

the seed is rendered soluble and absorbed by a flat sucker (scutellum), which is attached to the base of the coleoptile, and together with it represents the single cotyledon characteristic of the division of flowering plants, Monocotyledons, to which the grass family belongs.

### UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

**BIRMINGHAM.**—Sir William Ashley, Dean of the faculty of commerce, has been invited to become Vice-Principal in succession to Dr. R. S. Heath, whose resignation takes effect at the end of the current session. The post of registrar, hitherto occupied by Dr. Heath, is to be filled by Prof. Alfred Hughes, Dean of the faculty of arts.

**CAMBRIDGE.**—The governing body of Emmanuel College offers two exhibitions, each of the value of 50*l.* and tenable for two years, to research students commencing residence at the college in October, 1918. The governing body may also make additional grants to students whose means are insufficient to cover the expense of residence at Cambridge or whose course of research may entail any considerable outlay in the provision of apparatus or materials.

**OXFORD.**—Prof. Horace Lamb, professor of mathematics in the University of Manchester, has been appointed Halley lecturer for next year.

THE *Times* correspondent at Toronto states that a prominent citizen, whose name is not yet disclosed, will give from 100,000*l.* to 600,000*l.* to endow chairs in the faculty of medicine at the University of Toronto.

By the will of Sir G. H. Philipson, the sum of 2000*l.* has been left to the University of Durham College of Medicine, Newcastle-upon-Tyne, for the foundation of two Philipson scholarships to be awarded to the undergraduate of the college obtaining the highest marks at the M.B. final examination.

THE sum of 2500*l.* has been given to the Armstrong College, Newcastle-upon-Tyne, by Miss Stephenson, for the endowment of a studentship in the faculty of arts, in memory of her late father, Sir W. H. Stephenson; and Messrs. Cochrane, Ltd., of Middlesbrough, have given 3000*l.* to the same institution for the foundation of scholarships, primarily for residents of Middlesbrough and New Brancepeth.

THE Regulations for Secondary Schools for 1918-19 (Cd. 9076, price 2*d.*), now published by the Board of Education, are in substance the same as those for the present year. The definition of advanced courses for pupils remaining in secondary schools until eighteen years of age has been revised and modified. It will be remembered that the Board's circular of 1913 on the curricula of secondary schools pointed out that the legitimate requirements of the great majority of pupils would be met by the provision of three different types of advanced course, viz. (a) science and mathematics, (b) classics, and (c) modern humanistic studies. The requirement that the work of an advanced course in group (a) must include both science and mathematics has now been relaxed. In schools, especially girls' schools, where biology occupies a prominent place in the curriculum, it is not always possible without risk of serious overstrain to require the inclusion both of mathematics and of the auxiliary sciences of chemistry and physics. The Board has therefore reserved discretionary power to dispense with

the requirement of mathematics in such cases. It is expected that chemistry will always be continued in the advanced course in connection with biology, and that physics will also be continued unless it has previously been carried to an adequate standard. The claims of geography for recognition as an advanced course are discussed in an explanatory note to the regulations, and it is stated that the Board is prepared to give sympathetic consideration to any practicable proposals made by suitable schools for advanced courses in which geography is made a predominant subject.

ONE chapter of the recently published report of the Board of Education for the year 1916-17 (Cd. 9045) is concerned with the work of universities and university colleges. It includes a section dealing with the gifts and bequests received during the year under review by the university institutions which come within the scope of the report. The majority of the foundations were directed to promoting the study of subjects the importance of which has been emphasised by the war. Among the gifts recorded the following may be mentioned:—A legacy to the University of Birmingham of 5000*l.* from the late Sir Charles Holcroft, the income of which is to be devoted to research work in science and engineering; a bequest of 10,000*l.* from the estate of Miss Craddock for the purpose of founding a chair of commerce at the University of Liverpool; 25,000*l.* under the will of Sir George Franklin for the foundation of chairs at the University of Sheffield; 30,000*l.* contributed to the Ramsay Memorial Fund; some 30,000*l.* given towards the erection of new science buildings at Bangor University College; 20,000*l.* promised by anonymous donors to Aberystwyth College for buildings required by the Agricultural Department; and at Cardiff 25,000*l.* received from Sir W. J. Tatem towards the provision of new chemical laboratories, a bequest of 20,000*l.* to the Medical Department, and a sum of 30,000*l.* from Miss Emily Talbot to endow a chair of preventive medicine. Altogether, well over 200,000*l.* was found by private donors for the improvement and development of higher education, in addition to the gifts of land, like the site of nine acres in the heart of Bristol given to the University there by Mr. Henry Wills, part of which is marked out for the erection of a department of physics. The benefactions to universities and colleges in the United States exceed 5,000,000*l.* annually, or twenty-five times more than the gifts to similar institutions in Great Britain.

