

WEEKLY SUMMARY OF THE PROGRESS OF SCIENCE.

ASTRONOMY.

The divisions in Saturn's rings.—Professor Kirkwood, in 1868, accounted for the great division in Saturn's rings by the commensurability of the period of a body revolving at that distance from Saturn with the periods of the six inner satellites. Dr. William Meyer of Geneva has investigated every possible combination of the commensurabilities of the revolution periods of the satellites, and finds six other places where a perturbing influence is exercised. The divisions most strongly marked seem to be at places where the commensurabilities are the closest, and all the satellites take part. A faint division should be found in the inner bright ring, according to Dr. Meyer. Prof. Holden has noted a distinct point at which the shading-off begins, in the position indicated by Meyer's theory, — a fact which seemed to have escaped Meyer's notice. — (*Observ.*, Sept., trans. from *Astr. nachr.*, 2,527, with additions.)

M. MCN.

[306]

Saturn.—Dr. William Meyer of Geneva gives a new determination of the orbits of six of Saturn's satellites, — Enceladus, Tethys, Dione, Rhea, Titan, and Iapetus. From each of these he has determined the mass of Saturn, the reciprocal value of the combined result being $M = 3,482.9 \pm 5.5$. The original observations are to appear in the *Mémoires de la société de physique de Genève* during the present year. — (*Astr. nachr.*, 2,528.)

M. MCN.

[307]

MATHEMATICS.

Functions of a complex variable.—In the present paper, entitled 'Applications of Fourier's theorem to the theory of the functions of a complex variable,' M. Harnack first shows in what manner the Fourier series are to be employed in the discovery of a rigid basis for the Cauchy-Riemann theorem concerning the development of functions of a complex variable. A generalization is also given of the fundamental hypothesis involved in the C.-R. theorem, as follows: if w is a function of $x + iy$, which over a simply connected plane region is everywhere continuous, and which 'in general' satisfies the differential equation, —

$$\frac{dw}{dx} + i \frac{dw}{dy} = 0,$$

then the function w is with its derivatives everywhere finite and continuous, and will possess no singular points. The term 'in general' (*im allgemeinen*) means that the points which do not satisfy the above differential equation, together with the points for which the partial derivatives $\frac{dw}{dx}$ and $\frac{dw}{dy}$ are indeterminate between finite or infinite limits, or are discontinuous, shall make up simply a discrete system of curves. In the second part of the paper, the author has gone very briefly into the subject of the representation of an analytical function, without singularities, in the interior of a circle by aid of Dirichlet's principle. — (*Math. ann.*, xxi.)

T. C.

[308]

ENGINEERING.

Heavy engines and American railroad-tracks.—Mr. O. Chanute states that heavy 'consolidation' engines do not injure the track more than the lighter engines formerly did. Trains have been lengthened from 22 cars in 1874 to 38 in 1883; and the weights hauled, from 106 to 228 tons. By strengthening draw-heads, links, and pins, accidents from breaking apart of trains have been diminished, and the cost of haulage has been reduced from one cent to a half-cent per ton per mile. — (*Mechanics*, July 28.)

R. H. T.

[309]

The British institution of mechanical engineers.—This society held its summer meeting in Belgium. It was received by the Association of engineers of Liège university, and visited the principal engineering establishments of the country. President Westmacott, in his opening address, called attention to the progress recently made in the rapid production of good articles of manufacture, and to the fact that speed and excellence of work are not incompatible where machinery is used. The materials must be of the best quality, however, the machines well proportioned, and all working parts well balanced and well fitted. He referred to Thorneycroft's experience with torpedo-boats, and called attention to the fact, that, at high speeds, the difficulties of lubrication and the jar observed at lower speeds disappear. In the speed of railway-trains, no advance has been lately made, and the maximum speeds remain at the figures of earlier years. Some economy has been obtained by the use of the crude products of the distillation of petroleum in the fireboxes of locomotives, this economy sometimes amounting to fifty per cent. Cotton-machinery has been speeded up, until the spindles which formerly made 5,000 revolutions are now making from 8,500 to 10,000, on fine American cotton. The increase in speed of woollen-machinery has not been great. In gunnery, the weight of gun and projectile have increased, in twenty-five years, from 5 tons and 66 pounds to 100 tons and 2,000 pounds. The shot has an initial energy of nearly 50,000 foot-tons. High speed is the direction of change in all departments of engineering. — (*Nature*.)

