

Education Department or its equivalent. An elaborate scheme of work is set out for the course of instruction, including chemistry, plant diseases, agricultural engineering, animals, co-operation, etc., which is to cover a year of three terms. Three examinations are arranged for during the course, and a certificate is to be granted at its conclusion. If the students succeed in gaining a sound knowledge of even a quarter of the subjects detailed in the prospectus, the school may perhaps be considered to justify its existence, but it would seem impossible in so short a time as a year for a real grasp of tropical agriculture to be gained by the students. Lectures and demonstrations are to be given by the staff of the Agricultural Department, an arrangement which bids fair seriously to hamper the legitimate work of the agricultural officers if the syllabus is to be followed and not to be merely a grandiose paper scheme.

THE Appointments Board of the University of London was appointed by the Senate in 1909 to assist graduates and students of the University to secure appointments. During the past academic year the Board has secured more than 100 appointments for its clients. In the last report of the Board to the Senate attention is directed to the special assistance which has been given recently, in filling the vacancies caused by men enlisting, by the appointment of women graduates to them. The services of educated women are proving of great value in boys' schools, in business offices of every kind, and in the various Government departments. The secretary to the Appointments Board, University of London, will be glad to assist employers by giving names of suitable women graduates still disengaged.

THE Cambridge University Calendar for the year 1915-16 has now been issued by the University Press. The present edition contains an index of complete degrees *honoris causa*, in addition to the index of titular degrees which appeared last year. A separate section on the war has also been added, and an annotated list of presidents of the union, from the foundation of the society in 1815, appears in the appendix. In other respects the edition of last year has only been brought up to date. Since the section on the war was sent to press, a supplementary war list has been issued by the *Cambridge Review*. From this it appears that the total number of members of the University on service is now 10,250, and of these nearly one in seven is numbered among the killed, the wounded, or the prisoners, while more than 300 have won distinctions in the field.

## SOCIETIES AND ACADEMIES.

### LONDON.

**Royal Society**, December 2.—Sir J. J. Thomson, president, in the chair.—W. H. Young: Note on the existence of converging sequences in certain oscillating successions of functions.—S. A. Shorter and S. Ellingworth: The emulsifying action of soap—a contribution to the theory of detergent action. (1) The hydrolysis alkali in a soap solution is capable of assisting in the formation of the soap absorption layer by interacting with free fatty acid in an oil. (2) The "surface activity" of the hydrolysis alkali, in case of oils containing small amounts of free fatty acid, is much smaller than that of the undecomposed soap. (3) Surface activity of free alkali in soap solution is less than that of the same concentration of alkali in water. (4) Addition of alkali to soap solution increases surface activity of soap. This effect is much too large to be explained by suppression of hydrolysis.

NO. 2406, VOL. 96]

It is suggested that the effect is due to increase in colloidal nature of "semi-colloidal" soap solution.—P. E. Shaw: The Newtonian constant of gravitation as affected by temperature. (1) It has been found possible (a) to obtain consistent cycle readings in a gravitational experiment of the Cavendish type, even though the large masses are maintained for hours above 200° C., while the small masses remain at ordinary temperatures; (b) to carry on this investigation in the centre of a city at any time by day or night, in spite of tremors and the special disadvantage of having the torsion balance in a vacuum. (2) The conclusion reached is that there is a temperature effect of gravitation. When one large mass attracts a small one the gravitative force between them increases about 1/500 as temperature rises from, say, 15° to 215°. Provisionally, the result is stated as  $+1.2 \times 10^{-5}$  per 1° C. The readings are not steady enough to justify the statement that there is a linear relation for  $G/\theta$ . Time may be a factor in the effect, but the net result has not been shaken by a long series of tests. (3) The above result, though new, is not entirely unsupported by other experiments, for previous work yields indirect evidence of a positive temperature-coefficient. The weight experiments of Poynting and Phillips, which yielded negative results, are not strictly comparable with the author's. (4) As a by-product of these experiments, it was found that silver bars of the highest purity, after being heated to 130° C. and kept in a strong magnetic field, were permanently, though weakly, magnetised, and that the coercivity was considerable.—G. I. Taylor: Skin friction of the wind on the earth's surface. The amount of the skin friction between the wind and the surface of the earth is calculated from observations of wind velocity at different heights above the ground. It is found that the skin friction force acting on unit area of the ground is proportional to the square of the wind velocity, and that its actual value is of the same order as, though probably smaller than, that found by experimenting with flat plates and pipes in the laboratory. The object with which the investigation was undertaken was to find out whether the skin friction on a small surface is nearly equal to that on a very large surface; but if it were assumed that this is the case, the method employed furnishes an explanation of the fact that the surface wind is, on the average, roughly about half the gradient wind in the latitude of the British Isles.

