

vard (5,627), Cornell (5,612), New York University (5,508), and Illinois (5,259). The largest number of officers is found at Columbia, where the staff of teaching and administrative officers consists of 907 members, as against 737 at Illinois, 731 at Harvard, 725 at Cornell, and 633 at Wisconsin.

## SOCIETIES AND ACADEMIES.

### LONDON.

**Royal Society**, February 12.—Sir William Crookes, O.M., president, in the chair.—S. G. **Brown**: Chemical action that is stimulated by alternating currents. This paper describes experiments on the effects produced by passing a rapid alternating current through simple voltaic cells, the general effect being to stimulate chemical action and to cause the cells to give a greater supply of continuous current which otherwise would not be produced.—R. D. **Oldham**: The effect of the Gangetic alluvium on the plumb-line in northern India. The depression occupied by the Gangetic alluvium along the southern face of the Himalayas, as determined by geological observation, has a nearly vertical face on the north, and a floor sloping upwards in a southerly direction to the surface. The effect of the defect of mass in the Gangetic depression is calculated and shown to be capable of producing about 30" of northerly deflection of the plumb-line at the margin of the range, a deflection which drops rapidly on either side of the margin, but more rapidly to the south than the north. At twenty to thirty miles south, the distance depending on the width of the trough, it becomes zero, and at greater distances is replaced by a southerly deflection.—G. W. **Walker**: Note on the origin of black-body radiation.—Prof. H. M. **Macdonald**: The transmission of electric waves along the earth's surface. A series is obtained which represents the magnetic force at any point on the surface when the oscillator is also on the surface; the series converges rapidly for large values of  $\theta$ , and for not very large values the first term is a sufficient approximation. For small values of  $\theta$  the series converges very slowly.—Dr. G. T. **Beilby**: Transparency or translucence of the surface film produced in polishing metals (see page 691).—Dr. S. W. J. **Smith** and J. **Guild**: A thermomagnetic study of the eutectoid transition point of carbon steels. The magnetic properties of steel at temperatures near the eutectoid transition point ( $A_1$ ) seemed to deserve further examination. Simultaneous observations of intensity of magnetisation and of temperature were made over various ranges of heating and of cooling in different magnetic fields. Nine steels containing percentages of carbon ranging between 0.1 and 1.5 were used. Each steel contained about 0.2 per cent., or less, of silicon and manganese. It was found that the temperature corresponding with the beginning of the transformation of the eutectoid during heating ( $A_{c1}$ ) could be fixed within  $\pm 1^\circ$  C. under suitable conditions. This temperature was  $735^\circ$  C., and was the same for all the steels.—W. R. **Bousfield**: Note on osmotic pressure. It is shown that the assumption that the molecular interspaces of a solution are filled with vapour, which there behaves as a perfect gas, leads to the same general relation between vapour pressure and osmotic pressure as is given by thermodynamical considerations. The anomalous fact that the osmotic pressure of a decinormal sucrose solution is found to be greater at  $0^\circ$  C. than at  $5^\circ$  C. is explained by reference to the constitution of water and the effect of compression upon the ice molecules.

**Physical Society**, January 23.—Prof. C. H. Lees, vice-president, in the chair.—P. R. **Coursey**: Some characteristic curves and sensitiveness tests of crystal and

