

Bombay presidency. Dr. J. W. Evans, the geologist to the State of Kathiawar, has kindly forwarded to me a translation of the report sent in by the local official. It is curious that a fall of Nagali Jaowar (a kind of seed used as food by the poorer people of the country) is said to have occurred at the same time as the fall of the stone. As suggested by Dr. Evans, the seed may have been carried a short distance by the wind, which is very strong on the coast of Kathiawar at the time of year when the fall occurred. The spot where the fall took place is a flat region of recent limestone. Dr. Evans adds that the official report is interesting, as it is the account of a man who never heard of a meteorite, and to whom the fall of grain is as probable as that of stones. The report is as follows:—

“There was thunder which lasted for a quarter of an hour on the southern side at between a quarter to eight and eight o'clock in the morning of April 28, 1893. At that time the sky was clear enough. It has been known that the thunder was heard in nearly all the villages of Babariawad. The reason for my giving you this trouble is that Nagali Jaowar has rained with thunder on a small piece of ground near the outskirts of a village called ‘Wad,’ situate on the eastern bank of a river named ‘Dhatarwadi,’ and about two kosh (miles) distant from this place, but there was not a drop of rain-water. A specimen of Jaowar that has come down is sent herewith. A coolie, named Hamo Shiyal, while working in his field on the same day and at the same time, saw a stone about five or seven tolas (a tola = 180 grains) in weight falling on to the ground, about two fields distant, on the southern side of a village called Covaya, situated south-west of, and three kosh distant from this place, with the noise of thunder. He picked it up, and came to the village with it. While showing it to the people of the village, they broke it to pieces. As a specimen, one piece of the stone, out of the two pieces found by inquiry, is also sent herewith. There was not a drop of rain, and the sky was clear enough. Notwithstanding the clearness of the sky, it has been said that there was a thunderbolt. Such were the details of the occurrence on the morning of Friday, at between a quarter to eight and eight. If any further details come to notice, they will be reported to you.”

The original stone was shown by Dr. Evans' investigations to have been 3·7 centimetres long, 2·9 centimetres broad, and 2·3 centimetres thick. It was broken up by the villagers, and only the two largest portions have been recovered by the officials. These weigh respectively 17·4 and 16·3 grammes. The stone is said to have been cold when picked up, and no hole in the ground made by its fall was noticed. The larger fragment of this meteorite has been entrusted to me by my friend Dr. Evans, and Mr. L. Fletcher, F.R.S., of the British Museum, has kindly made a preliminary examination of it, the results of which I give in his own words:—

“The fragment of stone weighing 17·42 grams ($\frac{3}{5}$ ths of an ounce), sent by Dr. Evans, is undoubtedly part of a true meteorite, as is seen at once on examination of the crust and the fractured surface. The crust formed during the passage of the stone through the earth's atmosphere is dull black in colour, and in parts so rough as to be scoria-like in texture. On direct comparison with the stones from other falls preserved in the British Museum it is seen that in these respects the Jafferabad stone is very similar to parts of Pavlograd, Bachmut, Middlesborough, Tourinnes-la-Grosse, Pohlitz, and Gross-Liebenthal. The crust, however, is very remarkable for its thickness, which a little exceeds a millimetre, and at one part even reaches two millimetres: in most meteoric stones the thickness of the crust does not exceed half a millimetre, and in very few cases reaches a millimetre: the thickness in this instance surpasses that of the crust of any specimen preserved in this collection: of the above-mentioned meteorites, Pavlograd approaches most

nearly in this respect. The broken surface of the stone is very white in colour, and shows the usual metallic spangles of nickel-iron and troilite, white and tombac brown respectively; the thin black veins, beginning at the crust and traversing the stone in various directions of former fracture, are unusually conspicuous, even more than in the case of the stone which fell at Gross-Liebenthal in Russia on November 19, 1881, and which is very similar in its general characters. The aspect of the fracture is very uniform, and no round enclosures (chondrules) are to be distinguished. This, however, is often the case, even when chondrules are actually present, and in all probability a microscopic section of the Jafferabad stone, when allowed by the owner to be made, will reveal their presence. The specific gravity of the stone with crust is 3·55, and has an average value; that of Pavlograd, for instance, is 3·58.”

It will be seen from the foregoing account that the Jafferabad meteorite presents some features of considerable interest; and it is to be hoped that, in the interest of science, his Highness the Nawab of Junagadh may permit the specimen now in this country to be subjected to a full microscopical and chemical examination.

JOHN W. JUDD.

NOTES.