### SOCIETIES AND ACADEMIES.

LONDON.

**Royal Society**, June 6.—Sir J. J. Thomson, president, in the chair.—N. B. Dreyer and Prof. C. S. Sherrington: Brevity, frequency of rhythm, and amount of reflex nervous discharge as indicated by reflex contraction. A single momentary stimulus of moderate intensity, e.g. a break-shock, even though not far above threshold value of stimulation, applied to the afferent nerve of a spinal reflex-centre, evokes from that centre not uncommonly a repetitive series of volleys of motor impulses. It tends to do so more as the stimulus, within limits, is increased in intensity, but the state of the reflex-centre at the time is also a decisive factor. The rhythm of repetition of volley-discharges from the spinal reflex-centre was traced, by the ordinary mechanical method, to be of synchronous rate with that of stimulation of the afferent nerve up to a frequency of 55 per sec., and by a mechanical resonance method up to a frequency of 65 per sec. By a "doubling frequency" method it

was shown further that the frequency-rate of the reflex discharge has not reached its limit under a stimulation of 75 per sec., but surpasses that degree, though by what amount the method cannot say. The maximal mechanical power of a muscle contracting under spinal reflex action is frequently as great as the maximal which can be evoked from it by direct faradisation of the motor nerve itself.

**Geological Society, June 5.**—Mr. G. W. Lamplugh, president, in the chair.—W. D. Lang: The Kelestominæ, a sub-family of Cretaceous cribrimorph Polyzoa. The Kelestominæ are a sub-family of Pelmatorporidæ. The latter are a family of Cretaceous cribrimorph Polyzoa, the costæ of which are prolonged upwards as hollow spines from the median area of fusion of the intraterminal front wall. The broken ends of these spines form a row of pelmata (or, if small, pelmatidia) on the intraterminal front wall. The Kelestominæ are Pelmatorporidæ with an apertural bar, each half of which is bifid; and the proximal and distal forks of each half are fused with the corresponding forks of the other half. The fused distal forks are also fused with the proximal pair of apertural spines, which are greatly enlarged. The simplest known form of this arrangement is seen in the genus *Kelestoma*, Marsson. Morphasmopora, unlike *Kelestoma*, retains a small number of costæ and a short cecum; but the thickness of the proximal apertural spines, which are scarcely recognisable as such, is enormously increased; the thickness of the bifid apertural bar is also increased.—Dr. R. L. Sherlock: The geology and genesis of the Trefriw pyrites deposit. This pyrites deposit is worked at Cae Coch Mine, on the western side of the Conway Valley (North Wales), about one mile north of Trefriw. A band of pyrites, about 6 ft. thick, and of considerable purity, rests on the inclined top of a thick mass of diabase, which is shown to be intruded into the Bala shales that cover the ore-body. Pyrites deposits are classified by Beyschlag, Vogt, and Krusch into four groups:—(1) Magmatic segregations; (2) formed by contact-metamorphism; (3) lodes; (4) of sedimentary origin. None of these modes of origin, however, will account for the Trefriw pyrites. The conclusion arrived at is that the diabase was intruded below a bed of pisolitic iron-ore. Hot water containing sulphuretted hydrogen given off from the intrusion combined readily with the pisolites, which were in the form either of oxide or of silicate of iron, and formed pyrites. The graptolitic horizon at which the pisolitic ore occurs usually contains some pyrites, and this would be added to that derived from the above reaction.

**Linnean Society, June 6.**—Sir David Prain, president, in the chair.—C. C. Lacaita: A revision of some critical species of *Echium* as exemplified in the Linnean and other herbaria, with a description of *Echium julaeum*, a new species from Palestine.—Capt. A. W. Hill: A series of seedlings of *Cyclamen*. Normally only one cotyledon develops, the other remaining as a rudiment at the apex of the hypocotyl or tuber. If the lamina of the cotyledon be removed, new laminæ arise as outgrowths from the petiole just below the cut surface; but if the cotyledon with its petiole be removed, the rudiment of the second cotyledon is stimulated to develop into an assimilating organ. On removal of the lamina of this second cotyledon new laminæ will be formed from the inner edges of its petiole close to the apex, exactly as is the case with the cotyledon proper. When plumular leaves are so treated no new laminæ are regenerated. Further cotyledon leaf-cuttings will produce roots from the base of the petiole, while plumular leaf-