other detectors. Experiments were described recently conducted on types of wireless detectors, and undertaken with a view of finding out whether any relation could be traced between the sensitiveness and characteristic curves of a detector. Sample curves for some common detectors are included, and show that in some cases a fairly good agreement exists between the sensitiveness curve of a detector and the second differential of its characteristic, this being most notable in stable crystal detectors, but it is evident that the flexure of the characteristic curve cannot be the only cause of the response of a detector to wireless signals, but that at least a second action must also be present, as it was observed, notably in the electrolytic detector, that the maximum ordinates on the second differential were at places where the measured sensitiveness was either zero or extremely small, showing that there are probably two actions opposing one another at this point. This action when present in other detectors is perhaps electrolytic in nature, or the received oscillations when superimposed on the direct-current boosting voltage partake of the properties of some "trigger" action. This view is supported by experiments with detectors of the tellurium-aluminium type.—W. **Duddell**: A water model of the musical electric arc.—C. R. **Darling**: Further experiments with liquid drops and globules.—James **Walker**: A note on aberration in a dispersive medium, and Airy's experiment. Lord Rayleigh's view that in the case of aberration we are concerned with the group-velocity instead of with the wave-velocity, makes it necessary to consider the experiment of Airy, in which he measured the angle of aberration with a telescope filled with water. A modification of Lord Rayleigh's explanation leads to the result that the angle of aberration thus determined corresponds to an angle  $\mu^{-1}v/U$  measured in air. The same result is obtained from an analytical investigation, and a numerical calculation shows that the increase in the angle is about 1 per cent.—an amount that is probably too small to be detected.

**Mineralogical Society**, January 27.—Dr. A. E. H. Tutton, president, in the chair.—T. **Crook**: The genetic classification of rocks and ore deposits. The general principles of the classification of rocks were considered, the term rock including all mineral deposits. The exact nature of genetic grouping was defined. Both rocks and ore deposits fall into broad natural divisions in accordance with a geological grouping of formative agents and processes, the type being determined by the last operative agent or process that gave the rock its individuality. The two main groups are (1) endogenetic deposits, arising from internal causes, and (2) exogenetic deposits, of superficial origin, and these are subdivided in a consistent genetic manner. "Sedimentary" and "metamorphic" products cannot be regarded as constituting two independent subdivisions. A historical review of the application of genetic-geological principles to the classification of rocks and ore deposits was included.—Prof. A. F. **Rogers**: Lawsonite from the central coast ranges of California. Crystals from new localities were described; prismatic and tabular in habit and usually small, they displayed the forms 010, 001, 011, 110.—A. F. **Hallimond**: Uniaxial augite from Mull. The small, lath-shaped crystals, which seldom exceed  $\frac{1}{2}$  mm. in diameter, have refractive indices  $o$  1.714,  $e$  1.744, specific gravity, 3.44, pronounced dichroism ( $o$  smoky-brown,  $e$  pale yellow), two cleavage directions nearly at right angles, and an extinction angle of  $30\frac{1}{2}^\circ$  on the cleavage. A chemical analysis revealed distinct differences from ordinary diopside, and the composition approximates to that of hypersthene.—H. H. **Thomas** and W. **Campbell Smith**: Apparatus for grinding crystal plates and

prisms. A gun-metal cylinder with its axis normal to a triangular brass-plate, about 5 cm. in diameter, resting on three screws, one of which has a graduated head, is movable vertically along, and rotatable about its axis, and by rotation of the graduated screw the axis of the cylinder is inclined at a known angle to the grinding lap. A crystal suitably mounted is brought by means of these two rotations into any desired position, a series of chucks of different inclinations being provided for holding it. The zero position is determined optically. A graphical method of determining the requisite rotations was described.

**Zoological Society**, February 3.—Sir John Rose Bradford, vice-president, in the chair.—G. A. Boulenger: Collections of Batrachians and reptiles made by the British Ornithologists' Union and the Wollaston Expeditions in Dutch New Guinea. Four species of Batrachians and eight species of reptiles were described as new.—Dr. F. E. Beddard: Further observations upon the Cestode genus *Urocystidium*, Beddard.

**Mathematical Society**, February 12.—Prof. H. F. Baker, vice-president, in the chair.—G. T. Bennett: Exhibition and explanation of some models illustrating kinematics.—Prof. H. M. Macdonald: Formulæ for the spherical harmonic  $P_n^{-m}(\mu)$ , when  $1-\mu$  is a small quantity.—Prof. E. W. Hobson: The representation of the symmetrical nucleus of a linear integral equation.—Dr. W. F. Sheppard: Fitting of polynomials by the method of least squares (second paper).—H. Bateman: The differential geometry of point-transformations between two planes.—Major McKendrick: Studies in the theory of continuous probabilities.