THE following is a list of names recommended by the President and Council of the Royal Society for election into the Council for the year 1894, at the anniversary meeting on November 30 (the names of new officers are printed in italics):—President: Lord Kelvin. Treasurer: Sir John Evans, K.C.B. Secretaries: Prof. Michael Foster and Lord Rayleigh. Foreign Secretary: *Sir Joseph Lister, Bart.* Other Members of the Council: Prof. Isaac Bayley Balfour, *Dr. Andrew Ainslie Common, Dr. Andrew Russell Forsyth, Richard Tetley Glazebrook, Prof. Alexander Henry Green, Sir John Kirk, K.C.B., Prof. Oliver Joseph Lodge, Sir John Lubbock, Bart., William Davidson Niven, Dr. William Henry Perkin, The Marquis of Salisbury, K.G., Prof. J. S. Burdon Sanderson, Adam Sedgwick, Prof. Thomas Edward Thorpe, Prof. William Augustus Tilden, Prof. W. Cawthorne Unwin.*

It is with deep regret that we announce the death of Sir Andrew Clark, Bart., on November 6, at the age of sixty-seven.

By the death of Prof. E. Lecouteux, France has lost one of its foremost agriculturists. Lecouteux was born at Créteil (Seine) in 1819. He was one of the founders, and afterwards a vice-president, of the Société des Agriculteurs de France. He was also at one time president of the Société Nationale d'Agriculture. Many important additions to agricultural literature were made by Lecouteux, and the effects of his beneficial influence will be apparent in France for many years to come.

THE Municipal Council of Paris has had an elegant album designed for M. Pasteur, containing the address presented to him in the name of the city of Paris at the celebration of his seventieth birthday in December of last year.

BRUSSELS UNIVERSITY will shortly have a laboratory of Psychological Physics, endowed by private munificence. The Rector, Prof. M. H. Denis, has nominated Drs. G. Dwelshauvers and P. Stroobant to take charge of the researches and practical work.

DR. JOHN ANDERSON, F.R.S., who for the past two years has been collecting materials in Egypt for a work on the mammals and reptiles of that country, is, we understand, again returning to Egypt to continue his researches, proceeding in the first instance to Suakin.

PROF. GUIDO CORA, of Turin, in 1886 a gold medallist of the R.G.S., has received this year a special gold medal from the Imperial Russian Geographical Society of St. Petersburg.

MR. CHARLES STEWART has been elected Fullerian Professor of Physiology to the Royal Institution of Great Britain, the appointment to date from January 13, 1894.

DR. VON JHERING has been appointed Director of the Natural History Museum, Sao Paulo, Brazil.

DR. WOLDRICH, Vienna, has been nominated Professor of Geology in the Bohemian University of Prague.

DR. T. PLESKE has been elected to the Directorship of the Zoological Museum of the St. Petersburg Academy of Sciences, in the place of the late Prof. A. Strauch.

DR. CARL BERG has been reappointed Professor of Zoology at the University of Buenos Ayres, a chair he occupied between 1875 and 1890, and which remained vacant after he went to Monte Video.

PROF. G. E. HALE is expected to be present at the meeting of the Royal Astronomical Society to-morrow, and to give an address on the subject of his solar researches.

IN NATURE of July 20 (vol. xlviii. p. 268) we published a communication from Prof. P. F. Frankland, calling attention to certain objections which had been raised by some members of the Society for Promoting Christian Knowledge against the publication of his little book, "Our Secret Friends and Foes," in the Romance of Science Series. The objections were stated formally by the Secretary of the Victoria-street Anti-Vivisection Society, and endorsed in most forcible terms by Lord Coleridge, as set forth in the correspondence published in our issue referred to. The protest calling upon the S.P.C.K. to withdraw the book from circulation, on the ground that it favoured "experiments upon living animals," was handed in last July with some fifty signatures attached, and in accordance with a rule of the Society was submitted to the Standing Committee, whose judgment in matters of this kind is considered final. This Committee has just passed the following resolution:—"The Standing Committee having taken into consideration the statement of objections, made under Rule xxxvi., against the book entitled "Our Secret Friends and Foes," by Prof. P. F. Frankland, and the remarks thereon submitted respectively by the author and the General Literature Committee, are unable to see sufficient reason for withdrawing the book from the Society's list." The decision arrived at will give general satisfaction to English men of science, and forms a fitting sequel to the correspondence forwarded to us by the author of the book.

AT last there is a possibility that a scientific method of identification will become part of our prison system. The Home Secretary has appointed a committee to consider the means at present available in this country for the identification of habitual criminals, and to report to him whether they could be improved by the adoption either of the Bertillon method of identification in use in France, or of Mr. Galton's finger-print method, or in any other way. The report will be awaited with interest.

THE Exhibition of the Photographic Society of Great Britain will close on Wednesday, November 15.

An International Congress of Applied Chemistry will be held at Brussels on August 4, 1894.

THE Russian Chemical Society will celebrate its twenty-fifth year of existence by a special meeting at St. Petersburg on November 18.

THE Newcastle-on-Tyne and Northern Counties Photographic Association propose to hold an international photographic exhibition next April.

AN "Exposition Universelle" will be opened at Lyon on April 26, 1894, and will remain open until the following November. Sections will be devoted to electricity, hygiene, and agriculture.

At the meeting of the Museums' Association, held in July last, under the presidency of Sir W. H. Flower, K.C.B., F.R.S., the following officers were elected by the Council:—Dr. V. Ball, C.B., F.R.S., to be president, Prof. D. J. Cunningham, F.R.S., and Mr. Walter Armstrong vice-presidents. The Association will meet in Dublin next year, about the end of June or the beginning of July.

