

geological chronology its value is at present only potential. The radium method of evaluating geological time seems to offer more immediate promise.

In conclusion, it is pleasant to note how these applications of chemistry, astronomy, and meteorology, not merely to general principles of geology but to a definite geological problem, emphasise the fundamental unity of the sciences, and illustrate the powerful aid that may be rendered by one to another.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

DR. H. ROY DEAN, professor of pathology in the University of Sheffield since 1912, has been appointed to the chair of pathology and pathological anatomy in the University of Manchester.

DR. ADA E. MILLER has been appointed lecturer on school hygiene by the Edinburgh Provincial Committee for the Training of Teachers, in succession to Dr. I. Douglas Cameron, who has resigned.

It is stated in *Science* that the committee on education of the United States House of Representatives has reported favourably a Bill establishing a National University in Washington. According to the Bill an initial grant of 100,000*l.* would be made. The university would be devoted to research and graduate work and no degrees would be conferred.

A REUTER message from Delhi reports that on March 22 Sir Harcourt Butler introduced in the Imperial Legislative Council a Bill for constituting a teaching and residential university at Benares, with special facilities for instruction in the Hindu religion. He referred to the scheme as the commencement of a new era in university organisation in India.

DR. ALEX. HILL, principal of the Hartley University College, Southampton, is reported by the *Times* to have said in an address on Monday that he had recently been preparing a war-roll of the Empire universities, and had found that the average contribution in men from universities and university colleges was just above 50 per cent. He added:—"It is a surprising fact that the contribution of German universities to the forces of the German Empire in the field is less than 20 per cent." This statement as to German university students is not, however, correct, judging from the statistics we gave last week (p. 81). Seventy-five per cent. of the students of German universities are in the field, and about 80 per cent. of the students of the Technical High Schools are also on active service.

SIR PHILIP MAGNUS retires, we understand, to-day from his official connection with the City and Guilds of London Institute. It is now no fewer than thirty-five years ago since he was appointed organising director and secretary of the institute, a post which he held for eight years, during which he was responsible for the initiation of the institute's work and for the schemes of the Finsbury College and Central Technical College, which have since developed so successfully. In 1888 his activities were transferred to the examinations department, or, as it is now known, the department of technology of the institute, where they found a wider field in assisting and guiding the development of technical instruction all over the country. The ability of his organising powers is sufficiently evidenced by the manner in which the department, without any assistance from Government and without

the power of the purse possessed by a department of State, has made the name of the City and Guilds of London Institute known to technical schools all over the British Isles, and, indeed, in the Dominions beyond the Seas. To the work of Sir Philip Magnus in the office which he is vacating, his careful insistence on the necessity of making technical instruction a true education in principles, his continual study of the best means of adapting courses to the needs of students and manufacturers alike, and his unceasing endeavours to raise the standard of teaching, the progress of technical education in this country is greatly indebted.

THE first annual report, for the period ended December 31, 1914, submitted by the executive committee to the trustees of the Carnegie United Kingdom Trust has now been published. Mr. Carnegie during many years prior to 1912 gave large sums to local authorities in this country for the erection of public libraries, and to churches for the acquisition of organs. As the applications for these grants increased and their administration became more difficult, Mr. Carnegie decided to place the future administration of grants under the control of a permanent body of trustees. In 1913 he placed 2,000,000*l.* in trust so that the income of about 100,000*l.* a year should be available "for the improvement of the well-being of the masses of the people of Great Britain and Ireland." The report is full of interesting particulars, but attention can be directed only to a few typical facts. Organ grants are to be discontinued for the present. Mr. Carnegie has already expended 550,000*l.* in this direction in the acquisition of some 3500 instruments. A total expenditure of nearly 2,000,000*l.* has been incurred already on the erection of public libraries in the United Kingdom. The executive committee has, we notice, intimated to the authorities of the Household and Social Science Department of King's College for Women, London, that it is prepared to meet half the cost of the erection of a library building, on certain conditions. The committee has also made an offer in the direction of endowment to the Central Bureau for the Employment of Women. The report throughout gives the impression of wise and sympathetic administration of a princely endowment.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, March 18.—Sir William Crookes, president, in the chair.—Prof. W. H. Bragg: Bakerian Lecture: X-rays and crystalline structure. The atoms of crystal may be conceived—in various ways—as arranged in a series of parallel planes, each capable of reflecting a small fraction of an incident pencil of X-rays. If the spacing of the planes is d , the wavelength λ , and the angle between the rays and the planes is θ , and if the relation $n\lambda = 2d \sin \theta$ is satisfied, where n is any integer, then the various reflected pencils are in the same phase and combine to give an obvious reflection of the X-rays. If this relation is not satisfied there is no reflection. The X-ray spectrometer is designed to measure the various values of θ at which reflection occurs in a given case. The angle can easily be determined to a minute of arc. Given d we can compare the wave-lengths of different X-rays. Given λ we can compare the spacings of various sets of planes of the same or of different crystals. By certain considerations the experiments can be made absolute and not merely comparative. In this way the structures of several simple crystals have already been found, such as rock-salt, diamond, iron pyrites, and so on. The reflections for various values of n , the

