

THE seventeenth annual conference of the Parents' National Educational Union will be held at the Caxton Hall, Victoria Street, S.W., on May 5. Among the subjects of papers are:—Education and social sympathy, J. St. G. Heath; the reading habit and a wide curriculum, Miss C. M. Mason; knowledge and learning, Stanley Leathes, C.B.; and knowledge and its relation to national efficiency, J. L. Paton. Further particulars may be obtained from Miss Parish, 26 Victoria Street, S.W.

THE University of Edinburgh announces the establishment, in October next, of a mathematical laboratory for practical instruction in numerical, graphical, and mechanical calculation and analysis, as required in applied mathematical sciences and for research in connection with the mathematical department. A course of practical work has been drawn up by Prof. E. T. Whittaker, F.R.S., including methods of interpolation, graphic solution of equations, practical Fourier analysis, use of calculating instruments, and calculations of elliptic functions, Bessel functions, gamma functions, and, indeed, new functions not previously tabulated. Prof. Whittaker proposes to give sufficient theoretical explanation to render the more advanced work intelligible to those who have not previously studied the functions of higher analysis.

THE Board of Agriculture and Fisheries proposes to award in October next twelve research scholarships in agricultural science, of the annual value of 150*l.*, and tenable for three years. These scholarships have been established in order to train promising students under suitable supervision, with the view of their contributing to the development of agriculture, either by carrying out independent research, or by acting in an advisory capacity to agriculturists. They will be granted only to students who show distinct promise of capacity for advanced study and research in some one of the sciences bearing on agriculture. Applicants must be graduates of a university, or holders of a diploma of a university or college of university rank, and application should be made not later than June 9 on a form to be obtained from the secretary, Board of Agriculture and Fisheries, Whitehall Place, London, S.W.

THE annual conference of the Association of Teachers in Technical Institutions will be held this year in Bradford at Whitsuntide. The proceedings will be opened on Whit-Monday, when the Lord Mayor of Bradford, Alderman Fred Foster, will officially welcome the conference to Bradford. This will be followed by the address of the president, Mr. P. Coleman, of the Northern Polytechnic Institute. The meeting on Tuesday evening will be addressed by the Right Hon. J. A. Pease, President of the Board of Education, and in view of the introduction of the new Education Bill soon after Whitsuntide, this address will be looked forward to with exceptional interest. This meeting will also be addressed by Dr. M. E. Sadler, Vice-Chancellor of the University of Leeds, Sir William Priestley, M.P., Sir Alfred Keogh, K.C.B., rector of the Imperial College of Science and Technology, Mr. F. W. Jowett, M.P., and others. Papers will be read to the conference on corporate life in a technical institution, by Mr. W. Hibbert, the Polytechnic, Regent Street; vocational education, by Mr. A. C. Coffin, director of education, Bradford, and coordination within a county area, by Mr. F. N. Cook, secretary for higher education in the West Riding of Yorkshire.

THE January issue of the Bulletin of the Massachusetts Institute of Technology contains the report of the president, Dr. R. C. Maclaurin, presented to the

governing body of the institute in December last. Taken in conjunction with that of the previous year, the report shows that during the last eighteen months nearly 1,400,000*l.* has been paid or promised by way of gift to the Massachusetts Institute of Technology. The principal items include 600,000*l.* for buildings, 160,000*l.* for land, 320,000*l.* for general endowment, 150,000*l.* for endowment of the department of naval architecture, 40,000*l.* for scientific research, and 100,000*l.* for scholarships. It is not surprising to find that the institute attracts students from all parts of the United States, and, indeed, from all parts of the world. Students come in large numbers from China, South America, Canada, and in considerable numbers from Europe, India, Egypt, South Africa, and a few from Australia. The proportion of foreign students at the institute is more than double that at almost any other institution in the United States. The number of students on November 1 last reached 1611, the largest in the history of the institute. The total number of members of the teaching staff for these students was 254, of whom 56 were full professors, while there were, in addition, 16 research professors.

SOCIETIES AND ACADEMIES.