#### MANCHESTER.

**Literary and Philosophical Society**, January 27.—Mr. F. Nicholson, president, in the chair.—T. A. Coward: The willow titmouse in Lancashire and Cheshire. The author, after defending the subdivision of geographical races of birds into subspecies with distinctive trinomials, described how the Holarctic black-capped titmouse fell naturally into two main groups, having as their types *Parus palustris* and *P. atricapillus*, L. The marsh-tit, the British representative of the first group, has long been recognised and accepted, but only within recent years has it been discovered that a British willow titmouse is referable to the *atricapillus* group. The willow-tit occurs along with the marsh-tit in many English counties, and it apparently replaces the latter bird in Scotland. It is found in both Lancashire and Cheshire, and in 1913, at any rate, nested in Cheshire. Most writers on British birds have described the typical marsh-tit, apparently in ignorance of the occurrence of both forms. Macgillivray, whose specimens were obtained in Scotland, accurately describes the willow titmouse. Both birds, however, are figured and described in the "British Bird Book," edited by F. B. Kirkman.—Dr. A. D. Imms: Observations on *Phromnia marginella* in India. He discussed the recorded instances of insects of the Fulgorid genus *Phromnia*, or *Flata*, bearing a close resemblance to certain flowers. One species, observed by J. W. Gregory, exists in two forms, one green and one reddish, and he (Gregory) describes the insects so grouped on a stem that the green individuals occupy the upper portion with the red individuals immediately beneath them, thus closely resembling a flowering spike with the green unopened buds above. On the occasions on which the author observed *P. marginella*, in the Himalayan foothills of Kumaon, the two types—one green, the other pinkish-buff—were closely intermixed. Poulton suggests that the first specimens of a group to emerge are red, and those that issue later green. Gregory may have come across undisturbed groups which, therefore, had the green specimens

above and the red ones below. The groups noted by other observers may have reassembled, and thus lost the possible arrangement possessed on emergence from the pupæ. Long waxy filaments, closely related chemically to Chinese white wax, issue from the hinder extremity of the larva of *P. marginella*.

#### DUBLIN.

**Royal Dublin Society**, January 27.—Prof. J. Joly, in the chair.—Prof. W. Brown and J. Smith: Subsidence of torsional oscillations in nickel wires when subjected to the influence of alternating magnetic fields. The experiments showed that a remarkable decrease takes place in the internal friction of the wire when under the influence of alternating magnetic fields, the influence being more marked the higher the frequency of the alternations. There was shown also a very marked difference in the behaviour of the nickel wires in the hard and soft states, the hard wire after being subjected to an alternating magnetic field of high frequency, say 100 to 140 a second, became temporarily non-magnetic, which the authors call magnetic fatigue. That this fatigue is temporary is shown by the fact that it can be cured in several ways.—Prof. T. Johnson: The fouling of a water supply by Oscillatoria and its purification. In the spring of 1913, when the London water supply was contaminated by the two diatoms *Asterionella* and *Tabellaria*, an important water supply in Ireland also suffered from the presence of a Myxophyceean, *Oscillatoria tenuis*, Ag., var. *natans*, which gave the storage water (360 million gallons) a fishy, mouldy smell. The water was cleared of the weed without injury to fish or man by treating it with copper sulphate (1 to 10 lb. in 1,000,000 gallons of water), as recommended by Moore and Kellerman, of the U.S. Department of Agriculture. Mud dredged from the shallow bottom of the upper end of the storage mountain lake gave the "water-bloom" of writers on examination in the laboratory.—Prof. H. H. Dixon: Note on changes in the sap caused by the heating of a branch. The changes which might be anticipated in the sap of the conducting tracts of a branch by the rendering permeable of the plasmatic membranes of the adjoining cells and the consequent discharge of their contents may be experimentally demonstrated by cryoscopic and conductivity measurements, and by various chemical tests. It is found that sap centrifuged from a heated branch is from four to six times more concentrated than that similarly extracted from a living one. This change in concentration of substances not rapidly absorbed would act as a physical poison on the cells of the leaves supported by the branch, and would alone explain the changes observed in these leaves. It was also found, in four cases out of five, that the sap of a steamed branch acted as a protoplasmic poison to the cells of Elodea leaves, while during the same time the sap from fresh branches was innocuous.—Prof. H. H. Dixon: Note on the tensile strength of the sap of trees. It has recently been stated that while water sensibly free from dissolved air has considerable tensile strength, it has been impossible to demonstrate this cohesion in the sap of trees. This statement is negated by previous experimental work. However, it seemed of interest to test the tensile strength of sap directly. Experiments were carried out on sap centrifuged from the branches of trees. Berthelot's method of generating tension was used, but allowance was made for the distortion of the containing tube during the experiment. It was found easy to generate tension in both boiled and unboiled sap. In both cases the sap was almost, if not quite, saturated with dissolved air. The highest tension obtained with the boiled sap was 72.5 atmospheres, but with the unboiled 208 atmospheres was obtained.—Prof. J. Joly:



A deep-sea hydraulic engine. This engine is for developing power in depths from 200 fathoms downwards, for the purpose of boring into the deep-sea deposits. The water at the great pressure prevailing is the working substance, and after actuating the boring engine, is discharged into steel bottles which are coupled to the engine by high pressure tubing. The power available is very considerable. A full description of the entire machine, and of the methods of lowering, controlling, and raising it, were given, and working drawings were shown.

## CALCUTTA.

**Asiatic Society of Bengal, January 7.**—Gouripati Chatterji: A demonstration apparatus for determining Young's modulus. An optical lever method is described, simplified so that measurements of the modulus can be made to 5 per cent. in about ten minutes for lecture demonstration purposes.—M. S. Ramaswami: A new species of *Diospyros* from the Tinnevely Hills. A description of a hitherto undescribed Indian species of the genus *Diospyros* is presented.—M. S. Ramaswami: Studies on the leaf structure of *Zoysia pungens*, Willd. A detailed discussion of the structural adaptations, noticeable in the leaf of the maritime sandgrass *Zoysia pungens*, Willd., due to its peculiar habitat.—J. Coggin Brown: Grooved stone hammers from Assam and the distribution of similar forms in eastern Asia. An account of certain hammer stones with well-marked grooves or belts, from the Tezpur district, Assam. Such forms are of the greatest rarity among the numerous Neolithic stone implements in which certain parts of the Indian Empire abound. Grooved stone hammers only occur sporadically in eastern Asia, and the short list of recorded instances is given for comparison. On the other hand, they abound in the North American culture area, and are generally distributed throughout the United States. The subject is of some importance for the additional light it throws on the relation of the prehistoric archaeological types of the eastern Asian and North American culture areas. It is concluded that there is no evidence to prove that the stone axe did not revolve as an independent unit in the latter area.—H. H. Mann and S. R. Paranjpye: Intermittent springs at Rajapur in the Bombay Presidency. These springs flow at very irregular intervals, generally for a month or two at a time, and are held in great veneration in western India. In this paper they are fully described and figured, their traditional history and the folklore connected with them are set forth, and partial analyses, showing that the water does not differ materially in composition from that of other springs in the Deccan Trap area, are given.

## BOOKS RECEIVED.

Les Récents Progrès du Système Métrique. By C. E. Guillaume. Pp. 118. (Paris: Gauthier-Villars.) 5 francs.

Foods and Household Management: By H. Kinne and A. M. Cooley. Pp. xv+401. (London: Macmillan and Co., Ltd.) 5s. net.

A History of Education in Modern Times. By Prof. F. P. Graves. Pp. xv+410. (London: Macmillan and Co., Ltd.) 5s. net.

The Continents and their People. South America. By J. F. and A. H. Chamberlain. Pp. viii+189. (London: Macmillan and Co., Ltd.) 3s.

Die Süßwasser-Flora Deutschlands, Oesterreichs und der Schweiz. Edited by Prof. A. Pascher.