integer in the formula, or, as they may be called, the spectra of various orders, differ amongst themselves in a surprising way. The intensities in the case of the most important planes in Iceland spar have recently been determined and give very interesting results. In the case of two pairs of planes the spacing is the same but the arrangement of atoms is different. This gives an opportunity of comparing the effect of arrangement apart from spacing, and it appears that the *intensity* of the reflection in any order is proportional to the weight of the planes which contribute to that order. Again, there are three calcite planes for which the arrangement of the atoms is exactly the same, but they differ in their spacings. The relative intensities follow a rule which has already been stated, viz., that the intensity in a reflection at an angle θ is inversely proportional to $\sin^2\theta$, other things being the same. Rules of this kind are needed if the method is to be used in the examination of more complicated crystals. The physical meanings that may be attached to these rules are of considerable interest.

Physical Society, February 26.—Dr. A. Russell, vice-president, in the chair.—Dr. C. Chree: Magnetic "character" figures, Antarctic and international. The paper makes use of magnetic "character" figures "0" (quiet day), "1" (moderately disturbed day), "2" (highly disturbed day) to investigate whether the incidence of disturbance at the base station of the Scott Antarctic Expedition, 1911-12, did or did not accord with the incidence of disturbance in temperate latitudes; also whether the "27-day period" could be recognised in the Antarctic data. The incidence of disturbance in the Antarctic was found to agree closely with that shown by the international lists, in spite of the fact that the disturbances in the Antarctic were much larger and more persistent than at any of the stations co-operating in the international scheme. The "27-day period" was clearly visible in the Antarctic records both in summer and winter, being as well developed there as elsewhere.—Dr. P. E. Shaw: The electrification of surfaces as affected by heat. The paper deals with anomalous electrical behaviour of various substances when subjected to heat. For example, a glass rod rubbed with silk is normally left positively electrified, but if the rod be passed through a bunsen flame, or heated in an electric furnace, and then allowed to cool it will be found on again rubbing with the silk that the glass becomes negatively electrified. Similar results were obtained with a number of materials, and various experiments are described which aim at determining the cause of the phenomenon. These seem to show that it is not due to the formation or removal of layers of any substance, solid or gaseous, but is probably due to surface strains in the material.—Prof. J. W. Nicholson: Electromagnetic inertia and atomic weight. The paper contains a mathematical deduction of a simple formula for the combined mass of two electrical charges when in proximity to each other. This mass is not the sum of their individual masses when far apart, if it be supposed that all mass of positive electricity, like that of electrons, is of electromagnetic origin. Applications are made of the formula to questions of atomic constitution and of radio-activity. A discussion is given of the evidence leading to the conclusion that the nuclei or cores of positive electricity in atoms are complex structures of electrons and even smaller positive nuclei. On this basis, emission of an α particle by an atom does not decrease its atomic mass by 4, a correction being necessary for the "mutual mass" of the α particle and the rest

of the core. Estimates of the magnitude of this correction, in the case of radium and thorium passing into lead by the emission of particles, are given. From the value given by Soddy for the atomic weight of thorite lead we can deduce the average distance apart of the components in a radium nucleus. It is of the same order as the radius of an electron. Suggestions of further interesting applications of the precise formula for mutual mass are also contained in the paper

