiospheres had become permanently differentiated in ascending order; of which the microspores, doubtless through the intervention of a spore-eating insect, had come to germinate upon the macrosporangium instead of upon the ground; and in which this variation (evidently advantageous, since making fertilization at once more certain and more economical) was aided to perpetuate itself by the contemporaneous evolution of those floral colours which are nascent even among the Thallophytes. And thus the morphologist, though excluding teleological and functional considerations from his anatomical researches, has yet a physiological ideal, and enters sooner or later upon a new series of inquiries—those of the interdependence of structure and function. Milne-Edwards's law of the physiological division of labour, Dohrn's principle of functional change, the speculations of Claude Bernard, Spencer, and Haeckel, experimental inquiries such as those of Semper, where organisms are subjected to special modifications of their environment, and the like, are all contributions to this newest and evolutionary department of morphology. Such ideas are even applied to the study of cellular morphology. Thus, Spencer points out the relation

MORRIS, ROBERT (1734-1806), American statesman, was born at Liverpool, England, on 20th January 1734. At the age of thirteen he accompanied his father to America, and after serving in a counting-house at Philadelphia he became in 1754 partner in the business. From 1776 to 1778 he was delegate to the Continental Congress, and he was one of those who signed the Declaration of Independence. During the war he served on the committee of ways and means, and freely placed his immense wealth at the disposal of his country, his personal credit being at one time pledged to the amount of \$1,400,000. He also in 1780 established the Bank of North America, and until 1784 acted as superintendent of finance. In 1786 he became a member of the Pennsylvania legislature, and he was one of the convention which framed the Federal constitution in 1787. From 1786 to 1795 he was United States senator. On account of the disastrous result of some of his financial speculations Morris passed the later years of his life in a debt prison. He died at Philadelphia, 8th May 1806. Robert Morris had as his assistant-superintendent of finance Gouverneur Morris (1752-1816), with whom he engaged also in several mercantile enterprises. Gouverneur Morris, who rose to some eminence as a statesman and orator, was more fortunate in his speculations than his colleague, and latterly became celebrated for the munificence of his hospitality. He was the author of a series of essays on currency and finance, which are included in the *Life, Correspondence, and Writings of Gouverneur Morris*, 3 vols., edited by Jared Sparks, 1832.

MORRIS-DANCE, or MORRICE-DANCE, a performance for a long time associated with certain festive seasons in England, but now wholly discontinued. The origin of the name is doubtful; and whether the dance was indigenous to England, or was introduced by John of Gaunt from Spain, or was borrowed from the French or Flemings, must be left to conjecture. That, as the name would seem to indicate, it was a development of the morisco-dance or Spanish fandango is not, however, invalidated by the fact that the morisco was for one person only, for, although latterly the morris-dance was represented by various characters, uniformity in this respect was not always observed, and the elements of the dance may have been borrowed from the morisco. There are few references to it earlier than the reign of Henry VII., but it would appear that in the reign of Henry VIII. it was an almost essential part of the principal village festivities. Although allusions to it in poems are very frequent in the 16th and 17th centuries, nothing more than fragmentary descriptions have been handed down to us, so that an accurate knowledge of its characteristic features at even any particular period is impossible. In earlier times it was usually

of the shapes of cells to their environments; James ingeniously explains the occurrence of cell-division by the rapid increase of bulk over surface which the growth of a solid involves, and the corresponding increase of difficulty of nutrition; and the writer has attempted to explain the forms of free and united cells as specializations of a (protomyxoid) cycle in which variations of functional activity are accompanied by the assumption of corresponding forms, the whole series of changes depending upon the properties of protoplasm under the variations in the supply of energy from the environment. Rauber, His, and others have even attempted to explain embryological phenomena in terms of the simplest cellular mechanics, but as yet such speculations are somewhat crude.¹

§ 10. *Orientation and Subdivisions of Morphology.*—The position of morphology in the classification of the sciences and the proper mode of subdividing it cannot be discussed within these limits, although the latter is especially the subject of much disagreement. The position above assumed, that of including under morphology the whole static aspects of the organic world, is that of Haeckel, Spencer, Huxley, and most recent animal morphologists; botanists frequently, however, still use the term under its earlier and more limited significance.²

(P. GE.)

danced by five men and a boy dressed in a girl's habit, who was called Maid Marian. There were also two musicians; and, at least sometimes, one of the dancers, more gaily and richly dressed than the others, acted as "foreman of the morris." The garments of the dancers were ornamented with bells tuned to different notes so as to sound in harmony.³ Robin Hood, Friar Tuck, and Little John were characters extraneous to the original dance, and were introduced when it came to be associated with the May-games. At Betley, in Staffordshire, there is a painted window of the time of Henry VIII., or earlier, portraying the morris,—the characters including Maid Marian, Friar Tuck, the hobby-horse, the piper, the tabourer, the fool, and five other persons apparently representing various ranks or callings. The hobby-horse, which, latterly at least, was one of the principal characters of the dance, consisted of a wooden figure attached to the person of the actor, who was covered with trappings reaching to the ground, so as to conceal his feet. The morris-dance was abolished along with the May-games and other festivities by the Puritans, and, although revived at the Restoration, the pageant gradually degenerated in character and declined in importance. Maid Marian latterly was personated by a clown who was called Malkin. Though the dance is now wholly discontinued, it is probable that some of the original elements of it still survive in a country-dance which, under the same name, is still popular in the north of England.