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Heft. i. Flagellatae 1. By E. Lemmermann. Pp. iv+138. (Jena: G. Fischer.) 3.50 marks.

Elementary Commercial Geography. By Dr. H. R. Mill. Revised by F. Allen. Pp. xii+215. (Cambridge University Press.) 1s. 6d. net.

Konstitution und Vererbung in ihren Beziehungen zur Pathologie. By Prof. F. Martius. Pp. viii+258. (Berlin: J. Springer.) 12 marks.

Handbuch der vergleichenden Physiologie. Edited by H. Winterstein. 40 Lief. (Jena: G. Fischer.) 5 marks.

Commission Polaire Internationale. Procès-Verbal de la Session Tenue à Rome en 1913. Pp. 293. (Bruxelles: Hayez.)

Handbuch für biologische Uebungen. Zoologischer Teil. By Prof. P. Röseler and H. Lamprecht. Pp. xii+574. (Berlin: J. Springer.) 27 marks.

Catalogue of the Ungulate Mammals in the British Museum (Natural History). Vol. ii. By R. Lydekker, assisted by G. Blaine. Pp. xvi+295. (London: British Museum (Natural History); Longmans and Co.) 7s. 6d.

The Anthropology of the Greeks. By E. E. Sikes. Pp. xi+112. (London: D. Nutt.) 5s. net.

Physical Chemistry and Scientific Thought. By Prof. W. C. McC. Lewis. Pp. 20. (Liverpool University Press.) 1s. net.

Smithsonian Institution. U.S. National Museum. Bulletin 71. A Monograph of the Foraminifera of the North Pacific Ocean. By J. A. Cushman. Part iii. Lagenidæ. Pp. ix+125+47 plates. (Washington: Government Printing Office.)

Report of the Secretary of the Smithsonian Institution for the Year Ending June 30, 1913. Pp. 119. (Washington: Government Printing Office.)

Annual Report of the Director of the Weather Bureau for the Year 1910. Part iii. Pp. 268. (Manila: Bureau of Printing.)

Intermediate Mechanics for Indian Students. By F. C. Turner and Prof. J. M. Bose. Pp. xii+332. (London: Longmans and Co.) 4s. 6d.

Monistische Bausteine. By E. Haeckel. Edited by W. Breitenbach. Erstes Heft. Pp. vii+224. (Brackwede i.W.: Dr. W. Breitenbach.) 3 marks.

The Socialized Conscience. By Prof. J. H. Coffin. Pp. viii+247. (Baltimore: Warwick and York, Inc.) 1.25 dollars.

Die Europaeischen Schlangen. By Dr. F. Steinhil. Heft 4. 5 plates. (Jena: G. Fischer.) 3 marks.

Die Kultur der Gegenwart: ihre Entwicklung und ihre Ziele. Teil iii. Abt. iv. Band 4, Abstammungslehre, Systematik, Paläontologie, Biogeographie. By R. Hertwig and R. v. Wettstein. Pp. ix+620. (Leipzig and Berlin: B. G. Teubner.) 22 marks.

The People's Books:—Wild Flowers. By M. Skene. Pp. 92. Applications of Electricity for Non-Technical Readers. By A. Ogilvie. Pp. 93. (London and Edinburgh: T. C. and E. C. Jack.) 6d. net each.

Ueber die Konstitution und Konfiguration von Verbindungen höherer Ordnung. By Prof. A. Werner. Pp. 21. (Berlin: J. Springer.) 1.20 marks.

The Elements of Qualitative Chemical Analysis. By Prof. J. Stieglitz. Vol. i. Parts 1 and 2. Pp. xi+312. Vol. ii. Parts 3 and 4. Pp. viii+153. (London: G. Bell and Sons, Ltd.) 6s. net each.

A Text-Book on Spherical Trigonometry. By Prof. R. E. Moritz. Pp. vi+67. (New York: J. Wiley and Sons, Inc.; London: Chapman and Hall, Ltd.) 4s. 6d. net.