R. H. T.

[310]

Hardening soft limestones with fluosilicates.—The application of alkaline silicates to the exterior of buildings, in order to prevent the deterioration of the stone, has not been attended with satisfactory results. H. L. Kessler proposes to use a solution of fluosilicates of bases whose oxides and carbonates are insoluble in a free state. When soft limestone is saturated with a concentrated solution of a fluosilicate of magnesium, aluminum, zinc, or lead, a very considerable degree of induration is soon reached, and the resulting products, except the liberated carbonic anhydride, are less soluble than the stone itself. No varnish is formed, and therefore no danger arises from expansion of frost beneath it. The process has

resisted the severe tests of winter. Colors may be introduced satisfactorily. — (*Les mondes; Amer. arch.*, Sept. 1.) C. E. G. [311]

CHEMISTRY.

(General, physical, and inorganic.)

The yellow and red plumbic oxides. — A study of the formation and properties of the two forms of plumbic oxide, by A. Geuther, shows that it is dimorphous, the yellow modification crystallizing in rhombic forms, and the red in the tetragonal system. The yellow oxide is changed by pressure and by friction into the red form, which is again transformed into the yellow, when heated to its melting point. — (*Ann. chem.*, ccxix., 56.) C. F. M. [312]

Artificial reproduction of barite, celestite, and anhydrite. — A. Gorgeu finds that the sulphates of barium, strontium, and calcium dissolve freely in the melted chlorides of various metals at a red heat. On cooling, they separate in well-defined crystals which resemble closely the natural sulphates. From the results of his experiments, M. Gorgeu concludes that the minerals barite, celestite, and anhydrite must have been deposited from a solution of their amorphous sulphates in some metallic chloride. — (*Comptes rendus*, xvi. 1734.) C. F. M. [313]

A modification of V. Meyer's apparatus for vapor density determinations. — In order to obtain a uniform temperature, H. Schwarz surrounds the tube containing the substance with a jacket which serves as an air-bath. The required temperature is obtained by placing the apparatus in an ordinary combustion-furnace. — (*Berichte deutsch. chem. gesellschaft.*, xvi. 1051.) C. F. M. [314]

METEOROLOGY.

Barometric laws. — The weather review issued by the *Deutsche seewarte* contains not only summaries of the weather conditions in each month, and of the work of the bureau in connection with them, but also occasional articles of scientific value, based upon the observations. The number for the year 1882 contains a valuable paper entitled *Typische witterungserscheinungen*, the object of which is to discuss the laws governing the velocity and direction of the movement of areas of low pressure, and their attendant phenomena, deduced from European observations between 1876 and 1880. The low areas during this period are grouped into five classes, according to the directions of the paths which they pursued. The accompanying charts exhibit, for each of three positions of the storm-centre (the entrance, middle position, and departure, as regards the territory of western Europe), six attendant phenomena, — the distribution of pressure and temperature, barometric changes in the preceding twenty-four hours, temperature departures from the normal, amount of precipitation, and cloud-phenomena. Tables are also given showing the distribution of the storm-tracks, with respect to the time of year, the average depth of the depressions, and their velocity.

The discussion to which the charts and tables have

been subjected brings out various empirical laws, which are of special aid to the officers of the *seewarte* in their weather forecasts, as well as of scientific interest. Several of these may be mentioned: 1°. The depressions usually advance in the direction of the strongest winds. 2°. The line of advance of the depression forms an angle with the line of greatest increase of temperature, which generally lies between 45° and 90°, the highest temperature lying at the right of the path of the minimum. In summer the angle is greater than in winter, often reaching 90°. Both of these laws conform to the principles laid down in 1872 by Ley. They may be combined into one as follows: "The onward movement of the depressions follows approximately in the direction of the preponderating movement of the whole mass of air in the vicinity of the depression." The importance of cloud-studies, especially of the upper clouds, consists in the fact that their direction of movement foreshadows, in a general way, the direction of movement of the depression. On the other hand, their distribution in advance of the depression is so irregular that their indications cannot be relied upon alone, but must be combined with the distribution of pressure and other meteorological conditions.