See Douce, "Dissertations on the Ancient Morris Dance," in his *Illustrations of Shakespeare* (1839); Strutt, *Sports and Pastimes of the People of England*; and Brand, *Popular Antiquities* (1849).

MORRISON, ROBERT (1782-1834), the first Protestant missionary to China, was born of Scottish parents at Morpeth, Northumberland, on 5th January 1782. After receiving an elementary education in Newcastle, he was apprenticed to a lastmaker, but his spare hours were devoted to studies connected with theology, and in 1803 he was received into the Independent academy at Hoxton. In the following year he offered his services to the London Missionary Society, by which, after he had attended the mission college of Gosport and studied Chinese under a native teacher, he was sent to Canton in 1807. He was appointed translator to the East India Company's factory

¹ See BIOLOGY, vol. iii. p. 681 sq.; Spencer, *Principles of Biol.*; Haeckel, *Gen. Morph.*; C. Bernard, *Phénomènes d. l. vie commune aux an. et aux vég.*; Semper, *Animal Life* (1880); James, *Edin. Med. Journal*, 1883; Geddes, *Zool. Anzeiger*, 1883; Rauber, *Morph. Jahrb.*, vi.; Haeckel, *Kalkschwedmanne*, i. p. 481, &c.

² See Haeckel, *Gen. Morph.*, i. introduction; also Comte, *Phil. Pos.*, iii. (1851-1864); Spencer, *Prin. of Biol.*, i.; Gegenbaur, *Comp. Anat.*; Asa Gray, *Manual*; and the article BIOLOGY; also Geddes, *Jena Zeitschr.*, 1883.

³ See Sir Walter Scott's *Fair Maid of Perth*, note on a dress preserved by the glover incorporation of Perth.

there in 1808, and, in addition to his official duties connected with this post, laboured with intense application at a *Chinese Grammar* and a translation of the New Testament, both of which were published in 1814. In 1817 he published *A View of China for Philological Purposes*, and his translation of the entire Bible was completed in the following year. His next enterprise was the establishment of an Anglo-Chinese college at Malacca for "the reciprocal cultivation of Chinese and European literature," which was opened in 1820. In 1821 his *Chinese Dictionary* was published by the East India Company at an expense of £15,000. Leaving China at the close of 1823 he spent two years in England, where he advocated Chinese missions before large and enthusiastic audiences, and was elected a Fellow of the Royal Society. Returning to China in 1826 he set himself to promote education and to prepare a Chinese commentary on the Bible and other Christian literature. He died at Canton on 1st August 1834. His *Memoirs*, compiled by his widow, were published in 1839 (2 vols. 8vo, London).

MORRISTOWN, a city of the United States, county seat of Morris county, New Jersey, lies on the Whippany river, 81 miles from New York by the Morris and Essex division of the Delaware, Lackawanna, and Western Railroad. It was twice the headquarters of the American army during the War of Independence, and Washington's residence, owned by the Washington Association, assisted by the State, is a half-mile to the east. On Whatnong mountain, 3 miles distant, stands the State insane asylum, usually called Morristown Asylum, a vast granite building 1243 feet long, erected in 1874-1875, and capable of accommodating 1000 patients. The population in 1880 was 5418.

MORSE, SAMUEL FINLEY BREESE (1791-1872), artist and inventor, was born at the foot of Breed's Hill, Charlestown, Massachusetts, on 27th April 1791. His father was the Rev. Jedediah Morse, D.D., the author of *Morse's Geography*. At the age of fourteen Samuel Morse entered Yale College; under the instruction of Professors Day and Silliman he received the first impulse towards those electrical studies with which his name is mainly identified. In 1811 Morse, whose tastes during his early years led him more strongly towards art than towards science, became the pupil of Washington Allston, then the greatest of American artists, and accompanied his master to England, where he remained four years. His success at this period was considerable; but on his return to America in 1815 he failed to obtain commissions for historical paintings, and after working on portraits for two years at Charleston, S.C., he removed first to Washington and afterwards to Albany, finally settling in New York. In 1825 he laid the foundations of the National Academy of Design, and was elected its first president, an office which he filled until 1845. The year 1827 marks the revival of Morse's interest in electricity. It was at that time that he learned from Professor J. F. Dana of Columbia College the elementary facts of electromagnetism. As yet, however, he was devoted to his art, and in 1829 he again went to Europe to study the old masters.

