

Government of India, the deputation, and various public officials; in April last a committee was appointed to give effect to the draft scheme, and the Bill to establish and incorporate a university in Mysore was unanimously passed last July. There are at present two constituent colleges, the Maharaja's College at Mysore and the Central College at Bangalore. Degrees (B.A. and B.Sc.) may be obtained after a continuous three-years' course, and a course leading to a degree in teaching is to be established in the near future. There are 890 students under university supervision, and there are twenty-two professors or assistant-professors. The new University is the first offshoot of the University at Madras, and it is foreshadowed that other universities may be founded at Travancore and Hyderabad. A scheme of university extension work is under consideration. The Chancellor, H.H. the Maharaja, in his speech, stated that the new University was the first to be established outside the limits of British India.

THE "Handbook" of the West Riding of Yorkshire Education Committee is published in parts, which deal respectively with the various grades of education aided by the committee. The pamphlet numbered Section X. of Part II. gives full particulars of the scholarships and exhibitions to be offered in 1917 for the pursuit of higher education. The committee appears to have made provision for the needs of every class of student in the area over which it presides. Among the scholarships and exhibitions offered may be noticed the fourteen county major scholarships of the estimated value of 60*l.* to 65*l.* per annum to be held at universities, university colleges, or other institutions of higher education; the four county technological scholarships of the value of 60*l.* per annum; and others of the value of 50*l.* or less, tenable for day courses or for combined day and evening courses at institutions where higher technical instruction is carried on, and intended for young workmen having three years' general practical experience in an occupation; the county scholarships for women to enable them, for example, to be trained in midwifery and nursing, horticulture, and other vocations; the county agricultural exhibitions; and the travelling scholarships awarded as occasion may arise. Full particulars of the scholarship scheme may be obtained from the Education Department, County Hall, Wakefield.

## SOCIETIES AND ACADEMIES.

### LONDON.

**Royal Society**, December 7.—Sir J. J. Thomson, president, in the chair.—J. T. **Carter**: The cytomorphosis of the marsupial enamel-organ and its significance in relation to the structure of the completed enamel.—Margaret **Tribe**: The development of the pancreas: the pancreatic and hepatic ducts in *Trichosurus vulpecula*. The history of the three pancreatic primordia has been followed out in detail. Their development is traced through the earlier stages where the three are separate from one another; through the later stages where fusion has occurred, but where the primordia are still individually recognisable, up to the late pouch-fœtus in which the identification of the various component parts of the gland is still possible.—H. J. **Watt**: The typical form of the cochlea and its variations. The data and conclusions may be summed up by saying that the cochlea is built according to a constant plan, of which the scale alone varies from case to case. This scale shows a decidedly high correlation with the size of the organism as a whole. A change of scale will obviously alter all the dimensions recorded except the number of whorls. But even that

number, when it varies independently, does not alter the other dimensions of the cochlea. The only other variant thus far detected is the rate of curvature of the spiral, which is greater in the bigger scale organs.—Dr. A. D. **Imms**: The structure and biology of *Archotermopsis*, together with descriptions of new species of intestinal protozoa, and general observations on the Isoptera. *Archotermopsis wroughtoni*, Desn., is exclusively confined to coniferous forests in the N.W. Himalaya, and lives in dead timber, no true nest being constructed. The queen exhibits no indications of degeneration or increase of size common to most species of Termitidæ. True workers are absent, but gynæcoid, egg-laying, worker-like forms occur. The soldiers are remarkable in retaining the external secondary sexual characters, and the gonads in this caste, and in the worker-like forms also, are fully developed. Abundant protozoa occur in the large intestine of the "sterile" castes and nymphs, they are scarce in the winged forms, and absent in the queens and young larvæ. These organisms usually have been regarded as parasites, but it appears more probable that they are symbiotic in their relations to their hosts. By breaking down ligneous matter they contribute towards the digestion of the latter by the Termites. Polymorphism in Termitidæ is not adequately explained on the grounds of special nutrition, nor does the theory of "castration parasitaire" account for the observed facts. The Mendelian inheritance of mutations appears to offer a reasonable solution of several of the outstanding difficulties associated with polymorphism and the inheritance of germinal characters in sterile castes. *Archotermopsis* is one of the most primitive of the Termitidæ, and its structure and bionomics throw light upon important biological problems.—J. J. **Guest** and F. C. **Lea**: Torsional hysteresis of mild steel. In this paper a series of experiments is described which show that, when mild steel is subjected to a torsional reversal of stress, the material does not follow Hooke's law, and that there is a distinct stress-strain hysteresis loop even for comparatively small ranges of stress.