**Society of Public Analysts**, December 1.—Mr. A. Chapman, president, in the chair.—W. Partridge: The "presumptive *coli* test" on unchilled water. The author points out that if positive results are ignored and negative results only considered, the "presumptive *B. coli* test" often usefully supplements the ordinary chemical analysis of unchilled water.—E. R. Bolton: Notes on methods of analysing oleaginous seeds and fruits. It is shown that the errors in the estimation of oil in oleaginous seeds and fruits (copra in particular) are due rather to "sampling" than to actual analysis. Methods of sampling, grinding, and analysis were demonstrated to show that, while the oil in copra could be estimated with great accuracy by the methods given, a departure from the procedure would be liable to cause considerable error.

### MANCHESTER.

**Literary and Philosophical Society**, November 16.—Prof. S. J. Hickson, president, in the chair.—Dr. G. A. Hemsalech: The spectra emitted by metal vapours in the explosion region of the air-coal-gas flame. The author reviewed the work done on Bunsen-flame spectra by M. de Wetteville, and on the different flame spectra of calcium and iron by Hemsalech and

de Watteville. He described a simple and convenient burner by means of which the various flame phenomena can be readily subjected to spectroscopic observation and experiment. Photographs were shown to illustrate the changes in the Swan spectrum emitted by the explosion region of flames on passing from rich to very weak gas mixtures. For very weak mixtures the ordinary Swan spectrum disappears, and another band spectrum develops. Some experiments were then shown to demonstrate the action of electric fields on the flames of weak gas mixtures charged with sodium vapour. The great sensitiveness of such flames in a longitudinal field was illustrated in several ways, and, in particular, it was shown that when the gas mixture had become so weak that in the absence of the electric field it would no longer ignite, it would do so immediately on the field being restored.

## EDINBURGH.

**Royal Society, November 15.**—Dr. J. Horne, vice-president, in the chair.—Dr. H. Drinkwater: Preliminary notice of a family showing inherited abnormal segmentation of the digits of both hands. The chief anatomical peculiarities were:—(1) The index, middle, and little finger much reduced in length, the ring finger projecting far beyond the others; (2) radiography shows (a) that the hands belong to the minor brachydactylous type, with abortive but separate middle phalanx; (b) that the base of the proximal phalanx of the index finger was very oblique, instead of being at right angles to the length of the bone, a condition shown to be due to the interposition of an extra bone of triangular shape; (c) that there are frequently two bones in place of the normal single proximal phalanx in the middle finger, the extra one being in series with the extra bone in the index finger. The condition had been hereditary in the family for (at least) four generations, and was transmitted on Mendelian lines.—Prof. Cossar Ewart and Miss Dorothy Mackenzie: The moulting of the king penguin. By means of a beautiful and complete series of photographs taken by Miss Mackenzie at the Edinburgh Zoological Park, the whole succession of stages in the process of moulting was clearly demonstrated. Other connected peculiarities of feather growth were also described.

## DUBLIN.

**Royal Dublin Society, November 23.**—Prof. W. Brown in the chair.—Prof. W. Brown: The subsidence of torsional oscillations and the fatigue of iron wires when subjected to the influence of alternating magnetic fields of frequencies up to 250 per second. In the subsidence of torsional oscillations and in the fatigue of iron wires under the influence of alternating magnetic fields it was found that the time taken to effect the maximum fatigue was inversely proportional to the frequency of the applied alternating magnetic field, and that the maximum value of the fatigue was the same for frequencies 50 to 250 per second. Increasing the frequency of the alternating magnetic field five times had very little effect on the subsidence of torsional oscillations.—P. E. Belas and Prof. M. Hartog: The path of a small permeable body moving with negligible acceleration in a bi-polar field. When a small pellet of paraffin wax containing iron dust is floated in glycerine in the vicinity of the poles of an electromagnet, certain curved paths are described by the pellet, which moves so as to include the maximum number of lines of induction. These paths were traced by focusing the image of the pellet on the ground glass of a camera fitted with a right-angled prism, and dotting in with a pencil the successive positions of the image. The curves were taken for similar and dissimilar poles.—T. G. Mason: Preliminary notes on the carbohydrates of the Musci. The wide divergence of opinion that prevails concerning the carbohydrates