THE new session of the Royal Geographical Society will commence on November 13, when the president, Mr. Clements R. Markham, C.B., F.R.S., will discourse on "Geographical Desiderata, or Exploring Work to be done and Geographical Problems to be solved." On November 27, Dr. John Murray will read a paper on "The Antarctic Region and the Scientific and Commercial Results of its Exploration."

THE seventy-fifth session of the Institution of Civil Engineers will be commenced on November 14, and the meetings before Christmas are likely to be occupied, in addition to an address from Mr. Giles, president, with the design and construction of impounding reservoirs for water-works at Tansa (Bombay), Baroda, and Jeypore, with machinery for the manufacture of casks, and with the development of hydraulic power-supply in London.

THE first meeting of the 140th session of the Society of Arts will be held on Wednesday, November 15, when the opening address will be delivered by Sir Richard E. Webster, M.P. A course of Cantor lectures will be given by Prof. Frank Clowes in January and February next, his subject being "The Detection and Measurement of Inflammable Gas and Vapour in the Air." Captain Abney will deliver three Cantor lectures on "Photometry" in April. The following are among the papers down for reading after Christmas:—"London Coal Gas and its Enrichment," by Prof. Vivian Lewes; "Experiments in Aeronautics," by Mr. Hiram S. Maxim; "Pewter," by Mr. J. Starkie Gardner; "Electric Signalling without Wires," by Mr. W. H. Preece, F.R.S. Two juvenile lectures on "Plants: their Foes and Defences," will be delivered by Mr. W. Gardiner, F.R.S., in January.

It is reported that Vesuvius is in a state of activity, and streams of lava are distinctly visible at night.

AN earthquake was distinctly felt in various parts of Wales and the West of England on Thursday, November 2, about 5.45 p.m. From reports of the occurrence we gather that at Milford Haven the tremor lasted about twelve seconds, and appeared to travel from north to south. In the St. Helens district of Swansea the shock lasted about five seconds. A distinct upheaval of the earth is reported from Carmarthen, where the shock is said to have lasted thirty seconds. Two successive shocks were felt at Cardigan, accompanied by a rumbling noise travelling from the sea in a south-easterly direction. In Pembroke there was a heavy rumbling sound, and the earth was felt to tremble for about seven seconds. The wave appeared to be travelling from south-east to north-west. Very faint shocks were felt at Cardiff and along the Rhondda Valley. In North Wales, however, the tremor was of a very pronounced character. Both shores of the Mersey seem to have been affected. From correspondents of the *Times* it appears that at Aigburth, just south of Liverpool, the vibration was felt at 5.44. At Woodside, on the Cheshire side of the Mersey, the time was

5h. 45m. 30s.; at Crosby, about five miles to the north of Liverpool, 5.47; at Shrewsbury 5.48, the duration in this case being estimated as three seconds. In Bristol it is reported that the tremor was distinctly felt along a course from north-west to south-east for forty seconds. Mr. H. Courtenay, writing to us from Waterford, says that the disturbance was experienced there at 5.25. Mr. Lloyd Bozward, of Worcester, describes the occurrence as follows:—"On Thursday last, at 5.45, a smart shock of earthquake was experienced. At this house the shock was vertical; no noise was heard, but in a second or two after the first shock a feeble one followed. Persons on the ground-floor observed nothing. The shock was felt at Boughton Park, southwards a mile hence, and there also the servants on the ground-floor felt nothing. These places are on the west side of the Severn. It is somewhat rare for the same shock to be felt on both sides of the Severn, but on this occasion it was somewhat severely felt at some large ironworks on the eastern side of the river. There the motion is described as a swaying one, and a rumbling like the passing of a heavy waggon was heard. At Boughton and the ironworks the time given is 5.48 p.m. I took the hour at the time of the shock from a clock, a good time-keeper, in the room with me. At Callow End, Dermstone, a farmstead ten miles north-east of Worcester, no shock was felt, but a loud noise was heard."

DR. N. M. GLATFELTER reprints from the fifth annual report of the Missouri Botanic Garden "A Study of the Venation of *Salix*." Photographic reproductions are given of the leaves of twenty-four American species of willow, and an attempt is made to classify them according to their venation.

THE Deby collection of diatoms now in possession of the British Museum, and open for reference by students in the Cryptogamic Herbarium, is the finest in existence, both as regards the number of species, the authority of the nomenclature, and the beauty of their preparation and preservation. Besides those collected by M. Deby himself, it includes a large number of type-slides prepared by other eminent diatomists. The collection of diatoms in the British Museum is now estimated to amount to about 50,000 slides.

DR. H. WILD, Director of the Central Physical Observatory at St. Petersburg, has published in German a summary of the decisions of the various international meteorological conferences, from that held at Leipzig in 1872 until that held in Munich in 1891. The arrangement is first under subjects, and secondly according to chronological order, and the work will be found very useful for reference by persons who may be seeking for information upon any particular subject, instead of having to consult some thirteen different volumes.