**Physical Society**, November 24.—Prof. C. V. Boys, president, in the chair.—H. R. **Nettleton**: The measurement of the Thomson effect in wires. The paper describes how absolute measurements of the Thomson effect may be made in wires. The theory is fully worked out, and the sources of error likely to arise—especially owing to the smallness of the area of cross-section—are considered. The method is sensitive, consistent, and very rapid; its ultimate object is to determine the Thomson effect at different temperatures in a number of metals, both rare and base, at the same time, and with the same specimens, finding their thermo-electric powers.—C. R. **Darling** and A. W. **Grace**: The thermo-electric properties of fused metals. One of the authors has for some time been investigating the possibility of using base metal thermo-couples at temperatures above the melting point of one of the constituents. For this purpose it was necessary to determine whether any peculiarities in the thermo-electric behaviour of metals occur at fusion. In the case of lead, tin, zinc, and cadmium there is no perceptible break in the continuity of the curves obtained. In couples containing bismuth, however, several cases were noted in which the E.M.F. remained constant for a wide range of temperature after the fusion of the bismuth. This occurs with silver, aluminium, iron, or nichrom as the other element. Useful applications of this property are discussed.

**Geological Society**, December 6.—Dr. Alfred Harker, president, in the chair.—G. C. **Crick**: Recent researches on the belemnite animal. Attention was con-

finned to the restoration of a typical belemnite animal and its shell, as shown particularly by examples in the British Museum collection. Mr. Crick first demonstrated, by means of a rough model, the construction of the belemnite shell, including the guard or rostrum, the phragmocone with its ventrally situated siphuncle, and its thin envelope, the conotheca, with its forward prolongation and expansion (on the dorsal side) known as the pro-ostracum. He then exhibited photographic slides of examples in the British Museum collection showing these various characters, and noted the abrupt termination of the chambered cone on the lower part of the pro-ostracum, of which the dorsal surface may have been partly or almost completely covered by a thin forward extension of the guard.

**Mathematical Society**, December 14.—Prof. H. M. Macdonald, president, in the chair.—Prof. W. Burnside: The efficiency of a surface of discontinuity regarded as a propeller.—G. H. Hardy and S. Ramanujan: (1) Proof that almost all numbers  $N$  are composed of about  $\log \log N$  prime factors. (2) An asymptotic formula for the number of partitions of a number.—G. N. Watson: The harmonic functions associated with the parabolic cylinder (second paper).—Prof. D. Buchanan: Orbits asymptotic to an isosceles triangle solution of the problem of three bodies.—Prof. H. S. Carslaw: Diffraction of waves by a wedge of any angle.—Prof. L. J. Rogers: Two theorems of combinatory analysis and two allied identities.—Prof. W. H. Young and Mrs. Young: (1) The internal structure of a set of points in space of any number of dimensions. (2) The inherently crystalline structure of a function of any number of variables.

## EDINBURGH.

**Royal Society**, November 6.—Dr. J. Horne, president, in the chair.—The President opened the session with a short address on the relations of industry and science.—Dr. J. Tait: Experiments and observations on Crustacea. Part i. Immersion experiments on *Ligia oceanica*. In distilled, or in tap, water *Ligia* dies within two days. When sea-water is added the period of survival is increased, and in full sea-water, steadily aerated, *Ligia* can live without food for three months. Size and condition as regards moult influence the period of survival. Part ii. The moulting of Isopods. Isopods appear to moult in two stages. Splitting occurs (1) transversely between the fourth and fifth free thoracic segments; (2) longitudinally at junction of coxopodite with tergite, thus revealing otherwise invisible lines of concurrence of segments. *Ligia* kept for weeks without food in sea-water moult normally. The opinion expressed by Réaumur that a crustacean moults because it has grown too large for its coat is incorrect.

November 20.—Dr. J. Horne, president, in the chair.—Prof. E. T. Whittaker: The adelphic integral in dynamics. The adelphic integral is defined to be such that the infinitesimal transformation corresponding to it transforms the members of a family of periodic orbits (corresponding to the same value of the constant of energy) into each other. It is shown that a dynamical problem with two degrees of freedom possesses only one really distinct adelphic integral, and that the finding of this integral is the most natural way of obtaining the complete solution of the problem. The integral is obtained as an infinite series, and it is shown that the difficulties connected with Poincaré's theorem on the non-convergence of the series of celestial mechanics may be surmounted by its means.—Dr. J. Tait: Experiments and observations on Crustacea. Part iii. Limb flexures and limb taxis in the Pericarida. The design and arrangement of the limbs