Royal Society, April 17.—Sir Archibald Geikie, K.C.B., president, in the chair.—Dr. W. Watson: The luminosity curves of persons having normal and abnormal colour vision. The author has calculated the form of the luminosity curves corresponding to different degrees of deficiency of the red and green sensation, and shows that in the great majority of cases of colour blindness the observed points agree with the calculated curves, and hence the correctness of Sir W. Abney's sensation curves and his theory as to partial colour blindness is supported. The cases of abnormal luminosity curves given by persons having normal colour vision are shown to be probably due to variation in macular pigmentation.—Prof. W. H. Bragg and W. L. Bragg: The reflection of X-rays by crystals. The paper deals with the reflection of a beam of X-rays by the cleavage faces of various crystals, an ionisation method being employed to measure the strength of the reflected rays. The apparatus corresponds to a spectrometer, the parallel planes in which the atoms of the crystal are arranged taking the place of the lines of a grating, and the ionisation chamber that of a telescope. A fine slit in front of the X-ray bulb allows a beam of rays to fall on the face of the crystal, and both crystal and ionisation chamber turn about the axis of the instrument and can be set at any desired angles. By this method evidence has been found of the existence of three very homogeneous components in the rays from the bulb employed, which are only reflected from the crystal at definite angles. They show as a very strong reflection superimposed on the general reflection which takes place at all angles. Each of these has a definite absorption coefficient in aluminium, and can be recognised when reflected from many crystals. The absorption of the homogeneous rays in different metals corresponds in all respects to the absorption of characteristic X-rays.—Prof. J. C. McLennan: A fluorescence spectrum of iodine vapour.—Dr. W. Wahl: The relation between the crystal-symmetry of the simpler organic compounds and their molecular constitution. Part I.—Prof. H. E. Armstrong and E. E. Walker: Studies of the processes operative in solutions. XXVIII., The causes of variation in the optical rotatory power of organic compounds and of anomalous rotatory dispersive power. Attention is directed to the explanation of the anomalous rotatory dispersive power displayed by some organic compounds,

notably, the tartrates, which was given by Biot, the original discoverer of optical rotatory power, viz. that it may be due to the presence of two compounds of opposite rotatory power (+ and -) differing in rotatory dispersive power. This explanation appears to have been generally overlooked. The behaviour to be expected of compounds varying in their optical properties in different ways is discussed. The results arrived at serve to explain the apparently abnormal variation in optical behaviour often noticed in optically active compounds; they also appear to be of significance as indicating a relation among solvents generally and underlying their action towards substances generally of a very definite and regular character; each solvent would seem to have its definite sphere and mode of action, so that any two solvents behave relatively always in the same way towards solutes generally, apart from the exceptional cases in which some special property of the solute comes into operation to disturb regularity of action.

Geological Society, April 9.—Dr. Aubrey Strahan, F.R.S., president, in the chair.—Dr. G. Hickling: The variation of *Planorbis multiformis*, Bronn. The writer gives an account of an investigation of the above-named Miocene gasteropod, based on a suite of 532 specimens from a single block of stone. A study was made of the variation in height presented by the shells, which include every gradation between perfectly discoid forms and types with a spire the height of which considerably exceeds the diameter of the base. By sorting the whole of the shells into ten grades, according to height, it was shown that forms of mean height were common, while extreme forms were rare, the height being distributed, in fact, according to a typical "variation-curve." If more than one species were really present, it is in the highest degree improbable that the various types should be distributed in the proportions actually found, and this is taken as the most satisfactory proof possible of the specific unity of the group. It is shown that the shells also vary extensively in respect of the amount of carination, the degree of involution, the form of cross-section of the whorls, the form of aperture, and the stage of development at which various characters are acquired, the variation in each character being, however, "continuous."—Miss M. Colley March: The structure and relationships of the Carbonicolæ. The evidence for the relationship of the Carbonicolæ to the Unionidæ, based on shell-structure, muscle-scars, form, habitat, ligation, and hinge-teeth, appears insufficient.

Physical Society, April 11.—Prof. C. H. Lees, F.R.S., vice-president, in the chair.—A. Campbell and H. C. Booth: Errors in magnetic testing due to elastic strain. In magnetic tests on sheet material considerable errors may occur if the sheets or strips are tested while in bent form. These errors, which are in general agreement with the known effects of compression and tension, were investigated experimentally with one or two forms of magnetic circuit similar to those sometimes occurring in practice.—Dr. G. W. C. Kaye: Note on cathodic sputtering. The paper gives an account of the volatilisation of an aluminium kathode in a discharge tube containing helium. The sputtered deposit on the glass indicates that, under the conditions which prevailed, the disintegration was restricted to the edges of the kathode and did not occur elsewhere. Accordingly the complete outline of the kathode (made by rolling a sheet of aluminium into a nearly complete cylinder) was traced out by the deposit on the walls of the tube.—A. Campbell: Vibration galvanometers with unifilar torsional control. The author exhibited a moving-coil

vibration galvanometer in which a novel principle is used to obtain the fine adjustment of the control torque requisite for accurate tuning.

DUBLIN.