WE have received the report on the operations of the German Meteorological Office for the year 1892, which closes an important period in the history of that institution, owing to the completion of the organisation of the rainfall stations which began with the year 1885, and the establishment of a first-class meteorological and magnetical observatory at Potsdam. The rainfall stations now number nearly 1900, and the stations which send special reports of thunderstorms exceed 1400. The report contains not only a list of the official publications for the year, but also a list of the contributions of the officials to both German and foreign periodicals. We also note that, in order to keep up an interest in the work, the office issues no less than 200 copies of the popular meteorological journal *Das Wetter* to its observers.

THE report of the Director of the Royal Alfred Observatory, Mauritius, for the year 1891 has just reached this country. The maximum shade temperature during the year was 95°·4 on December 8, and the minimum 51°·0 on August 3. The highest temperature in the sun was 162°·7, and the lowest on

the grass 46°·0. The rainfall amounted to 44°·63 inches, being 3°·15 inches below the average, but at some other stations in the island the rainfall was much greater than at the Observatory. Dr. Meldrum collects observations from ships visiting the island, for the preparation of meteorological charts of the Indian Ocean; the number of days' observations tabulated during the year amounted to 9,600, taken between 23° N. and 46° S. latitude.

COLONEL A. T. FRASER has sent us an interesting note from Bellary with regard to two Hindoo dwarfs which he photographed in the Kurnool district of the Madras Presidency, not far south of the river Kistna. In speech and intelligence the dwarfs were indistinguishable from ordinary natives of India. From an interrogation of one of them, it appeared that he belonged to a family all the male members of which have been dwarfs for several generations. They marry ordinary native girls, and the female children grow up like those of other people. The males, however, though they develop at the normal rate until they reach the age of six, then cease to grow, and become dwarfs. These stunted specimens of humanity are almost helpless, and are quite unable to walk more than a few yards.

MR. MILLER CHRISTY outlines a scheme for mapping the geographical distribution of vertebrate animals in the *Zoologist* for November. He proposes to construct a map showing, by means of different colours, the following points for each species:—(1) Its present (indigenous) area of permanent residence throughout the world; (2) its summer and winter ranges throughout the world (if migratory); (3) its relative abundance in different parts of its area; (4) its lines of migration (if any); (5) the additional area (if any) over which any species, now partly or wholly extinct, can be traced within historic times; (6) the additional area (if any) over which it has been naturalised by human agency; and (7) other points of interest, such as isolated occurrences, erratic movements, areas of hybridization, &c. Though it may be some years before a scheme of this kind is well under weigh, authors of monographs of genera or families would do well to systematise their works, so that they could easily be used in the compilation of a topographical catalogue or bibliography.

THE extensive and increasing demand for india-rubber renders it possible that the supply will eventually become exhausted, so attempts at artificial cultivation of rubber trees are being made in various rubber-producing countries. Mr. Hart remarks, in the June *Bulletin* of the Royal Botanic Gardens, Trinidad, that rubber has been procured in the Gardens from *Castilloa elastica*, and that trees of a mature size will produce it in paying quantities. It has also been proved that *Heveas* of several species will thrive well in Trinidad. In this connection a paper by Dr. Ernst, on the caoutchouc of the Orinoco, published in the first number of the *Revista Nacional de Agricultura*, and included in the *Bulletin*, is of interest. Dr. Ernst says that the rubber of the Orinoco is extracted from the juice of the *Hevea brasiliensis*, Müll, a tree belonging to the family *Euphorbiaceae*, and not to that of the *Hevea Guayanensis*. The milky juice obtained from the trees, through incisions made in the bark, has the consistency of cream, and the rubber existing in it in minute globules constitutes from thirty to thirty-three per cent. of the weight. The rubber collectors of the Amazons employ the slow, primitive, and contaminating process of evaporating the juice in the dense smoke of a wood fire, in order to separate the rubber from it. A far better method of obtaining coagulation is to add a six per cent. solution of alum to the juice, and then submit the coagulated rubber to pressure in order to extract the water it contains. Dr. Ernst thinks that every effort should be made to extend and conserve the forests, thickets, or groves of rubber trees, suggesting, among other things, that

when the collectors work a grove they should be made to plant a certain number of trees. Only by such means, and by adopting a chemical mode of coagulation, can the rubber production of the Amazon territory be increased in quantity and improved in quality.