The most interesting part of the discussion relates to the distribution of pressure at the height of 2,500 metres. The barometric readings are reduced to this height (in addition to the usual reduction to sea-level) by means of Köppen's formula, published in 1882; the first use of this method which has yet been published, as far as known. At this height the minima are not so closely enclosed by the isobars as is indicated by the charts; and it is shown, that "the rotary motion is limited to the lower atmospheric strata, in which the axis of the vortex is inclined towards the left and apparently somewhat forward." It seems that an advance in our knowledge of barometric movements might be made by further attention to this method of research, which enables us to investigate the extent of a depression in a vertical direction as well as in the horizontal direction, to which investigation has hitherto been limited. — (*Monatl. übersicht witterung*, 1882.) W. U. [315]

GEOGRAPHY.

(Arctic.)

Polar stations. — The Austrian steamer *Pola* reached Jan Mayen, Aug. 3, and found the party in excellent health and spirits. We have already announced their safe return to Vienna. Some account of the wintering is given in *Nature*, from which we learn, that, in 1882, the autumn storms began with a heavy snowfall about the end of August. September was fine and warm; October again stormy. The polar night began Nov. 12, and ended Jan. 30. Aurora was constant and of great brilliancy during the winter. The greatest cold (−63° F.) was observed in January, but March had the lowest average temperature. Terrible snow-storms occurred at intervals; the ice, which first formed around the island in December, being frequently broken up, and the salt spray carried a long distance inland. The ice dis-

appeared by the end of June. There had been no illness, and the international programme had been perfectly carried out. — In addition to the international stations, the physical laboratory at Upsala has made simultaneous observations for the year ending Aug. 15. — The Swedish expedition arrived at Tromsø from Spitzbergen, Aug. 28. The year's observations were completed Aug. 23. No casualties had occurred among the members of the party, and the relieving vessel encountered no ice of consequence. — The Dutch party which wintered in the Varna, near Waigatz Strait, arrived at Hammerfest, Sept. 3. The Varna was nipped Dec. 24, 1882, but did not founder until July 24, 1883. One of the crew died during the winter. The observations, except those relating to magnetism, were carried on with success. After the vessel sank, the party was accommodated on the *Dimfna*, from which it was taken by the steamer *Obi*, and carried to Vardö. Hovgaard, in the *Dimfna*, was confident of getting into open water in August, but intended, if he did not succeed in doing so by Aug. 15, to despatch half the crew under Lieut. Olsen for Yalmal on the Siberian coast, while he remained on the vessel with the other half during the winter. The *Dimfna* has since arrived at Vardö. — No attempt is to be made to reach Greely's party this year, as the season is considered too late. Several Eskimo stories have reached civilization, and have been supposed to refer to that party. It is certain that they are entitled to no credence whatever, in the shape in which they are received, even if originally based on some actual fact, which is doubtful. — The Point Barrow party under Ray has been successfully relieved, and reached San Francisco, Oct. 7. According to a telegram from Lieut. Ray, all work was accomplished except the pendulum observations. The relieving schooner *Leo* reached Point Barrow, Aug. 22, but was forced away by the ice the same night; returned on the 24th, but was again forced to retire, with some damage, the next day. On the 27th, however, the party and stores were embarked, and the vessel reached Unalashka, where she was beached and repaired. Lieut. Schwatka and party, who had descended the Yukon from the Chilkat country to the sea, and reached St. Michael's safely, were brought to San Francisco by the *Leo*. — W. H. D. [316]

The whaling-season. — Reports from Bering Strait to latest dates still continue to characterize the season as the worst and most icy for many years. No serious casualties had occurred since the loss of the *John Howland*. — W. H. D. [317]

Arctic notes. — The death of Admiral Sir Richard Collinson, at the age of seventy-two, is announced. He commanded the Franklin search expedition, 1850-54, on the *Enterprise* and *Investigator*, surveyed Minto Inlet and Prince Albert Sound in 1852. Part of his command under M'Clure, by walking from their vessel in Mercy Bay, over the ice to the *Resolute* at Dealy Island, and afterwards sailing for England on the *North Star*, made the north-east passage from the Pacific for the first and only time. Collinson received the gold medal of the Royal geographical society, the order of the Bath, and had been deputy-