of the angiosperms has suggested that an investigation conducted among the Musci would be of interest, and might shed light on the subject of photosynthesis. Dextrose, levulose, and sucrose have been identified in the following species:—*Polytrichum commune*, *Sphagnum cymbifolium*, and *Thuidium tamariscinum*. Maltose was found in *P. commune* alone; it is found only when starch is present. Invertase was detected in *P. commune*, *T. tamariscinum*, *S. cymbifolium*, *Brachythecium rivulare*, and *Dicranus majus*. The distribution of diastase and maltase is dependent on the presence of starch. In *P. commune* and *S. cymbifolium* the hexoses are the chief form in which the carbohydrates are translocated from the leaves. In *S. cymbifolium* sucrose is the first sugar to be formed in appreciable quantities after the application of light.—J. J. Dowling: A new form of very high resistance for use with electrometers. To measure very small currents by a steady deflection method, using an electrometer, very large resistances are required. The equivalent to such a large resistance may be obtained by alternately charging and discharging a condenser, as in Siemen's method for measuring small capacities. Assuming that the electrometer system has a capacity large compared with the condenser ( $c$  farads), which is intermittently connected to it ( $n$  times per second), the potential ( $V$ ), to which the electrometer system rises, when a current ( $i$ ) is flowing in, is given by the equation  $ncV=i$ . The arrangement is thus equivalent to a resistance  $R=i/nc$  ohms. Values of  $R$  up to  $10^{10}$  ohms have been worked with, but greater values may be obtained. If the condenser is not simply discharged each time, but charged with the opposite sign, the method may be used as a "zero" or a "compensation" method.

## PARIS.

**Academy of Sciences, November 22.**—M. Ed. Perrier in the chair.—L. Maquenne: The action of saccharose on the cupropotassic solution. In the action of alkaline copper solutions upon invert sugar, the reducing power is mainly dependent upon the proportion of alkali and only slightly affected by the proportion of copper. But with cane-sugar the reverse is the case; the action appears to be one of oxidation by the copper salt, and is not a result of hydrolysis by the alkali.—L. Guignard: New observations on the formation of pollen in certain Monocotyledons. In all the species of Iridaceæ examined the mode of division of the mother pollen cell resembles that typical in the Dicotyledons.—A. Blondel and F. Carbenay: The forced oscillations of an oscillating system with discontinuous damping.—P. Carrasco: The structure of the line spectrum of the solar corona. A photograph of the solar corona taken during the eclipse of August 21, 1914, gave a red line as the most prominent in the spectrum ( $\lambda 6374$ ). It is now shown that this line is included in Nicholson's series,  $\lambda=(18.5397-1.1029n)^2$ ,  $n$  having the values 0, 1, 2, 3, etc.—J. Haag: The calculation of time.—Gabriel Sizes: The resonance law of sonorous bodies.—L. Tschugaëff and L. Tschernijæff: The complex hydroxylamine compounds of bivalent platinum. An account of the preparation of all the members of the series  $Pt(NH_2.OH)_2(NH_3)_{1-n}X_2$ , of which only the extremes,  $Pt(NH_3)_2X_2$  and  $Pt(NH_2.OH)_2X_2$  were previously known.—M. Dalloni: The upper Miocene in the west of Algeria; the Hipparion layers of Tafna.—P. W. Stuart-Menteth: The lignites of Bidart-Biarritz.—Louis Lopicque: New methods for electrodiagnosis.—Charles Nicolle and Ludovic Blaizot: New researches on exanthematic typhus. The virus can be preserved indefinitely by transmission through guinea-pigs. During the fever, the unknown micro-organism of typhus is present in all the organs of the body, even when free from blood.—E. Vasticar: The terminations of the acoustic nerve.—H. Colin: The sterilisation of

water by carbonic acid under pressure. Water containing the Eberth bacillus is sterilised by carbonic acid in 20 hours under 10 kg. pressure, 8 to 20 hours under 15 kg., 3 to 9 hours under 20 kg., and 3 to 6 hours under 25 kg. pressure. Data for other micro-organisms are also given.