MR. VERNON BAILEY has prepared a report, for the U.S. Department of Agriculture, on the haunts and habits of the spermophiles, known in America as gophers or ground squirrels, inhabiting the Mississippi Valley region. Five distinct species of the genus *Spermophilus* inhabit this region, and four are restricted to it. On account of the immense damage done to crops by these mammals, several States have endeavoured to exterminate them, and they have formed the subject of investigation at a number of agricultural colleges and experimental stations. The increase of the pest is probably due to the thoughtless destruction of its natural enemies. We learn that no less than sixteen of the seventy-three species and sub-species of hawks and owls found in the United States are known to prey on the various members of the genus *Spermophilus*. Among mammals, the spermophile's enemies include the badger, fox, coyot, wild cat, and weasel, all of which are hunted and killed for sport or because of poultry-yard depredations. In several States immense amounts of money have been paid as bounties for the destruction of the pest, but the results are far from satisfactory; and it is evident that a bounty is only a temporary expedient for the extermination of these or any other animals. Mr. Bailey says that in many ways spermophiles render valuable service to the farmer, so he does not recommend a complete destruction of them. The evil which they do to crops, however, is very considerable over more than two-thirds of the United States; hence there is a general demand for some economical means of destroying them. The animals can, of course, be shot, and in this way limited areas may be freed from their ravages. Fumigation and trapping have also been employed with more or less success; but the most effective and quickest results have been obtained by placing in the burrows a bunch of rags or waste saturated with carbon bisulphide, and closing up the hole. The information on this point given by Mr. Bailey should be of use to agriculturists; indeed, the whole of the bulletin is of high importance.

AT the request of the Royal Academy of Science in Vienna, Prof. V. Hirbel undertook a geological tour this season in Thessaly. One or two short reports from him are published in the journal of the *Mathematisches naturwissenschaft. Classe* (No. 20, October 12). Respecting the geology of Northern Greece, he writes that calcareous formations of the Flysch have the most extensive outcrop on the three parallel chains of the Pindus range. Dykes of serpentine intrude through the Flysch, and occur as flows interbedded with the overlying Cretaceous limestones. The age of the much larger intrusive masses of serpentine in the sandstone zone of the upper Peneus has not yet been definitely ascertained.

IN the "Proceedings of the U.S. National Museum" (vol. xvi. pp. 471-478, pl. 56), Mr. William Healey Dall describes a "Sub-tropical Miocene Fauna in Arctic Siberia." This fauna consists of a few well-preserved specimens of molluscan genera, *Ostrea*, *Siphonaria*, *Cerithium*, &c., which were found in 1855 by a member of the "Ringgold and Rodgers Exploring Expedition in the North Pacific." The fossils occur in Miocene sandstones of the Sea of Okhotsk, which are exactly like those of the Alaskan coast, and they are of interest chiefly because they prove beyond doubt strong affinities of the Miocene mollusca of these northern seas with species now living in the warm seas of Japan and China. According to Mr. Dall, the annual mean temperature of the waters in the Okhotsk area has diminished by at least 30° to 40° F. since Miocene time.

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THE U.S. National Museum has also published a report by Mr. James I. Peck, on the pteropods and heteropods collected by the U.S. Fish Commission steamer, *Albatross*, during the voyage from Norfolk, Va., to San Francisco in 1877-8. The pteropod collections of this voyage are, for the most part, from the Caribbean and Panamaic provinces, and the material belongs almost exclusively to the family Cavoliniidae. From none of the deeper dredgings in the Pacific were pteropod deposit shells reported, though at times the surface collections in the same regions showed an abundance of the live animals. Mr. Peck agrees with Agassiz that bottom distribution is largely determined by the course of the ocean currents, so that by means of pelagic fauna and their bottom distribution, light may be thrown upon the course of the currents. To this cause Agassiz ascribed the presence of Arctic pteropods along the New England coast, from the course of the Labrador currents, and Mr. Peck believes that the differences between the bottom and surface collections of the *Albatross* on the voyage in the Gulf of Panama and at the Galapagos Islands may be similarly explained.

SOME years ago, a discovery of fossil plants was made for the first time in the Trinity Division of the Comanche series of Texas. These have now been worked out in detail by Mr. Wm. Morris Fontaine, who has published his results, together with a series of illustrative plates, in the "Proceedings of the U.S. National Museum" (vol. xvi. pp. 261-282, pl. 36-43). There are twenty-three species described; by far the greater number are conifers belonging to the genera *Abietites*, *Laricopsis*, *Pinus*, *Frenelopsis*, *Sequoia*, &c., a few Cycad genera, and a new species of *Equisetum* are also present; ferns are of exceedingly rare occurrence, and angiosperms entirely wanting. Seven of the species have been identified with forms from the Lower Potomac deposits (Lower Cretaceous) of Virginia, and several others show striking points of similarity with the same flora; four species agree with Wealden types. The whole character of the "Trinity" flora, more especially the absence, so far as known, of angiosperms, seems in favour of Jurassic as well as Cretaceous affinities. It certainly does not bear the distinct Cretaceous impress of the flora in the Potomac or Wealden formations. Mr. Fontaine refers the "Trinity" flora, therefore, to the base of the Cretaceous deposits in Texas, occupying a slightly lower horizon than the very similar flora in the Potomac deposits of Virginia.