master of Trinity House since 1875. — The latest news from the polar station at the Lena mouth was to the effect that all were well April 3, though the winter had been very trying. The lowest temperature observed was $-52^{\circ}.3$ F., Feb. 9. The deviation of the magnetic needles was very great, especially during 'magnetic storms,' reaching 25° in azimuth in the declinometer, and 90° for the suspended magnet in observations for horizontal intensity. — The newspaper accounts of Lieut. Schwatka's voyage are so confused, and contain so many absolute errors, that it is difficult to know exactly what they are intended to convey. The facts appear to be, that he crossed the portage from the Chilkat River to the Kussooa affluents of the Lewis River, as several parties of prospectors have done before him. The descent was then made to the Yukon, at Fort Selkirk, on rafts. Some of the Indians of the party becoming mutinous, it is reported that three of them were killed by Schwatka; and the party then descended the river from the site of Fort Selkirk to Fort Adams, just below Nuklukahyet', about longitude $152^{\circ} 30'$ west, where one of the river-boats used in trading was chartered to take them to the seacoast. It is to be hoped that astronomical observations have been made by the party, which, so far as merely traversing the country is concerned, has done no more than has been done by different parties of prospectors and explorers before; none of whom, however, obtained any observations of precision on the river above Fort Yukon. — Lieut. Stoney, U.S.N., after delivering the presents to the Chukchi of St. Lawrence Bay, which were sent in return for their benevolence to the officers and men of the *Jeannette* search expedition, on the U.S.S. *Rodgers*, landed near Hotham Inlet, and, according to newspaper reports, attempted to explore one of the three large rivers which fall into this estuary. The information given by the daily press is not exact; but it appears that the chief work accomplished was the collection of some native reports in regard to one of these rivers, which, in the state they have been made public, are incompatible with the known geography of the region. Doubtless, in this as in the case of Lieut. Schwatka's party, when the official reports are received, they will be found to contain welcome additions to our knowledge of these regions. [318]

BOTANY.

Color-changes of lungwort flowers. — Dr. Müller finds, that while occasionally insects visit the blue (older) flowers of *Pulmonaria officinalis*, but without benefit to themselves or the plant, the red (younger) flowers are much more frequently visited for pollen and nectar, being at the same time fertilized. One female of *Anthophora pilipes*, for example, was seen to visit only red flowers, or those just beginning to change. Another visited, at first, both red and blue flowers, but later, apparently learning by experience that the blue flowers contain no nectar, confined her visits to the red flowers. A third visited in the following order: sixteen red flowers of *Pulmonaria*, one blue *Nepeta glechoma*, twenty-three red *Pulmonaria*, one *Nepeta*, twenty-

one red *Pulmonaria*, and one *Nepeta*. Coming, now, to a place where the ground-ivy prevailed, she visited sixty-one *Nepeta* flowers, then five red *Pulmonaria* flowers, after which she returned to her nest. Earlier observation has also shown that this bee is not constant in its visits to a given species. The visits of the second individual and of one or two other insects, watched but a short time, to the blue flowers, is attributed to their lack of experience on this species; while the promiscuous visits of others are believed to be due to a noticeable confusion which was manifested after one or two unsuccessful visits had been made to flowers drained by earlier comers. From his observations, the writer concludes that the blue color of the older flowers, like the final color of those of *Ribes aureum* and *Lantana*, is of twofold advantage to the plant, — on the one hand increasing the conspicuousness of the flower-cluster, while, on the other hand, it indicates to the more acute of the visiting insects the flowers to which their attentions should be confined for their own good and that of the plant. — (*Kosmos*, 1883, 214.) W. T. [319]

Insects versus fertilization. — In some notes on Thripidae, Mr. Osborn discusses the food-habits of these minute insects, believing, from the structure and position of their mouth-parts, and such observations as he has been able to make, that the major part of the group are vegetable feeders, the few species considered by Walsh and Riley as insectivorous differing in this respect from most of their congeners. Even these are thought to possibly seek the honeydew of aphides, etc., rather than to destroy them.

Of young apple-blossoms frequented by them, "eighty per cent were injured by punctures upon the styles and other parts, but particularly the styles; and all the evidence pointed to the thrips as the cause of injury," though they were never seen to actually puncture the tissue. — (*Canad. entom.*, Aug.) W. T. [320]

ZOOLOGY.

Origin of individuality in the higher animals.