### BOOKS RECEIVED.

Mimicry in Butterflies. By Prof. R. C. Punnett. Pp. vi+188+plates xvi. (Cambridge: At the University Press.) 15s. net.

A Student's Book on Soils and Manures. By Dr. E. J. Russell. Pp. ix+206. (Cambridge: At the University Press.) 3s. 6d. net.

Soils and Plant Life as related to Agriculture. By Prof. J. C. Cunningham and W. H. Lancelot. Pp. xx+348. (New York: The Macmillan Co.; London: Macmillan and Co., Ltd.) 5s. net.

The Cambridge University Calendar for the Year 1915-1916. Pp. xxvi+1069. (Cambridge: At the University Press.) 7s. 6d. net.

A Course of Modern Analysis. By Prof. E. T. Whittaker and Prof. G. N. Watson. Second edition. Pp. 560. (Cambridge: At the University Press.) 18s. net.

U.S. Bureau of Education. Bulletin No. 27. Whole No. 654. Opportunities for Foreign Students at Colleges and Universities in the United States. Pp. 213. (Washington: Government Printing Office.)

Smithsonian Miscellaneous Collections. Vol. lxxv., No. 3. Hodgkins Fund: A Study of the Radiation of the Atmosphere. By A. Angström. Pp. v+159. (Washington: Smithsonian Institution.)

Homer and History. By Dr. W. Leaf. Pp. xvi+375. (London: Macmillan and Co., Ltd.) 12s. net.

Instinct and Intelligence. By N. C. Macnamara. Pp. 216. (London: H. Frowde and Hodder and Stoughton.) 6s. net.

Contributions from the Jefferson Physical Laboratory of Harvard University for the Years 1913 and 1914. Vol. xi. (Cambridge, Mass.)

Department of Education, Ontario. Educational Pamphlets, No. 9: Laboratory Accommodation in Continuation and High Schools and Collegiate Institutes. By G. A. Cornish. Pp. viii+144. (Toronto: L. K. Cameron.)

### DIARY OF SOCIETIES.

#### THURSDAY, DECEMBER 9.

ROYAL SOCIETY, at 4.30.—Croonian Lecture: The Respiratory Process in Muscle; and the Nature of Muscular Motion: Dr. W. M. Fletcher and Prof. F. G. Hopkins.

MATHEMATICAL SOCIETY, at 5.30.—The Vibrations of a Special Type of Dissipative System: H. Jeffreys.—Diffraction by a Wedge: F. J. W. Whipple.—Some Applications of the Two-three Birational Space Transformation: T. L. Wren.—The Circles which Touch the Escribed Circles of a Triangle: T. C. Lewis.

OPTICAL SOCIETY, at 8.—Improvements in Prismatic Compasses, with Special Reference to the Creagh-Osborne Patent Compass: A. Hughes.

#### FRIDAY, DECEMBER 10.

ROYAL ASTRONOMICAL SOCIETY, at 5.—(1) The Accuracy of Hagen's Chart of T Herculis, and on a possible new Variable Star; (2) Note on the number of faint stars with large Proper Motions: F. A. Bellamy.—The Theory of Star-streaming and the Structure of the Universe: J. H. Jeans.—(1) The Viscosity of the Earth, second paper; (2) The Figure of the Earth; a reply to Mr. Hinks: H. Jeffreys.—Note on Comet Mellish (1915a), 1915, October 4: F. Henroteau.—Preliminary Paper on recent lists of new Double Stars: E. Doolittle.—The Distribution of Stars in Globular Clusters: H. C. Plummer.—*Probable Papers*: The Magnitude Scales of the Astrographic Catalogue, ninth note: The Toulouse and Cape Magnitudes, with further remarks on the Obscured Region in the Sky as a Spiral: H. H. Turner.—Baxendell's Observations of Variable Stars, fifth instalment; No. 13, T Herculis and No. 14 R Leonis: H. H. Turner and Mary A. Blagg.

MALACOLOGICAL SOCIETY, at 7.—Note on the Oligocene of Tampa, Florida, the Panama Canal Zone, and the Antillean Region: Dr. W. H. Dall.—Description of Two New Species of Angasella: G. K. Gude.

#### MONDAY, DECEMBER 13.

ROYAL SOCIETY OF ARTS, at 4.30.—Optical Glass. III: Dr. W. Rosenhain. ROYAL GEOGRAPHICAL SOCIETY, at 8.30.—The Work of the Peru-Bolivia Boundary Commission: Sir T. H. Holdich.