THE recent geological history of the Arctic lands is discussed by Sir Henry Howorth in the *Geological Magazine*. The general conclusions to which he arrives are as follows:—(1) During the Pleistocene period the Arctic lands, instead of being overwhelmed by a glacial climate, were under comparatively mild conditions, and were the home of a widely-spread and homogeneous fauna and flora, constituting, perhaps, the best defined life-province in the world. (2) Since Pleistocene times the climate of these Arctic lands has been growing more and more severe, resulting in the extinction of a portion of their vegetable and animal inhabitants. (3) While one portion of this Pan-Arctic fauna and flora still remains largely homogeneous, another portion has become differentiated by evolution in Northern America and Northern Europasia, into the Nearctic and Palearctic regions respectively. (4) The true and the only glacial climate which we know to have prevailed in the Arctic lands was not during the so-called glacial age of geologists, that is during the Pleistocene period, but in that which is now current, and which is the product largely, if not entirely, of changes of level in the earth's crust which have occurred since Pleistocene times.

THE "Geology of Dublin and its Neighbourhood" has found a clear interpretation at the hand of Prof. Sollas, of Dublin University (*vide* Proceedings of the Geologists' Association, August,

pp. 91-121). Prof. Sollas discusses the origin of the ancient quartzites, grauwackes, and slates in that district, and gives drawings from microscopic sections to illustrate the evidence in favour of their originally sedimentary nature. Palæontological evidence is present in the form of numerous worm-tubes and the doubtful organic remains known as *Oldhamia radiata* and *antiqua*. The whole group is regarded as a deposit in the tranquil sea of a period, probably Cambrian or pre-Cambrian, which he rather happily characterises as the "Age of Worms." Just as in the Highlands of Scotland, this Irish area has been subjected to great earth-movements, not only once, but several times. First, in later Cambrian age, the sedimentary rocks were rolled up into a series of anticlinal and synclinal folds. Ordovician time saw the rocks once more below sea level, and a second elevatory movement set in with extreme slowness in Upper Ordovician time. The third period of movement is of post-Carboniferous date, and of simpler character than the two preceding, the flexures having in the main followed those of the Ordovician movements. In his concluding pages Prof. Sollas briefly refers to the absence of mesozoic and tertiary deposits, the general characters of the glacial period, and the distribution of the boulder-clay over the Dublin area. Sketch maps and diagrams illustrate the paper.

THE effect upon the optical properties of a plate of quartz of compressing it in a direction perpendicular to its axis has been investigated by M. F. Beaulard, who publishes his results in the *Journal de Physique*. A quartz plate was cut normally to the axis and compressed laterally, thus superimposing a double refraction, varying with the pressure, upon the rotatory power. Allowing a beam of plane-polarised light to fall normally on to the plate, he obtained inside the crystal two elliptic vibrations propagated with different velocities and exhibiting after emergence a certain difference of phase. These two vibrations interfered and gave an ellipse whose elements could be experimentally determined. The pressures were obtained by means of a Perreaux dynamometer, varying from 0 to 530 kgr. per square cm. The quartz was placed between two jaws which could be made to approach each other by turning a screw. One of the jaws was fixed firmly in a frame, the other moved on guides which communicated the pressure to an elliptical pair of springs, the amount being indicated on a dial through a rack and pinion arrangement. The dynamometer was mounted on two wooden platforms allowing of the orientation of the quartz plate normally to the incident ray. The rest of the apparatus consisted of a polariser, a quarter-wave mica plate, a pair of quartzes with two different rotations, an analyser, and a spectroscope with eye-piece slit. It was found that the rotatory power remains constant; that the difference of phase due to double refraction alone is proportional to the pressure, and that the angle between the major axis of the emergent ellipse and the original incident vibration increases at first with the pressure (for plates of given thickness), then oscillates, and at particular pressures the two directions are the same, so that at some points the major axis turns in a direction contrary to the natural rotation of the quartz plate.

AT a recent meeting of the Académie des Sciences (Paris), M. Poincaré communicated an account of the experiments on the velocity of propagation of an electric disturbance along a wire, which have been carried on by M. Blondlot at Nancy. The wires used were of "high conductivity" copper, 3 mm. in diameter, and were fixed to the telegraph posts between the Préfecture and the Maxeville Asylum, a distance of about one kilometre. The method employed was very like that used by Wheatstone in his attempt to measure the velocity of the passage of an electric discharge, only instead of a rotating mirror M. Blondlot uses a rotating photographic plate. Matters

are so arranged that two sparks pass between two knobs, one direct and the other after travelling round the 2 kilometre circuit. The mean of five experiments gives a velocity of 296 kilometres per second, the retardation being $\frac{1}{100}$ of a second. On a line 2 kilometres long, that is, one where the electricity has to travel over 4 kilometres, the velocity obtained was slightly greater, namely 298 kilometres per second.