The year of his return, 1832, may be said to close the period of his artistic, and to open that of his scientific life. On board the packet-ship "Sully," which sailed from Havre 1st October 1832, while discussing one day with his fellow-passengers the properties of the electromagnet, he was led to remark: "If the presence of electricity can be made visible in any part of the circuit, I see no reason why intelligence may not be transmitted by electricity." It was not a novel proposition, but the process of formulating it started in his mind a train of new and momentous ideas. The current of electricity, he knew, would pass

instantaneously any distance along a wire; and if it were interrupted a spark would appear. It now occurred to him that the spark might represent a part of speech, either a letter or a number; the absence of the spark, another part; and the duration of its absence, or of the spark itself, a third, so that an alphabet might be easily formed, and words indicated. In a few days he had completed rough drafts of the necessary apparatus, which he displayed to his fellow-passengers.¹ During the twelve years that followed Morse was engaged in a painful struggle to perfect his invention and secure for it a proper presentation to the public. The refusal of the Government to commission him to paint one of the great historical pictures in the rotunda of the Capitol seemed to destroy all his old artistic ambition. In poverty he pursued his new enterprise, making his own models, moulds, and castings, denying himself the common necessities of life and encountering embarrassments and delays of the most disheartening kind. It was not until 1836 that he completed any apparatus that would work, his original idea having been supplemented by his discovery in 1835 of the "relay," by means of which the electric current might be reinforced or renewed where it became weak through distance from its source. Finally, on 2d September 1837, the instrument was exhibited to a few friends at his room in the university building, New York, where a circuit of 1700 feet of copper wire had been set up, with such satisfactory results as to awaken the practical interest of the Messrs Vail, iron and brass workers in New Jersey, who thenceforth became associated with Morse in his undertaking. Morse's petition for a patent was dated 28th September 1837, and was soon followed by a petition to Congress for an appropriation to defray the expense of subjecting the telegraph to actual experiment over a length sufficient to establish its feasibility and demonstrate its value. The committee on commerce, to whom the petition was referred, reported favourably. Congress, however, adjourned without making the appropriation, and meanwhile Morse sailed for Europe to take out patents there. The trip was not a success. In England his application was refused, on the alleged ground that his invention had been already published; and, while he obtained a patent in France, it was subsequently appropriated by the French Government without compensation to himself. His negotiations also with Russia proved futile, and after a year's absence he returned to New York. On 23d February 1843 Congress passed the long-delayed appropriation, steps were at once taken to construct a telegraph from Baltimore to Washington, and on the 24th of May 1844 it was used for the first time. Morse's patents were already secured to him and his associates, and companies were soon formed for the erection of telegraph lines all over the United States. In the year 1847 Morse was compelled to defend his invention in the courts, and successfully vindicated his claim to be called the original inventor of the electromagnetic recording telegraph. Thenceforward Morse's life was spent in witnessing the growth of his enterprise and in gathering the honours which an appreciative public bestowed upon him. As years went by he received from the various foreign Governments their highest distinctions, while in 1858 the representatives of Austria, Belgium, France, the Netherlands, Piedmont, Russia, the Holy See, Sweden, Tuscany, and Turkey appropriated the sum of 400,000 francs in recognition of the use of his instruments in those countries. In the preparations for laying the first Atlantic cable he took an active part, though the attempt of 1857, in which he personally engaged, was not successful. He died 2d April

¹ Five years later the captain of the ship identified under oath Morse's completed instrument with that which Morse had explained on board the "Sully" in 1832.

1872, at New York, where his statue in bronze now stands in the Central Park. His instrument and alphabet are now used on 95 per cent. of the telegraph wires of the world.

MORSHANSK, a district town of Russia, situated in the government of Tamboff, 58 miles (187 miles by rail) to the north of the capital of the province on the Tsna river, a tributary of the Oka, and on the railway between Moscow and Orenburg. The village Morsha was founded only in the middle of the 17th century, and received municipal institutions in 1779; but a hundred years ago it was already a wealthy town, owing to its situation in a most fertile district. Since it was brought into railway communication with Riaznsk (on the railway between Moscow and Riazan) it has acquired still more importance, and has become the chief centre for trade in wheat raised in the governments of Tamboff, Penza, Saratoff, and in the eastern districts of the government of Riazan. Merchants from Moscow, Yaroslav, Vladimir, St Petersburg, and the Baltic ports come to Morshansk to make large purchases of grain, flour, hemp-seed, tallow, and potash. These are sent, either to the Shilovskaya loading-place, or by rail to Moscow. There are in Morshansk several steam flour-mills, distilleries, and large store-houses for grain; the town, though built of wood, is cleaner than most of the towns of the black-earth region. Morshansk has also some importance for the import of manufactured ware brought from the north and sent thence to the villages of the neighbouring districts. Population, 20,000.