VICTORIA INSTITUTE, at 4.30.—The Movements of the Stars: Prof. A. S. Eddington.

SOCIETY OF ENGINEERS, at 5.30.—Annual General Meeting.

#### TUESDAY, DECEMBER 14.

ROYAL ANTHROPOLOGICAL INSTITUTE, at 5.—The Evolution of the Earliest "Chelles" Palaeoliths from the Rostro-Carinate Implements: J. Reid Moir.

INSTITUTION OF CIVIL ENGINEERS, at 5.30.—"James Forest" Lecture, Electrical Railways: H. M. Hobart.

ILLUMINATING ENGINEERING SOCIETY, at 8.—Recent Developments in Electric Incandescent Lamps in Relation to Illuminating Engineering: Prof. J. T. Morris.

#### WEDNESDAY, DECEMBER 15.

ROYAL SOCIETY OF ARTS, at 4.30.—Carillons and Carillon Playing: J. J. Denyn and W. W. Starmer.

ROYAL METEOROLOGICAL SOCIETY, at 7.30.—The Incidence of Bright Sunshine over the United Kingdom during the thirty years, 1881-1910: F. J. Brodie.—Remarkable Cloud Phenomena: Dr. W. Galloway.—South African Coast Temperatures: Dr. J. R. Sutt-n.

ROYAL MICROSCOPICAL SOCIETY, at 8.—The Use of Ultra-violet Light in Microscopy: J. E. Barnard.

GEOLOGICAL SOCIETY, at 5.30.—Deep-Boring for Coal at Little Africk, near Missenden (Bucks): Dr. A. Strahan.

#### THURSDAY, DECEMBER 16.

ROYAL SOCIETY OF ARTS, at 4.30.—The Indian Jute Industry: C. C. McLeod.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—The Design of High-pressure Distribution Systems: J. R. Beard.

ROYAL GEOGRAPHICAL SOCIETY, at 5.—The Nature and Formation of Sand Ripples and Dunes: W. J. Harding King.

LINNEAN SOCIETY, at 5.—The Structure and History of Play: The Flating Fen of the Delta of the Danube: Miss Marietta Pallis.—The Seed-mass and Dispersal of *Helleborus fatidus*, Linn.: T. A. Dymes.—Sample of "Figured Ebony," with Specimens of Walking-sticks Manufactured from it by Messrs. Henry Howell & Co.: B. Daydon Jackson.—The Reproduction of Protodrilus; E. S. Goodrich.

#### FRIDAY, DECEMBER 17.

INSTITUTION OF MECHANICAL ENGINEERS, at 6.—Engineering Colleges and the War: Dr. R. Mullineux Walmsley and C. E. Larard.

### CONTENTS.

	PAGE
National Needs . . . . .	391
The Chlorine Industry . . . . .	393
Oil Seeds and their Products. By E. J. R. . . . .	394
Public Health Administration . . . . .	395
Our Bookshelf . . . . .	396
Letters to the Editor:—	
The Principle of Similitude.—E. Buckingham . . . . .	396
Grime's Graves Flint Mines.—J. Reid Moir; A. S. W. . . . .	397
Discovery of a Skeleton of "Elephas Antiquus" at Upnor, near Chatham. ( <i>Illustrated.</i> ) By Dr. Chas. W. Andrews, F.R.S. . . . .	398
Bacterised Peat as a Fertiliser. ( <i>Illustrated.</i> ) By Prof. Frederick Keeble, F.R.S. . . . .	399
Dysentery and War. By Prof. R. T. Hewlett . . . . .	400
Oils and Fats as War Supplies . . . . .	401
Prof. C. R. Zeiller. By Prof. A. C. Seward, F.R.S. . . . .	402
Prof. F. R. Barrell . . . . .	402
Notes . . . . .	403
Our Astronomical Column:—	
A New Comet . . . . .	408
The Solar Rotation . . . . .	408
Galactic Co-ordinates . . . . .	408
A Martian Calendar . . . . .	408
The Centenary of the Société Helvétique des Sciences Naturelles. By Grace Chisholm Young . . . . .	408
The Conch Shell of India . . . . .	410
Luminous Insects. By K. G. Blair . . . . .	411
University and Educational Intelligence . . . . .	415
Societies and Academies . . . . .	416
Books Received . . . . .	418
Diary of Societies . . . . .	418

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