March 12.—Dr. A. Russell, vice-president, in the chair.—C. C. Paterson and B. P. Dudding: The estimation of high temperatures by the method of colour identity. Preliminary experiments are described in which the temperature of incandescent substances is estimated with a very fair accuracy by matching their colour with that of incandescent filament lamps working at appropriate efficiencies. These have previously been calibrated by comparison with a "black body" over a large temperature range. The comparisons are made in the field of a Lummer Brodhun photometer, and the method is shown to give the correct result for the melting point of platinum.—C. C. Paterson and B. P. Dudding: The unit of candle-power in white light. The paper describes the methods adopted at the National Physical Laboratory for minimising the difficulty of photometric comparison of white lights of different hue. A series of six sets of electric standards are described varying in the tint of the light radiated from that of the pentane lamp to that of a tungsten vacuum lamp operating at 1.5 watts per candle. The absolute value of the unit of candle-power has been re-determined, as have also the corrections for humidity and barometric changes, while the probable existence of a temperature correction is discussed.—G. L. Addenbrooke: The relative losses in dielectrics in equivalent electric fields, steady and alternating (R.M.S.). After references to former work, especially on surface leakage, tables are given showing an intimate connection between the losses in steady and alternating fields, and that one can be predicted from the other to a first approximation. Exceptions are mentioned, and it is shown that there is heterogeneity in these cases. Curves of the losses from 1 to 4 seconds to 40 ~ are given for specimen dielectrics. Above 8 to 12 ~ both for "good" and "poor" dielectrics, these become rising straight lines. The salient features lie below about 16 ~. The formula $a+bn$ applies to all dielectrics for frequencies above about 8 ~, but not below. The a constant is always larger than, and bears only a very indefinite relation to, the steady voltage loss. Liquid dielectrics behave similarly to solid with certain differences, particularly that for a given resistance the ratio of the steady to the alternating loss is less than with solids. There is a great difference in the comparative ranges of the losses. For the dielectrics tabulated these vary in a steady field from 1 to 1,300,000, but the corresponding alternating losses vary only from 1 to 1,100.

Linnean Society, March 4.—Prof. E. B. Poulton, president, in the chair.—A. W. Hill: The germination of the cucurbitaceous genus *Marah*. The genus *Marah* includes some eleven species practically confined to the Pacific watershed of the western States of North America and the islands of Lower California. The genus is distinguished from *Echinocystis* and other genera with similar floral characters by its enormous tuberous root, associated with which is the peculiar mode of germination of the seeds. The petioles are fused to form a tube, and on germination this tube grows out, carrying plumule and radicle some distance into the ground, the cotyledons remain-

ing hypogean. The plumule finally bursts through the petiolar tube, and grows up into the air with sharply bent over tip. The petiolar tube is covered with hairs which appear to function as root-hairs.—Dr. Marie C. **Stopes**: New types of stem-anatomy in Cycadeoidea, with a well-petrified new species. A short account was given of two species of Cycadeoidea in which the internal anatomy is partially preserved, and also of a well-petrified new species showing very curiously alternating series of wood zones.—W. E. **Collinge**: A new genus and species of terrestrial Isopoda from British Guiana.—Dr. **Stapf**: Inflorescences of the Carob tree (*Ceratonia siliqua*) representing the several sexual conditions in which the tree occurs. Reference was made to Cavanilles's observations in the Carob groves of Valencia and the work done by Heckel and Schlagdenhauffen on the French Riviera, and by Gennadius in Cyprus. According to these authors most of the apparently female trees, that is, trees with very small subsessile anthers, are in reality hermaphrodite (brachystemonous hermaphrodites in contradistinction from the rare dolichystemonous hermaphrodites). But Dr. Stapf pointed out that no anthers containing pollen could be found in the "brachystemonous" specimens in the Kew Herbarium, in spirit material recently received from the Italian Riviera, and in preparations of such flowers obtained from Cyprus. In spite of Heckel's, Schlagdenhauffen's, and Gennadius's excellent work, there is still some mystery surrounding the pollination of the Carob tree which is certainly worth studying on the spot.