MORTALITY TABLES. See **INSURANCE**, vol. xiii. p. 169 sq.

MORTGAGE. The general object of mortgage is to secure a money debt by making it a charge on land, so that, if the debt be not paid by a time agreed upon between the parties, the creditor may sell the land and pay himself out of the proceeds. In English law this is done by a conveyance of the land in absolute terms to the creditor, subject only to its being defeated if the debt should be paid at the time fixed—an arrangement to which the law has attached peculiar incidents designed to carry out its real object. An absolute conveyance, however, is by no means essential to the purposes of mortgage.

The history of mortgage transactions in Roman law shows three well-marked stages. In the beginning the estate was conveyed absolutely to the creditor, who made a covenant (*fiducia*) to reconvey it when the debt should be paid. All the interest, however, in the meantime passed from the debtor to the creditor, and should the latter refuse to reconvey there was no remedy to the original owner except a personal action. In the second stage (that of *pignus*) the property did not pass to the creditor; he merely received possession of the thing pledged, together with certain rights of sale, &c., in the event of payment not being made at the time appointed. Lastly, without parting with the possession even of the pledge the debtor could create a lien or charge (*hypotheca*) over it in favour of the creditor, who acquired thereby a right on failure of payment to follow the thing by real action against the possessor, whosoever he might be, and to repay himself from the proceeds of his sale.

The mortgage of English law is the result of two distinct influences. Its origin and form belong to the common law; the restrictions by which it is made to serve the purpose of a security only, and nothing more, belong to the courts of equity. In the eye of the common law the mortgagee was the owner of the estate conveyed in the mortgage; in equity the mortgager remains the real owner, and the mortgagee is merely an encumbrancer. A, the owner of land in freehold, conveys to B and his heirs, with a proviso that on repayment of money lent by B to A, on

a future day, with interest until payment, B or his heirs will reconvey the estate to A and his heirs, and that, until default be made in payment, A and his heirs may hold without interruption from B and his heirs. This is a common mortgage of land, and at law, after failure of payment, the land belonged absolutely to the mortgagee, while in the meantime, before payment, the legal estate was considered to be vested in him, subject only to being defeated by payment at the proper time. The Court of Chancery first interfered in the reign of James I. to decree a redemption after forfeiture, and a case in the reign of Charles I. decides that payment after forfeiture has the same effect as payment before. The right of the mortgager to redeem his estate after it has been forfeited, according to the terms of the deed, is called his equity of redemption. No agreement between the parties was suffered to oust the jurisdiction of the court, or to deprive the debtor of his equity of redemption. And this equity, at first regarded as a mere right of the debtor, became established in course of time as an estate in land which descended to the heirs of the mortgager. On the other hand, the interest of the mortgagee is part of his personal estate, and passes to his executor and not to his heir. In spite of the terms of the mortgage, the owner of the land is still the owner, and the mortgagee is a creditor for the money he advanced and the interest thereon. It may be a question whether a given deed is a conveyance or a mortgage, and the court, in deciding, will look at all the circumstances of the case, and will treat it as a mortgage when it was the real intention of the parties that it should operate as a security only. Thus, if the price was grossly inadequate, if the purchaser was not let into immediate possession, if he accounted for the rents to the grantor, retaining an amount equivalent to interest, if the expense of the deed was borne by the grantor, there would be reason to believe that the conveyance was only meant to be a mortgage. And "once a mortgage, always a mortgage;" no subsequent agreements can change its character.

A mortgagee may, however, on default of payment file a bill of foreclosure requiring the mortgager to pay the amount of the debt with interests or costs by an appointed day, or submit to be deprived of his equity of redemption. The effect of failure to pay by the time appointed would be to make the mortgagee absolute owner of the estate; but the court in any foreclosure suit may, at the request of either side, order a sale instead of a foreclosure. And a power of sale is now implied as one of the incidents of the mortgage, unless forbidden or varied by express destination. The mortgagee is entitled to retain out of the proceeds of the sale the amount of his principal, interest, and costs, the surplus belonging to the mortgager. A mortgager cannot require the creditor to receive payment before the time appointed in the deed; and, on default of payment at the appointed time, he must give the creditor six months' notice of his intention to pay off the mortgage, so that the creditor may have time "to look out for a fresh security for his money."