in five orders were described, the mode of inquiry being physiological, advantage being also taken of the principle of analogy. A series of swimming limbs (Mysidacea) develop tri-alternate flexures when the animal passes from a homogeneous fluid medium to a fixed bounding surface. The proximal segments of these limbs are at first directed laterally outwards from the body (Cumacea, Tanaidacea), and the limbs from two groups, anterior and posterior. By a process akin to the rotation that occurs in vertebrate limbs the principal plane of flexure comes to lie antero-posteriorly in the Cammaridea. In the Isopoda further rotation has occurred, producing a taxis suitable for clinging. In the isopodan limb the most proximal joint is a universal hinge like a spheroidal bony joint. The author discussed the application of functional conceptions to the study of structure.

## DUBLIN.

**Royal Irish Academy**, November 30.—The Most Rev. J. H. Bernard, Archbishop of Dublin, president, in the chair.—H. Ryan and W. M. O'Riordan: The tinctorial constituents of some lichens which are used as dyes in Ireland. Four species of lichens, viz. *Parmelia saxatilis*, Ach., *Ramalina scopulorum*, Ach., *Ramalina cuspidata*, Nyl., and *Physcia parietina*, De Not, were examined. The first three of these are known to have been largely used in the west of Ireland, and also in parts of Scotland, for dyeing wool a brownish colour. The chief constituents of these three lichens were found to be as follows:—*Parmelia saxatilis*, Ach., contains stereocaulic acid and salazinic acid,  $C_{35}H_{24}O_{16}$ ; *R. scopulorum*, Ach., contains scopuloric acid,  $C_{31}H_{26}O_{16}$ , and *d*-usnic acid; *R. cuspidata*, Nyl., contains cuspidatic acid,  $C_{34}H_{32}O_{22}$ , or  $C_{17}H_{16}O_{10}$ , and *d*-usnic acid. The tinctorial properties of the lichens were found to be due to the presence in them of salazinic acid, scopuloric acid, and cuspidatic acid respectively. The fourth lichen, *Physcia parietina*, De Not, is not largely used as a dye. It contains, however, a yellow substance, physcione, which, when demethylated by means of strong sulphuric acid, yields emodin, which dyes wool an orange colour.—H. Ryan and P. Ryan: The condensation of aldehydes with ketones. III.—Benzaldehyde with methyl isopropyl ketone. Benzaldehyde condenses with methyl isopropyl ketone to form the benzylidene derivative of diphenyldimethyltetrahydropyrone, which was previously obtained from benzaldehyde and dimethylacetylacetone. Monomethylacetylacetone with benzaldehyde forms another compound melting at  $157^{\circ}$  C. Benzaldehyde also condenses with ethylacetoacetic ester to yield cinnamoylbutyric acid.—J. Algar: Unsaturated ketones derived from diaceto-ornicol. In this communication is described the preparation of diaceto-ornicol from ornicol-diacetate. It is identical with the diaceto-ornicol obtained by Collie from diacetylacetone. Diaceto-ornicol condenses with aldehydes in the presence of alcoholic caustic soda, and in this manner unsaturated ketones were prepared. A description is given of the preparation of dibenzylidene-, dianisylidene-, diveratrylidene-, and dipiperonylidene-diaceto-ornicol.

## PARIS.

**Academy of Sciences**, November 27.—M. Camille Jordan in the chair.—E. Picard: The integrals of total differentials relating to regular algebraical surfaces.—G. Bigourdan: The position and co-ordinates of the astronomical station of the island of Notre-Dame. The works of Auzout. This station was where Auzout made a part of his observations, constructed his telescopes, the largest up to that time, and invented the micrometer with movable thread.—C. Guichard: The K networks of a quadric of revolution.—F. Gonnessiat: A star with a large proper motion.