IN a paper read before the American Institute of Electrical Engineers, Messrs. Bedell, Miller, and Wagner give an account of a new form of contact-maker which they have employed in their experiments on transformers. The contact-maker was required to connect for an instant a voltmeter with the circuit of the transformer at any required part of the cycle. The instrument consists of discs carried by a spindle which was connected to the shaft of the dynamo. A needle projects from the face of this disc and forms one of the electrodes for making contact, the other being formed by a fine water-jet issuing from a nozzle which is insulated from the rest of the instrument. The water-jet is supplied by a jar of water, several feet above, the connection being through a rubber tube. The nozzle of the water-jet is carried by a disc which is capable of being rotated, and has its edge graduated in degrees. The needle cuts the water-jet near the nozzle before the continuous column has had time to break up into drops. It was found necessary to put a little salt in the water, as pure water does not work, while acidulated water corroded the nozzle. This form of contact-maker the authors find far superior to any of the usual mechanical devices, the contact being perfectly constant and reliable.

IN the *Zeitschrift für physikalische Chemie*, vol. xii, No. 4, Herr Humburg gives an account of a significant piece of work which was undertaken for the purpose of obtaining additional evidence as to whether the magnetic rotatory polarisation of solutions gave any support to the hypothesis of electrolytic dissociation. Measurements were made on solutions of the lower fatty acids in water, benzene, and toluene. The molecular rotation of the dissolved substance was calculated on the supposition that the value found for the solution was the sum of those given by the amounts of solvent and dissolved substance which it contained. The numbers thus obtained were found to be practically independent of the concentration and of the chemical nature of the solvent, and were identical with the values given by the free acids. Not only was this the case with acids such as acetic, propionic, and butyric, which are held to be but feebly dissociated in aqueous solution, but also of the chlor-acetic acids, which are supposed to be much more strongly dissociated. Similar results were obtained from observations on solutions of various inorganic salts, such as potassium iodide, sodium bromide, ammonium nitrate, and barium bromide in water, and in methyl alcohol. Although the molecular conductivity of the aqueous solution of any of the salts was invariably much greater than that of the alcoholic solution, nevertheless the molecular rotation of the salt was the same in both cases. In conjunction with the work of Schönrock on this subject (see Notes, vol. xlviii, p. 230), the above results indicate that the effect of electrolytic dissociation on the magnetic rotatory polarisation of solutions (if such an effect really exists) is too small to be detected by ordinary methods of measurement.

ALTHOUGH such a large number of investigations have been made on the bacterial contents of waters derived from such different sources as lakes, rivers, springs, and wells, only a few observations have been made on the microbial condition of sea-water. Giaxa's are the earliest recorded examinations, and exhibit the poverty in this respect of sea-water. Thus, in the Bay of Naples, at about a mile and a half from the shore, only ten organisms were found in 1 c.c. Russell, also working in this bay at distances of 2½ to 9 miles from the coast, obtained

from 64 to 6 n r c.c. respectively. Very different is, however, the bacterial condition of sea-mud, as many as 245,000 microbes being found in 1 c.c. of slime at a depth of 164 feet, and 12,500 at 1,640 feet, whilst sea-water examined at such depths contained 121 and 22 respectively. Russell has been recently extending his observations (*Botanical Gazette*, vol. xvii. 1892) to the sea-water and mud on the Massachusetts coast. The number of bacteria, both in the water and slime, was very much less in these more northern and cooler waters than in the Mediterranean at Naples. The microbes present in the mud from Buzzard's Bay average from 10,000 to 30,000 per c.c., being but a very small fraction of the number found in Mediterranean mud at equal depths. Samples of mud were also obtained about 100 miles from the shore at a depth of 100 fathoms, on the edge of the great continental platform skirted by the Gulf Stream. These samples are the farthest from land that have ever been bacteriologically examined, and bacteria were found in large numbers; moreover, the two prevailing varieties present were identical with those obtained near the Massachusetts coast. As in his earlier researches, Russell also here found but few varieties of bacteria in the mud, mostly two or three, and curiously one form, *Cladothrix intricata*, isolated from Mediterranean mud and frequently met with, was only rarely found in this Atlantic slime.

ETHYL and methyl derivatives of hydroxylamine, in which the alkyl radicles replace an atom of the hydrogen in the amido group, and are therefore directly linked to nitrogen, have been isolated by Dr. Kjellin, of Heidelberg, and their mode of preparation and properties are described in the current number of the *Berichte*. They have been obtained by the decomposition with hydrochloric acid of the esters of meta-nitro-benzaldoxim, which oxim was merely selected on account of its ready preparation in a state of purity. The process consisted in boiling the ester with seven times its volume of concentrated hydrochloric acid in a flask to which a reflux condenser was attached, subsequently cooling, saturating the liquid with hydrochloric acid gas, and again boiling for a few minutes. A large quantity of meta-nitro-benzaldehyde is deposited and removed by filtration, after which the hydrochloride of the substituted hydroxylamine is obtained by evaporation, first over a water bath, and finally over sulphuric acid. In order to isolate the free bases from the hydrochlorides, the same method was adopted as proved so efficacious in the isolation of hydroxylamine itself, namely, decomposition with sodium alcoholate, and subsequent fractional distillation of the resulting liquid *in vacuo*. The hydrochloride was dissolved in the minimum quantity of methyl alcohol, and a little less than the calculated quantity of sodium methylate added, the large evolution of heat being controlled by extraneous cooling. The deposited sodium chloride was removed by filtration through asbestos; filter paper cannot be employed on account of the strongly corrosive properties of these methyl and ethyl derivatives of hydroxylamine. Upon distillation *in vacuo* in the case of the methyl compound, after the greater portion of the methyl alcohol has passed over and at a temperature of 35-40°, an alcoholic solution of the base distils, then finally the free base admixed with a small proportion of alcohol. Upon submitting this last fraction to redistillation, at a temperature of 62° and a pressure of 15 m.m., the pure β -methyl hydroxylamine, $\text{CH}_3\text{NH.OH}$, distils as a colourless liquid, which solidifies to a solid composed of colourless and odourless prisms upon cooling with ice or agitation of the receiver. The crystals melt sharply at 42°, but do not resolidify until the much lower temperature of 20° is reached. Upon distillation *in vacuo* in the case of the ethyl compound, after the methyl alcohol has largely passed over an alcoholic solution of the base distils for a short time, then lastly the ethyl compound itself commences to sublime and condenses in the