Zoological Society, March 9.—Mr. R. H. Burne, vice-president, in the chair.—R. I. **Pocock**: The feet, perfume-glands, and other external characters of the Viverrinæ. The term Viverrinæ was used by the author in a restricted sense for the typical Civets and Genets referred hitherto to the three genera, Viverra, Viverricula, and Genetta. He pointed out, however, that a new generic term must be introduced for the African Civet (*V. civetta*), which differs from the Oriental species (*V. zibetha*), the type of the genus Viverra, in the presence of a small metatarsal pad, the absence of skin-lobes protecting the claws on the fore-feet, the nakedness of the area of the feet round the plantar pad, the structure of the perfume-gland, etc.—Mary L. **Hett**: New Pentastomids from the lungs of snakes. The snakes from which the material was obtained had died in the society's gardens. There is great difficulty in establishing diagnostic characters for the separation of species in the Pentastomids. Size and number of annulations have generally been used as standards of comparison and they hold good in a certain number of cases; but in many forms both these characters are so variable as to afford no sound basis for classification. This is illustrated by *Porocephalus bifurcatus* and three allied forms which are here described as varieties. They were all obtained from the lungs of snakes from different regions. An average specimen of each form differs from the other varieties in length and number of rings, but intermediate forms occur which almost bridge the gap between them in both particulars. Hence it is difficult to regard them as separate species. If, however, the differences should prove to be of specific value, the four species, together with one other, should certainly be united in a new genus, as they differ from all other Pentastomids and resemble one another in several important particulars.—Reports on the collections made by the British Ornithologists' Union Expedition and the Wolleston Expedition in Dutch New Guinea:—G. J. **Arrow**, G. A. K. **Marshall**, and C. J. **Gahan**: Coleoptera.—

F. W. **Edwards** and E. E. **Austen**: Diptera.—H. **Campion**: Odonata.—Dr. L. **Cognetti de Martis**: Vermes.—G. **Arnold** and Dr. C. L. **Boulenger**: The fresh-water Medusa recently discovered in the Limpopo River system. This jelly-fish is referred to the same species (*Limnocoñida rhodesiae*, Boulenger) as the form described from a tributary of the Zambesi River in 1912. Species of *Limnocoñida* are now known to occur in the five principal river systems of Africa as well as in the Bombay Presidency of India. The paper contains descriptions of the structure and habits of the jelly-fish, and attention is directed to the occurrence of parasitic Infusorians of the genus *Trichodina* on both the African species, *L. tanganicae* and *L. rhodesiae*.—F. F. **Laidlaw**: Bornean dragonflies collected on Mount Kina Balu. Two new genera and seven new species were described.

Geological Society, March 10.—Dr. A. Smith Woodward, president, in the chair.—C. **Reid**: The plants of the late Glacial deposits of the Lea Valley. Large collections of plants from the Lea Valley deposits, already described, have been made by Mr. S. H. Warren, Mr. E. T. Newton, and Mr. Wrigley. The localities from which the plants were obtained are Angel Road, Hedge Lane, Ponders End, and Temple Mills. A list from Ponders End has already been given by Dr. Lewis, but the new collections include many unrecorded species, several of which have not previously been noted as British fossils. Although there are slight differences, the collections from all four localities are so similar as to leave no doubt that the deposits are contemporaneous. The whole assemblage points to a very cold climate, though perhaps not quite so cold as that indicated by the Arctic plants found at Hoxne, in Suffolk. Among the more interesting novelties may be mentioned *Armeria arctica*, a species of thrift now confined to Arctic America, although it has also been recorded as a Pleistocene fossil from the continent of Europe by Dr. C. A. Weber.—S. **Smith**: The genus *Lonsdaleia* and *Dibunophyllum rugosum* (McCoy). The present paper discusses the literature, structural characters and development, descent, classification, and distribution of the corals constituting the genus *Lonsdaleia*; it includes also a description of *Dibunophyllum rugosum* (McCoy).

Royal Meteorological Society, March 17.—Dr. W. G. **Duffield**: The meteorology of the sun. An account was given of methods and results of spectroscopic and other observations of solar phenomena. Abbot's work on the variability of solar radiation opens up the prospect of further discoveries in connection with solar and terrestrial phenomena, the most important practical problem in the region of physics or meteorology. It is the hope of astronomers that the earth will be completely girdled by observatories which will take part in the international scheme of co-operation in solar research. The promise of such observatories in Australia and New Zealand is welcomed by all interested in the development of solar and terrestrial meteorology.

BOOKS RECEIVED.

Elementary Human Biology. By J. E. Peabody and A. E. Hunt. Pp. xii + 194. (London: Macmillan and Co., Ltd.) 4s.

The Chemistry of Paints and Painting. By Sir A. H. Church. Fourth edition. Pp. xx + 388. (London: Seeley, Service, and Co., Ltd.) 7s. 6d. net.

Elementary Electricity and Magnetism. By W. S.