— H. Fol has published a very interesting note, in which he studies, not the historical or phylogenetic, but the physiological, origin of the individual. The questions proposed are, At what moment in the ontogeny is the individuality created and limited? What factors determine the development of one, two, or several embryos from a single vitellus? The cases of double monsters by union of two distinct eggs, and polymerism, being phenomena of a different order, do not come into consideration here.

Fol's new researches were made principally on the sea-urchin, *Strongylocentrotus lividus*, which is strictly individualized at all stages of its existence. He had previously reached the conclusion that normal fecundation demands only one spermatozoon for each egg. Selenka thinks that two or three do not involve the sequel of an irregular development. Fol has verified both points, and finds that normal fecundation may be effected by either one or two spermatozoa uniting with the egg-nucleus. Three seem to produce abnormalities. The spermatozoon, then, does not act as an individuality: it represents

only a certain dose of nuclear substance; and the dose may be either single or double. Immature or injured eggs admit several spermatozoa. Very ingeniously Fol has produced such a condition temporarily by immersing the mature ova for a moment in water saturated with carbonic acid, then transferring them to well-aerated water, and impregnating. The half-asphyxiated eggs admit each three or four spermatozoa, which unite with the female pronucleus, after which follows an abnormally long period of repose. When segmentation begins, there appears a complex caryolytic figure, with three or four poles instead of two, a triaster or tetraster, or two parallel amphiasters, separate or united. The number of segmentation-spheres formed is at least double the normal. The larvae have irregular forms, and often two or three gastrular cavities.

If the eggs are more completely under the influence of the carbonic acid, from five to ten spermatozoa may gain entrance. The earliest comers unite with the female pronucleus: the later ones remain in the periphery. The nucleus forms a tetraster or double amphiaster; and the peripheral male pronuclei form each an amphiaster, which usually join end to end, forming a rosary of asters and spindles. Each of these amphiasters seems to be a centre of development, for the surviving larvae are polygastric.

These facts lead to the conclusion that neither the egg, nor the female pronucleus, nor the spermatozoon, suffices, taken separately, to determine the individuality. The dose of nuclear substance resulting in the formation of an embryo may vary within considerable limits; and the number of amphiasters at the first cleavage is the first criterion which decides the number of individuals. Fol then considers the first amphiaster of segmentation as the first fact of individuality. [Fol does not appear to have demonstrated a strict correspondence between the number of amphiasters and of individuals. His view raises the question whether there is a fundamental difference between the bipolar (amphiasters) and multipolar asters in cell-division.] — (*Comptes rendus acad. Paris*, Aug. 13, 1883.) C. S. M. [321]

VERTEBRATES.

Birds.

The white of birds' eggs. — Tarchanoff has discovered that the white of the eggs of those birds whose young are born unfeathered differs from ordinary albumen, its most striking peculiarity being that it remains transparent after coagulation by heat. He designates it as 'tata-eiweiss.' It [differs from ordinary white of egg in many respects. When coagulated it is fluorescent. It has less polarizing power, and contains more water, than the white of hens' eggs. It gives no precipitate when abundantly diluted with water. It is at first strongly alkaline, but loses that reaction as the yolk develops. It is rapidly digested. It can be redissolved in water after drying at 40° C. It can be changed into what appears to be identical with ordinary albumen, *a*, by the addition of a few drops of concentrated solutions of neutral salts of alkaline bases, or, *b*, of concen-

trated acetic or lactic acid; *c*, under the influence of carbonic acid at a temperature near boiling; *d*, by incubation (owing to the action of the CO_2 excreted by the yolk?—*Rep.*). Experiments left it uncertain whether the ordinary albumen first passes through the 'tata' form. It seems probable that the 'tata-eiweiss' is a sodic or potassic albuminate. — (*Pflüger's arch. physiol.*, xxxi. 368.) C. S. M. [322

Yolkless artificial eggs.—Tarchanoff, in the course of his experiments, noticed in the preceding abstract, made fistulae of the oviduct in hens. They bear the operation well, but it causes atrophy of the glands of the oviduct, and apparently of the ovary also. The mature ova are discharged into the body-cavity. Under favorable circumstances, if a ball of amber is introduced into the upper end of the duct, the white with fully developed chalazae, and the membranous shell, are deposited, producing a normally formed egg, in which the yolk is replaced by the amber ball. A ligature prevented the descent of the egg, during the experiment, into that region of the oviduct which secretes the calcareous shell. — (*Pflüger's arch. physiol.*, xxi. 375.) C. S. M. [323

ANTHROPOLOGY.