cuttings remain rootless.—R. Paulson and S. Hastings: The relationship between the symbionts in a lichen: *Cladonia digitata*, Hoffm., is the lichen used as material for many of the authors' preparations. This plant grows at the base of trees in shady woods in Hertfordshire and Essex, as well as in most northern localities. The gonidium is spherical, except when subject to pressure from other gonidia. The diameter of fully developed cells ranges from 8 to 15  $\mu$ ; the chloroplast in the mature gonidium has an uneven surface; after fixing and staining, minute reticulation of the cytoplasm is evident; the so-called pyrenoid is large and central, and exhibits a distinct structure throughout the substance, its diameter is roughly one-third that of the chromatophore; a small lateral body stains darker than the pyrenoid, it is very conspicuous in many of the preparations surrounded by a very lightly stained area. Twin gonidia frequently occur; there is no vegetative cell-division of the gonidium; the increase in the number of gonidia results from the formation of autospores, reduced zoogonidia; there is no penetration of gonidia by hyphæ.

**Mathematical Society, June 13.**—Prof. E. W. Hobson, vice-president, in the chair.—Prof. M. J. M. Hill: An assumption in the theory of singular solutions of ordinary differential equations of the first order.—Col. A. J. Cunningham and Th. Gosset: Quartic and cubic residuacity tables.—Col. A. J. Cunningham: Lucas's process applied to composite Mersenne numbers.—Dr. A. E. Western: The Gaussian period numbers and the conditions that 2 should be a residue of a 16th or 32nd power.—T. W. Chaundy: The aberrations of a symmetrical optical system.—T. L. Ince: The rotation groups of the regular figures in four or more dimensions.—J. H. Grace: (1) An analogue in space of a case of Poncelet's porism. (2) Note on enumerative geometry.—E. K. Wakeford: Posthumous MS. discovered in his kit.

#### EDINBURGH.

**Royal Society, June 8.**—Dr. John Horne, president, in the chair.—Miss L. H. Huie: The formation of the germ-band in the egg of the holly tortrix moth (*Eudemis naevana*). The following main results were obtained. The egg laid in July and August is much flattened, having the form of an oval scale, the ventral surface of which adheres to the leaf. The shape of the egg and the transparency of the envelopes make this a convenient material for the study of the early development of a lepidopterous insect. An account was given of the stages leading to the formation of the Blastoderm, the ventral plate, the amnion, the germ-band, and the "inner layer." This last becomes segmented almost at once, but the ectoderm remains unsegmented during the winter.—Prof. R. A. Sampson: Studies in clocks and timekeeping. No. 2.: The circular equation. The present communication is the second of a series of studies executed at the Royal Observatory upon precision clocks and timekeeping. The astronomical interest of these studies comes from their ultimate bearing on the rotation of the earth, which is our standard of timekeeping. Their plan is to accumulate with sufficient care and detail the necessary observations and discussions upon all points at present obscure or imperfectly treated which may affect the timekeeping of a clock. The present paper contains the calculation of the theoretical effect upon the clock's rate of any variation of arc of oscillation of the pendulum. The formulæ, which are known, are here reduced to tables for convenient reference. The comparison of these theoretical results with actual performance is reserved for future members of the series.—Dr. C. Davison: The sound-waves and other

air-waves of the East London explosion of January 19, 1917. This is the complete report of the facts collected on the occasion of the East London explosion on January 19, 1917 (see NATURE, February 1, 1917, p. 438, and August 2, 1917, p. 450, in which the main conclusions were anticipated).—Sir Thos. Muir: The quadratic relations between the determinants of a 4-by-8 array. The main idea of the paper was to develop a convenient notation to facilitate the analytical use of these arrays.

## CAPETOWN.

**Royal Society of South Africa**, April 17.—Dr. J. D. F. Gilchrist, president, in the chair.—Dr. J. D. F. Gilchrist: Luminosity in a South African earthworm and its origin. Luminous earthworms are found on the slopes of Table Mountain. The luminosity proceeds from a discharge from the mouth and anus, which consists of cells heavily laden with inclusions of different kinds. The smaller inclusions consist of a substance allied to fat, by the oxidation of which the light is produced. The cells arise from the body cavity, and are discharged into the anterior and posterior parts of the alimentary canal by definite communications between the coelom and alimentary tract.—Sir Thomas Muir: Note on the adjugate of Bezout's eliminant of two binary quatics.—I. B. P. Evans and Averil M. Bottomley: The genera *Diplocystis* and *Broomeia*. Some specimens of *Diplocystis* have recently been obtained by the authors from Portuguese East Africa, and this is the first recorded occurrence of the interesting genus from Africa. The African material is not identical with that from Cuba, and the authors describe it as *Diplocystis Junodii*, nov. spec.—Ethel M. Doidge: South African Perisporiaceae, ii. Revisional notes. This communication consists of a revision, due to work on a number of fresh collections of South African Perisporiaceae, of a previous communication on the subject by the author.—F. G. Cawston: Fresh-water snails as a cause of parasitic diseases. The author describes a number of snails collected by him from various districts in South Africa, and found to be infested with the cercarial stages of the various trematode worms.—J. Moir: Colour and chemical constitution, part iv. The remaining phthaleins. The absorption spectra of complex phthaleins are described, these being partly duplex compounds of the phenol-anthrol type and partly of a new class (e.g. thymol-naphthol) derived from thymoylbenzoic acid. The additive nature of the effects of different substitutions is emphasised by means of a table giving the numerical value of the change of wave-length for different substituting groups.