receiver in the form of large leafy crystals, filling the whole receiver. After pressing the crystals on porous plates to remove any superficial oil, pure β -ethyl hydroxylamine $\text{C}_2\text{H}_5\text{NH.OH}$ is obtained; the crystals are quite colourless and odourless, and exhibit a mother-of-pearl lustre. They melt sharply at 59-60° without decomposition.

THE β -methyl and β -ethyl derivatives of hydroxylamine are substances which are readily soluble in water and lower alcohols, but only very slightly in ether and benzene. The crystals of both deliquesce in moist air. In the case of the methyl compound the deliquesced substance rapidly volatilises; but in the case of the ethyl compound the deliquescence can only be observed in badly-stoppered bottles, for in the open air the spontaneous volatilisation is so rapid that the substance has not time to deliquesce before it entirely disappears. Both compounds react strongly basic, and reduce alkaline copper and silver solutions as energetically as hydroxylamine itself in the cold. They strongly attack organic substances, but do not etch glass, nor do they appear to be explosive substances like free hydroxylamine. Both compounds are rapidly destroyed by halogens with production of halogen acids; concentrated hydriodic acid converts them to amines. When heated for some time in a sealed tube with concentrated hydrochloric acid, the methyl compound suffers an interesting change, being converted into ammonia and formaldehyde— $\text{CH}_3\text{NH.OH} = \text{NH}_3 + \text{HCOH}$.

NOTES from the Marine Biological Station, Plymouth.—Last week's captures include another living specimen of *Lima Loscombi*, the Holothurian *Thyone fusus*, and the rare Nemerites *Carinella polymorpha* (second specimen), *Cerebratulus marginatus* (first record), and a large *Lineus bilineatus* (16 cm. long). The tow-nettings have been of a uniform character. The diatom *Coscinodiscus* has been present in remarkable profusion for several weeks past. Medusæ have been scarce. The most plentiful larvæ are those of Polychætes, of Cirrhipedes, the *Mysis* stages of several Decapods, and *Scyphonautes*. Veligers are present in small numbers; and isolated specimens of the larvæ of *Cephalothrix*, *Porcellana* and *Carcinus (Megalops)* have also been observed. Very few individuals of *Crangon vulgaris* are now to be found bearing ova.

THE additions to the Zoological Society's Gardens during the past week include a Black-handed Spider Monkey (*Ateles geoffroyi*) from Nicaragua, presented by Mr. T. E. M. Rymer-Jones; a Rhesus Monkey (*Macacus rhesus*, ♀) from India, presented by Miss G. A. Gollock; two Macaque Monkeys (*Macacus cynomolgus*, ♂ ♂) from India, presented respectively by Mr. W. Wyld and the Hon. Mrs. E. Yorke; a Philippine Deer (*Cervus philippinus*, ♀) from Manila, presented by Capt. T. E. Saunders; seven Common Quails (*Coturnix communis*), two Common Terns (*Sterna hirundo*), two Common Toads (*Bufo vulgaris*), European, two Bull Frogs (*Rana catesbeiana*) from North America, a Grey-headed Porphyrio (*Porphyrio poliocephala*) from India, presented by Mrs. Rickards; a Smooth Snake (*Coronella levis*) British, presented by Mr. A. Green; a Bay Wood Owl (*Phodilus bodius*) from Java, deposited; two Rose-Hill Parrakeets (*Platycercus eximius*) from Tasmania, a Purple Sandpiper (*Tringa striata*) British, purchased.

OUR ASTRONOMICAL COLUMN.

A NEW SOUTHERN STAR.—Prof. Krueger has received a telegram from Prof. E. C. Pickering to the effect that a new star was discovered by Mrs. Fleming on October 26. Its Right Ascension is given as 23° 34', and its North Polar Distance = 140° 14'. The magnitude on July 10 = 7.0. No further details have been received, but from the date for which the magnitude is given it is probable that the star was detected by