Notes on New Guinea.—By degrees this unknown land is being brought before the scientific world. Mr. W. G. Lawes, writing from Port Moresby, describes a visit to the Rouna Falls, accompanied by his wife, the first lady to tread the unbeaten tracks of New Guinea. In the district of Sogere the travellers stopped at several native villages. The one where they camped consisted of seven houses and three tree-houses, which are really forts or castles. One was a hundred and twenty feet high. A native went up with an armful of spears, and threw them down at an imaginary enemy. When they have reason to expect an enemy, they take up a supply of big stones. These houses command the whole village, and could not easily be taken. The travellers saw much of the natives, who are good specimens of the average Koiarian. They are somewhat darker, shorter, and more hairy, than the coast people. When a man dies, it is always known whose spirit has bewitched him; and his tribe must pay in order to give the dead man rest. Whenever a man of the least consequence dies, there is fighting. Their mode of getting fire is peculiar. They take a dry stick of pithy wood, and split it a little way. In the cleft they put a piece of wood or a stone to keep it open; then, putting a little rubbish as tinder under the split part of the stick, they stand on the other end, and pass a strip of rattan, cane, or bamboo, under the cleft, drawing it rapidly up and down, when it soon begins to smoke, and sparks appear between the forks of the stick, which, with a little care, sets fire to the tinder, and a flame is soon obtained. — J. W. P. [324

The Toltecs.—Notwithstanding Dr. Brinton's consignment of the Toltecs to the Morgenland, M. E. T. Hamy has the courage to say, "The Toltecs

play the most important part in the past history of North America. Their history commences with the fifth century of our era, and their migration to the south-east coincides in a striking manner with the great movement of peoples in the old world. When the Goths and Huns were annihilating the civilization of Europe, at the other end of the world other barbarians, travelling in the same direction, were destroying older nations." M. Hamy gives a brief review of the Toltec art, especially in clay, and then proceeds to enlarge upon the discoveries of M. Charnay, illustrating his remarks by means of specimens in the Lorillard collection. The first period of Toltec ceramic art is termed *pastillage*; the second, more advanced, may be called *poussage*. Tula, Teotihuacan, and Cholula contain the most imposing vestiges of Toltec grandeur. The remains of what was the first capital of the Toltecs are situated nineteen leagues north of Mexico, at the confluence of the Rio Grande de Tula and a small river from the mountains of Texas. M. Charnay visited the ruins of this place, and photographed the most important. The descriptions of the other two capitals are passed over briefly by M. Hamy; but of Cholula, fortunately, we have the very minute observations of Baudelier, to be published by the Archeological institute. — (*Assoc. sc. France*, Conférence 25 Mars, 1882.) J. W. P. [325

The perforated humerus.—Professor Henry W. Haynes, in exhibiting a perforated Indian humerus found at Concord, Mass., brings together some important references to the same phenomenon observed elsewhere. Mr. Henry Gilman found 50 % in the Michigan mounds; at Grenelle, Paris, M. Martin found 28 %; in the Furfooz race of the caves of Belgium, M. Dupont found 30 %; in the Dolmen of Argenteuil, near Paris, M. Leguay found 25 %; while Dr. Pruner Bey ascertained the average at Vaureal, near by, to be 26 %. He also reported that it is common in skeletons of the Guanches. In the cave of Orrouy, belonging to the bronze age, the average was ascertained by Dr. Broca to be 25 %. Among two thousand skeletons of the polished stone age, discovered by the Baron de Baye in Champagne, he reports it as very frequent. Prof. Ward also speaks of the broken state in which long bones are found, attributing it to design. With regard to percentages on small numbers, a very singular experience was that of the writer of this note last year. Wishing to know what races and nationalities supplied the criminals of his city, he consulted the census and the police records. The former reported one Persian in the community; the latter, five Persians, arrested and convicted. Startled by the fact that five hundred per cent of the Persians were criminals, he was about to warn the government against allowing any more to land. A few moments' study, however, set the matter right. The poor Persian on the census-roll had been 'sent down' five times during one year, for sixty days each time, on account of vagrancy. — (*Proc. Amer. antiq. soc.*, ii. 80.) O. T. M. [326