When the same land is successively mortgaged to different persons, their rights take priority according to their chronological order. But the operation of equitable doctrines in the formation of the law of mortgage leads to an important modification of this rule. Of the successive mortgagees, the first only takes the legal estate, and this, according to the maxim of the Court of Chancery, will turn the scale when there is an equality of equitable rights between two contracting parties. Thus, if the third mortgagee had no notice at the time of making his advance of the existence of the second mortgagee, the equities of the two claimants are supposed to be equal, and if nothing else intervened priority of time would decide the order of

their rights. But if the third mortgagee gets an assignment of the first mortgage, he can *tack* his third mortgage to the first, and so postpone the second mortgagee. And if the first mortgagee himself makes an additional advance after the date of the second mortgage, but without notice of it, his whole debt will take precedence of the second mortgagee. A similar result of equitable rules is seen in the consolidation of securities. Two separate estates, mortgaged at different times and for different sums of money by the same mortgager to the same mortgagee, are regarded as consolidated, so that the whole of the land becomes security for the whole of the money, and the owner cannot redeem either mortgage without redeeming the other. So that, as Mr Justice Williams reasons, no person can safely lend money on a second mortgage, for, in addition to the risk of a third mortgagee *tacking*, there is the danger that, if the mortgager should have mortgaged another estate for more than its value, the holder of the deficient security may buy in the first mortgage, consolidate it with his own, and exclude the second mortgagee.

An *equitable* mortgage is constituted simply by the deposit of title-deeds in security for money advanced. The enactment of the Statute of Frauds that no action shall be brought on "any contract or sale of lands," &c., or any interests in or concerning them unless the agreement be in writing and signed by the party to be charged, has been cited as incompatible with the recognition of equitable mortgages, but it is argued by Lord Abinger that the Act was never meant to affect such a transaction. The deeds which are the evidence of title could not be recovered in an action at law, and, if they were claimed in equity, the court would require the claimant to do equity by repaying the money borrowed on the deposit. Any subsequent legal mortgagee, having notice of the deposit, will be postponed to the equitable mortgagee, and when the legal mortgagee has not inquired as to the title-deeds the court will impute to him such knowledge as he would have acquired if he had made inquiry.

As to mortgages of personal property see **PLEDGE**.

United States.—In the United States there is great diversity in the extent to which equitable principles have been formally substituted for the rules of the common law in dealing with mortgages. Washburn (*Law of Real Property*, vol. II.) arranges the States into three "pretty well-defined classes." In the first, the mortgage deed is held to create a seizure of and an estate in the premises, with all its common law incidents, to be enforced if need be by ejectment. In the second, the mortgagee's rights are limited to such as the rules of equity prescribe, and may not be enforced by a suit at law. In the third, the mortgagee's interest is not deemed an estate at all, but is here only to be enforced by the sale of the premises as a means of paying the debt. In the first class come Massachusetts, Maine, Connecticut, New Hampshire, Rhode Island, Vermont, Indiana, Missouri, North Carolina, Mississippi, Minnesota; in the second, Iowa, Illinois, Pennsylvania, Kentucky, Ohio, Wisconsin, and Texas; in the third, California, Georgia, and New York, to which may be added Oregon. (E. R.)

MORTIFICATION, a term used in surgery signifying a local death. Any cause which interferes with the blood-supply of a portion of the body will, if sufficiently prolonged or sufficiently severe, give rise to mortification. In some cases the death may be preceded by inflammation; in others, as in old people with diseased vessels, the part may die in consequence simply of insufficient blood-supply without any previous inflammation. The part is said to mortify; the process is termed gangrene; the dead part is called a slough. A severe injury may end in mortification. Extreme heat as in severe burns, or extreme cold as in frost-bite, may give rise to the condition. Those parts of the body farthest from the centre of the circulation are most liable to mortification. Frost-bite, for example, may attack the toes or fingers as well as those parts which are most exposed to the cold, more particularly the point of the nose or the ear. The part affected

becomes pale, bloodless, cold, and insensible. The great point to attend to is to restore the circulation gradually, using gentle friction. If the person is brought before a fire, or if any hot applications are used, then a rapid reaction may issue in a severe inflammation, which may be followed by mortification. Chilblain is a mild form of frost-bite occurring in young people with sluggish circulations, very often caused by sitting down before a strong fire with cold feet; any one suffering from cold feet or hands should take plenty of exercise, and if after a return from a sharp walk the feet remain cold the heat should be restored by rubbing with a rough towel.

MORTMAIN, STATUTES OF. The object and effect of these enactments are treated in the articles **CHARITY** and **CORPORATION** (*q.v.*). The following is a list of the Mortmain Acts:—

9 Henry III. c. 36 (Magna Charta); 7 Edward I. st. 2, c. 1 (De Religiosis); 13 Edward I. c. 32; 13 Edward I. c. 41; 18 Edward I. st. 1, c. 3; 27 Edward I. st. 2; 34 Edward I. st. 3; 18 Edward III. st. 3, c. 3; 15 Richard II. c. 5; 21 Henry VIII. c. 6, s. 5; 23 Henry VIII. c. 10; 1 and 2 Philip and Mary, c. 8, s. 51; 35 Elizabeth, c. 4; 21 James I. c. 1; 13 and 14 Charles II. c. 6, s. 10; 29 Charles II. c. 8; 7 and 8 William III. c. 37; 9 George II. c. 36; 43 George III. c. 108; 9 George IV. c. 85; and 2 and 3 William IV. c. 115.