## BOOKS RECEIVED.

The Chemical Analysis of Iron: By A. A. Blair. 8th edition. Pp. 318. (Philadelphia and London: J. B. Lippincott Co.) 21s. net.

Fisheries of the North Sea. By N. Green. Pp. vii + 178. (London: Methuen and Co., Ltd.) 4s. 6d. net.

Map Work. By V. S. Bryant and T. H. Hughes. Pp. 174. (Oxford: Clarendon Press.) 5s. net.

Is Man the Product of Evolution? By S. J. Whitmee. Pp. 24. (London: Headley Bros, Ltd.) 6d. net.

Wayfarings: A Record of Adventure and Liberation in the Light of the Spirit. By W. J. Jupp. Pp. 234. (London: Headley Bros., Ltd.) 6s. net.

Methods of Measuring Temperature. By Dr. E. Griffiths. Pp. xi + 176. (London: C. Griffin and Co., Ltd.) 8s. 6d. net.

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## DIARY OF SOCIETIES.

THURSDAY, JUNE 20.

ROYAL SOCIETY, at 4.30.—Croonian Lecture: The Physiological Basis of Thirst: Major W. B. Cannon.

LINNEAN SOCIETY, at 5.—Les espèces d'Alpehidae rapportées par M. J. Stanley Gardiner de l'Océan Indien: Prof. H. Coutière.—(1) A Selection of Ferdinand Bauer's Landscapes, c. 1784. (2) Ten British Plants: G. Claridge Druce.—Exhibition of Lantern-slides representing a Series of Intermediate Forms of the Diatom Genera *Navicula* and *Cymbella*: Sir Nicolas Vermoloff.—Sex-segregation in the Bryophyta: E. J. Collins.—Phenological Observations in an Elementary School: A. O. Walker.

ROYAL SOCIETY OF ARTS, at 4.30.—Indian Cotton and the Cotton-mill Industry: The Hon. Sir Dinshaw E. Wacha.

MONDAY, JUNE 24.

ARISTOTELIAN SOCIETY, at 8.—The Moral Argument for Theism: Rev. W. R. Matthews.

ROYAL GEOGRAPHICAL SOCIETY, at 8.30.—Address by the Hon. Arthur Meighen, Canadian Minister of the Interior, attending the Imperial Conference.

TUESDAY, JUNE 25.

ROYAL ANTHROPOLOGICAL INSTITUTE, at 5.—Sociology of the East Coast People, Formosa: S. Ishii.

AERONAUTICAL SOCIETY (Central Hall, Westminster), at 8.—Wilbur Wright Memorial Lecture: Some Outstanding Problems in Aeronautics: Prof. W. F. Durand.

THURSDAY, JUNE 27.

ROYAL SOCIETY, at 4.30.—*Probable Papers*: Periodic Irrational Waves of Finite Height: Prof. T. H. Havelock.—The Diffraction of Electric Waves by the Earth: Dr. G. N. Watson.—Concerning Emotive Phenomena. II.: Periodic Variations of Conductance of the Palm of the Human Hand: Dr. A. D. Waller.—The Mechanism and Control of Fibrillation in the Mammalian Heart: Prof. J. A. MacWilliam.—The Development of the Sea Anemones, *Actinotoba dianthus* and *Adamsia palliata*: Dr. J. F. Gemmill.—The Occurrence of Multinucleate Cells in Vegetative Tissues: R. Beer and Agnes Arber.—The Epithelial Sheath of Hertwig in the Teeth of Man, with Notes on the Follicle and Nasmyth's Membrane: Dr. J. H. Mummery.—*And other Papers*.

FRIDAY, JUNE 28.

PHYSICAL SOCIETY, at 5.—A New Method of Measuring Alternating Currents and Electric Oscillations: I. Williams.—Demonstration of Coupled Vibrations: Prof. E. H. Barton and Miss H. M. Browning.

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