Barnard noted a star on the photographs made at the Yerkes Observatory with an annual displacement of  $10.3''$ , the largest known. This star has been found in the photographic catalogue of Algiers, and gives an annual displacement of  $10.286''$ . It is the nearest star known; its parallax corresponds to 3.26 light years. Full details of the method of reduction will appear shortly in the *Bulletin Astronomique*.—Ch. Ed. **Guillaume**: Modifications of the expansibility of invar by mechanical or thermal actions. Both in annealed and tempered invar wires drawing down causes a rapid lowering in the coefficient of expansion; the coefficient is also affected by the heat treatment. Prolonged heating to  $100^{\circ}$  C. not only renders the condition of the metal after wire-drawing stable, but gives a material with a coefficient of expansion which is practically zero under the tension used in geodesic operations, and hence eliminates temperature errors.—G. **Koenigs**: The general geometrical form of the properties of the second order of plane movements with two parameters.—M. **Mesnager**: Formula of the thin plate, with edges fixed on a plane rectangular contour.—L. **Fabry** and H. **Blondel**: The elements of the planet discovered by M. Sy at Algiers, May 26, 1916. It is proved that the elements of the Sy comet do not coincide with those of 562 Salomé. It would appear probable that this planet is new.—H. **Arctowski**: The fluctuations of the solar constant. It is shown that besides the sun-spots, other phenomena affect the solar constant in a manner sufficiently strong partially, or even totally, to mask the effect of the spots.—R. **Ledoux-Lebard** and A. **Dauvillier**: Theoretical and experimental researches on the bases of radiological estimations. In the special form of X-ray tube described by the authors, giving intense K spectra, the energy supplied (continuous current) being known, the estimation is reduced to a time measurement.—J. **Repelin**: The geology of the islands of Pomégnés and Ratonneau (Bay of Marseilles). The islands have been erroneously assumed to be a continuation of the massif of Notre Dame de la Garde, but are now shown to be constituted by Urgonian limestones arising from an accident altogether independent of this massif, and spreading out as a layer on a substratum of the upper Aptian.—A. **Boutaric**: Nocturnal radiation. A theoretical expression is developed for the nocturnal radiation, the loss of heat per minute of 1 sq. cm. of a black surface exposed to the air. Some experimental data obtained at Montpellier in 1913 and 1914 are in fair agreement with the formula, and show at least that the results of calculation and observation are of the same order of magnitude.—F. **Gérard**: Four new Ochnaceæ of Madagascar.—A. **Béclère**: The inoculability of variole in the vaccinated, but not completely immunised, calf.

### BOOKS RECEIVED.

University of Sheffield. Calendar for the Session 1916-17. Pp. 742. (Sheffield.)

A Defence of Classical Education. By R. W. Livingstone. Pp. xi+278. (London: Macmillan and Co., Ltd.) 4s. 6d. net.

A Text-Book of Organic Chemistry for Students of Medicine and Biology. By Prof. E. V. McCollum. Pp. xiii+426. (New York: The Macmillan Co.; London: Macmillan and Co., Ltd.) 10s. net.

The World as Imagination. By E. D. Fawcett. Series I. Pp. xlii+623. (London: Macmillan and Co., Ltd.) 15s. net.

Decennial Index of the *Analyst*. Vols. xxxi.-xl. Compiled by M. A. Baker. Pp. 733. (London: Simpkin, Marshall and Co., Ltd.)

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What is Instinct? By C. B. Newland. Pp. xv+217. (London: John Murray.) 6s. net.

The Control of Hunger in Health and Disease. By A. J. Carlson. Pp. vii+319. (Chicago: University of Chicago Press; Cambridge: At the University Press.) 9s. net.

Second-Year Mathematics for Secondary Schools. By E. R. Breslich. Pp. xx+348. (Chicago: University of Chicago Press; Cambridge: At the University Press.) 4s. net.

The High Price of Sugar and How to Reduce It. By H. H. Smith. Pp. iv+54. (London: John Bale, Ltd.) 1s. net.

Highways and Byways in Nottinghamshire. By J. B. Firth. Pp. xviii+426. (London: Macmillan and Co., Ltd.) 6s. net.

Some Questions of Phonetic Theory. By Dr. W. Perrett. Pp. vi+110. (London: University of London Press, Ltd.) 2s. 6d. net.

Charts: Their Use and Meaning. Prepared by Dr. G. H. Fowler. Pp. iv+47+charts viii. (London: J. D. Potter.) 4s.

### DIARY OF SOCIETIES.

THURSDAY, DECEMBER 21.

CHEMICAL SOCIETY, at 8.—Studies on the Walden Inversion. V. The Kinetics and Dissociation Constant of  $\alpha$ -Bromo- $\beta$ -phenylpropionic Acid: G. Senter and G. H. Martin.—The Alcohols of the Hydroaromatic and Terpene Series. III. The Isopulegols corresponding with  $\beta$ -Menthol and  $\beta$ -Neomenthol: R. H. Pickard, W. Lewcock, and H. de Pennington.—Lead Sub-iodide, with Details of the Preparation of Lead Suboxide: H. G. Denham.—Note on the Solubility of Lead Iodide: H. G. Denham.—Chromium Phosphate: A. F. Joseph and W. N. Rae.  
INSTITUTION OF MINING AND METALLURGY, at 5.30.—The Economic Geology of the Insizwa Range: W. N. Goodchild.

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