MORTON, JAMES DOUGLAS, fourth earl of (1530-1581), regent of Scotland, second son of Sir George Douglas of Pittendriech, was born at Dalkeith in 1530. Having married Elizabeth, daughter of the third earl of Morton, he through her succeeded in 1553 to the title and estates of his father-in-law. After the return of Queen Mary in 1561 he was chosen a privy councillor, and in 1563 he became lord high chancellor. Though his sympathies were Protestant, he took no part in the combination of Protestant barons in 1565, but he headed the armed force of 150 men who took possession of Holyrood Palace to effect the assassination of Rizzio, and it was to his house that the leading conspirators adjourned while a messenger was sent to obtain Mary's signature to the "bond of security." The queen, before complying with the request, escaped to Dunbar, and on her return to Edinburgh with an escort of 2000 men Morton and the other leaders fled to England. After her marriage with Bothwell, Morton returned, and with 600 men appeared before Borthwick Castle, where the queen, in dread of a rising, had taken refuge. He was present at the remarkable conference at Carberry Hill, and he also took an active part in obtaining the consent of the queen at Lochleven to an abdication. Thereupon he was reappointed lord high chancellor, and also succeeded Bothwell as lord high admiral. On the death of the earl of Mar he became regent (October 1572). Through his persistence in recovering the crown jewels from the countess of Argyll, widow of the earl of Moray, Morton awakened the bitter animosity of Argyll and Athole, who persuaded the young king James VI. to assume the government. Morton deemed it prudent to resign, and for a time retired to Lochleven, but shortly afterwards, with the assistance of his nephew, the earl of Mar, he obtained possession of Stirling Castle, where the king was residing, and thus for a time recovered his old influence. Suddenly, however, he was accused by James Stewart, earl of Arran, of having taken part in the murder of Darnley, the father of the king, and being tried by a jury of sixteen peers, most of whom were his enemies, was condemned to death and beheaded on 2d June 1581.

MORVEAU. See **GUYTON DE MORVEAU**.

MOSAIC (late Greek *ψήφος*, from *ψήφος*, a small stone; also *μοσαϊον*, *i.e.*, refined, delicate work; hence the Latin *opus musivum*) is the fitting together of many, generally small, pieces of marble, opaque glass, coloured clays, or other substances, so as to form a pattern; the

design may be of various degrees of elaboration, from the simplest, almost monochromatic, geometrical pattern to the most elaborate picture, with figure-subjects represented in colours of countless gradations.

The earliest existing specimens of mosaic belong to one of the less important branches of the art—namely, the ornamentation on a small scale of jewellery, ivory thrones, and other furniture, or more rarely of some elaborate architectural ornament. Most of this earliest sort of mosaic resembles in execution what are called *cloisonnée* enamels. In the Louvre and in the British Museum are preserved some very beautiful ivory carvings in low relief, some from Nineveh and others from Egypt, in which figures of deities, ornaments formed of the lotus and papyrus plants, and royal cartouches are enriched by small pieces of glass or lapis-lazuli and other gem-like stones, which are let into holes made in the ivory. Each minute piece is separated from the next by a thin wall or *cloison* of ivory, about as thick as cardboard, which thus forms a white outline, and sets off the brilliance of the coloured stones. The favourite pattern in this sort of work for decorating the larger surfaces appears to have been suggested by the feathers on a bird's wing. See *Ivory*, vol. xiii. pl. vii. fig. 3.

Recent excavations at Tel al-Yahudiya in Lower Egypt have brought to light some mosaics on a larger scale, but treated in the same way. These are caps of columns, wall tiles, and other objects, either of white limestone or earthenware, in which designs, chiefly some forms of the papyrus, are formed by brilliantly-coloured bits of glass or enamelled earthenware, let into a sinking in the tile or column. This form of mosaic was employed by the Greeks: the Erechtheum at Athens, built in the middle of the 5th century B.C., had the bases of some of its white marble columns ornamented with a plait-like design, in which pieces of coloured glass were inserted to emphasize the main lines of the pattern.

Another, quite different sort of mosaic was known to the Egyptians of the Ptolemaic and Roman periods. This is made entirely of glass, and is extremely minute. The finest known specimen is in the British Museum: it is a small tablet about three-eighths of an inch square, apparently the bezel of a ring, on which is represented the sacred hawk,—every feather on the bird's wing being produced with a great number of colours and tints, each quite distinct, and so minute that a strong magnifying glass is required to distinguish its details.

The way in which this wonderful little mosaic was produced is extremely ingenious. Numbers of long sticks of various-coloured glass were arranged in such a way that their ends produced the figure of the hawk; other sticks of blue glass were placed all round so as to form the ground. The whole bundle of sticks of glass when looked at endwise now presented the figure of the hawk with a blue background, immensely larger than it afterwards became. The bundle was then heated till the sticks melted together, and the whole thick rod, softened by fire, was then drawn out to a greatly-diminished thickness. In this process the relative positions of the sticks of coloured glass forming the design were not altered. A slice of the rod was then cut off, and its faces polished,—the design, much reduced in size, of course being equally visible at both sides of the slice; and thus the microscopic minuteness of the mosaic was produced, with astonishing delicacy and refinement; many slices, each showing the same mosaic, could be cut from the same rod.

The more important use of mosaic has been on a large scale either for pavements or for walls and vaulted ceilings. Mosaic for these purposes has by many writers, both ancient and modern, been divided on various systems into classes; perhaps the simplest classification is the following:—

I. *For Pavements*:—(a) *Tesselated*, in which the design is formed of small cubes, generally of marble, more rarely of glass or clay; (b) *Sectile*, formed of larger pieces of marble, shaped and cut so as to fit accurately one with another. II. *For Walls and Vaults*:—*Fictile* or *vermiculated*; pieces of opaque glass, in small cubes, arranged so as to form complicated pictures.

This classification is not altogether satisfactory, more than one method often being employed in the same mosaic; as, e.g., in the "opus Alexandrinum" of mediæval writers, which is often partly tesselated and partly sectile.

Until Roman times we know but little of these kinds of mosaic. There is some evidence (in Pliny and other writers) to show that elaborate mosaic pavements, *λιθόστρωτον* or *λιθολόγημα*, were made by the Greeks in the 4th century B.C., or even earlier; but most of the numerous fine specimens of tesselated work still existing in Greece, such as those at Sparta and Athens, must be referred to the time of the Roman occupation. The best examples of Hellenic mosaic are some pavements discovered during the recent excavations at Olympia. (See fig. 1 and *Ausgrabungen zu Olympia*, 1877-82).

Among the Romans the use of mosaic, both of marble and opaque glass, was very extensive. According to Pliny (*H.N.*, xxxvi. 25), they derived this art from the Greeks, but not until the time of the Third Punic War, 146 B.C., while glass mosaics for walls, "vitreae parietes," were a recent invention in his time. Many of these have been found at Pompeii; most commonly they are used to decorate niches for fountains or statuettes. Judging from the description given by Vitruvius (vii. 1), and an examination of numerous specimens of Roman tesselated mosaics



FIG. 1.—Greek Pavement from the Temple of Zeus at Olympia.

the process of manufacture was the following: The earth was first carefully rammed down to a firm and even surface; on this was laid a thick bed of stones, dry rubbish, and lime, called "rudus," from 6 to 9 inches deep, and above this another layer, 4 to 6 inches thick, called "nucleus," of one part of lime to three of pounded brick, mixed with water; on this, while still soft, the pattern could be sketched out with a wooden or metal point, and the tesserae or small bits of marble stuck into it, with their smoothest side uppermost. Lime, pounded white marble, and water were then mixed to the consistency of cream, forming a very hard setting cement, called "marmoratum." This cement, while fluid, was poured over the marble surface, and well brushed into all the interstices between the tesserae. When the

concrete and cement were both set, the surface of the pavement was rubbed down and polished. This kind of mosaic was largely used for floors of hypocausts; the concrete bed was then supported on large tiles resting on numbers of short pillars.

If used for upper floors very strong joists were required, and both Pliny (xxxvi. 25) and Vitruvius (vii. 1) recommend a double layer of boards, one crossing the other, on which the concrete and cement bedding was to be laid.

The usual Roman pavement was made of pieces of marble, averaging from a half to a quarter of an inch square, but rather irregular in shape. A few other, but quite exceptional, kinds of mosaic pavements have been found, such as that at the Isola Farnese, 9 miles from Rome, made of tile-like slabs of green glass, and a fine "sectile" pavement on the Palatine Hill, made of various-shaped pieces of glass, in black, white, and deep yellow. In some cases—e.g., in the "House of the Faun" at Pompeii—glass tesserae in small quantities have been mixed with the marble ones, for the sake of greater brilliance of colour. Pompeii is especially rich in its mosaics both on floor and walls, almost every house having at least its vestibule paved in this way.

In addition to graceful flowing patterns and geometrical designs, picture-like subjects of great elaboration frequently occur: of these the most important is the large and minutely-executed scene of the battle of Issus, found in the "House of the Faun." It is of special value as being the chief classical historical picture still existing. It is a well-designed though somewhat crowded composition, representing the moment of Alexander's victorious charge against the cavalry of Darius. The expression of the faces and the characteristic dresses of the Greeks and Persians are represented with great skill (see fig. 2). The tesserae, as was always the case in this sort of work, are not all the same size, the smallest (only about one-tenth of an inch square) being reserved for the faces, where greatest refinement of detail was required. This was a floor-mosaic, though generally these minutely-executed works were affixed to walls.

The most skilfully-executed of all existing mosaics of this pictorial kind is that known as "Pliny's Doves," found in Hadrian's villa at Tivoli, and now in the Capitoline Museum. It may possibly be the one so highly praised by Pliny (xxxvi. 25) as the work of Sosus, for, although he describes it as being at Pergamum, yet it was a common practice with the Romans to transport these mosaics from one place to another, and this very celebrated one may well have been brought to Tivoli to adorn the emperor's villa. It is treated in a very realistic way: the light on the gold bowl, the plumage of the doves, and especially the reflexion in the water of the drinking dove, are represented with wonderful skill. It is, in fact, far too pictorial, and, like the late mosaics in St Peter's, Rome, is more remarkable for its technical skill than for any real artistic merit. This excessive realism, produced with great difficulty and cost, is a not uncommon fault of the more elaborate Roman mosaics, and was the inevitable result of the luxury and ostentation of imperial Rome, which made art the bond-slave of the wealthy, rather than the free and natural expression of a whole people, as it was among the earlier Greeks.

Another interesting mosaic from the wall of a house at Pompeii, of extremely delicate work, is a rehearsal scene in a Greek theatre, where the choregus is instructing the actors: it is specially remarkable from its being signed as the work of Dioscorides of Samos. Other figure-subjects are not uncommon, such as various representations of the victory of Theseus over the Minotaur, others of Achilles in Scyros, many hunting scenes, and the like.

Throughout England, Germany, France, Spain, Asia Minor, and Northern Africa in no way have signs of Roman occupation been left so clearly and in so conspicuous a form as by the numerous large and generally well-preserved mosaic pavements which have at various times been discovered in all these countries. In many cases, long after all traces of the walls of the buildings have disappeared, owing to their being dug up and removed for building purposes, the mosaics still remain to testify of the artistic power and mechanical skill of the Roman colonists.

Few countries are richer than England in these remains; the great pavements of York, Woodchester, Cirencester, and many other places are as elaborate in design and as

skilfully executed as any that now exist even in Rome itself. In whatever country these mosaics are found, their style and method of treatment are always much the same; the materials only of which the tesserae are made vary according to the stone or marble supplied by each country. In England, for instance, limestone or chalk often takes the place of the white marble so common in Italian and North African mosaics; while, instead of red marble, a fine sort of burnt clay or red sandstone is generally used; other makeshifts had to be resorted to, and many of the Anglo-Roman mosaics are made entirely without marble. It is perhaps partly owing to the great wealth of Northern Africa in marbles of many colours and of varying shades that the finest of all Roman mosaics have been found in Algeria and Tunis, especially those

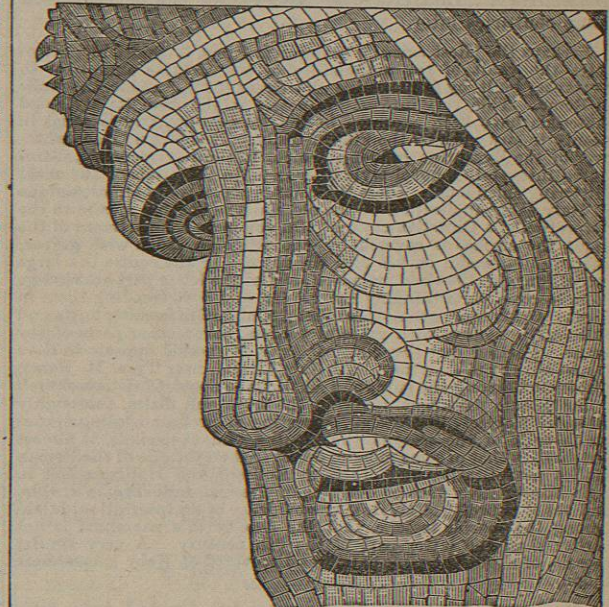


FIG. 2.—Part of a Persian's Head from the Battle of Issus; full size.

from Carthage, some of which have been brought to the British Museum. See *Archæologia*, vol. xxxviii. p. 202.

The range of colour in the marble tesserae is very great, and is made use of with wonderful taste and skill: there are three or four different shades of red, and an equal number of yellows and greens, the last colour in all its tints being almost peculiar to this part of Africa, and one of the most pleasant and harmonious in almost any combination. Deep black, browns, and bluish-greys are also abundant. The white marble which forms the ground of nearly all the designs is often not pure white, but slightly striated with grey, giving great softness and beauty of texture to the surface, and doing away with too great monotony of tone. The Roman practice, common to all their mosaics, of not fitting the tesserae quite closely together, but allowing the cement joints to show freely, was also of great value in giving effect to the general texture of the surface—a point quite forgotten by some later mosaic-workers, who thought that the closer their tesserae were fitted together the better the mosaic would be. This remark does not apply to sectile mosaic, in which sufficient variety can be given by the markings and veins in each piece of marble. To return to the mosaics from Carthage, they are no less excellent in design than in the richness and beauty of their materials. Large spaces