Royal Dublin Society, April 15.—Dr. James H. Pollok in the chair.—Prof. H. H. Dixon and W. R. G. Atkins: Extraction of zymase by freezing. Yeast frozen solid by exposure to liquid air, and centrifuged when thawed, gives up its sap. The sap thus extracted amounts to about one-third of the volume of the yeast originally treated. It is free from fermentable carbohydrates, but actively ferments cane-sugar when supplied to it. Its activity, in the samples examined, was as great as that of the extract prepared from the same samples by Lebedeff's maceration method. The method of extraction by means of liquid air has the advantage of great rapidity. Culture experiments show that the yeast is killed by exposure to the temperature of liquid air.—Prof. H. H. Dixon and W. R. G. Atkins: Osmotic pressures in plant organs. III., The osmotic pressure and electrical conductivity of yeast, beer, and wort. Measurements of osmotic pressure were made by the thermo-electric method of cryoscopy previously described. The yeast juice was obtained by freezing the yeast in liquid air and centrifuging the resultant liquid mass. It was found that ordinary yeast has an osmotic pressure of about 41 atm., that of wort being about 14. Thus there is a marked rise in pressure during fermentation. The impermeability of the yeast cell to electrolytes is shown by the conductivity of the juice being about four times as great as that of the beer, which is practically the same as that of the unfermented wort. Both the osmotic pressure and electrical conductivity of pressed yeast are greater than is the case in actively fermenting yeast.—R. Lloyd Praeger: The buoyancy of the seeds of some Britanic plants. The importance of the question of the buoyancy of seeds in water in connection with the dispersal and distribution of plants has been long recognised. The experiments of Darwin, Martins, Thuret, and Guppy lead to the generalisation that only about one-tenth of a flora bear seeds capable of more than a very brief period of buoyancy. The present experiments were undertaken in order to furnish further data for a study of the dispersal of our native species. Hitherto results were available for about 330 native species. The number of species tested is now raised to 900. The results bear out the conclusion already mentioned; also Guppy's conclusion that the buoyant seeds belong mainly to maritime and marsh species. Some results relating to fresh and dried fleshy fruits and also to fruiting branches are given.

PARIS.

Academy of Sciences, April 14.—M. F. Guyon in the chair.—Emile Picard: Application of the theory of integral equations to certain problems in the analytical theory of heat on the hypothesis of a sudden rise of temperature at the surface of separation of the bodies in contact.—J. Boussinesq: The velocity of slow fall of a liquid spherical drop, after becoming uniform, in a viscous liquid of slightly greater density than the falling drop.—M. Landouzy was elected a member of the section of free academicians in the place of the late M. Teisserenc de Bort.—G. de Saint-Aubin: An apparatus allowing of a variation of the carrying surface of an aeroplane. The apparatus consists of two auxiliary planes with surfaces of slight curvature, with their centres of sustentation for a given angle of attack on the same line passing through the centre of sustentation of the ordinary planes of the aeroplane. J. Guillaume: Observations of the sun made at the

Observatory of Lyons during the fourth quarter of 1912. Tables are given of the number of spots, their distribution in latitude, and the distribution of the faculæ in latitude. Observations were possible on fifty-nine days.—**J. Lagrula**: A new method for the rapid visual search for the small planets. The method is based on the application of binocular vision, combined with the use of a coloured screen. The presence of a small planet in the field can be proved in less than a minute. An error of position of the asteroid 233, *Asterope*, was detected on the night of April 1 in less than five minutes.—**M. Tzitzéica**: A generalisation of non-Euclidean minimal surfaces.—**G. Valiron**: Integral functions of finite order.—**Georges Rémondos**: The series and families of algebraic functions in a domain.—**G. Pólya**: The method of Graeffe.—**M. Gunther**: The characteristics of systems of partial differential equations.—**Albert Turpain**: The reception in the Morse code of radio-telegrams with simultaneous photographic record. Diagrams showing the results obtained by the system of relays described in an earlier communication (March 17).—**M. de Broglie**: The reflection of the Röntgen rays. Reproductions of photographs obtained by the reflection of Röntgen rays by various crystals at a grazing angle. The exact interpretation of the results is still uncertain.—**H. Guilleminot**: The variation of the electrical resistance of selenium when irradiated by the Röntgen rays and by radium rays. The results are given in a table showing the fall of resistance of a selenium cell under the action of the X-rays; a preliminary study of the effects of varying voltage and temperature was necessary. Similar measurements were made with exposure to radium rays, but the results are not given.—**Camille Matignon**: The reduction of magnesia by aluminium. A mixture of aluminium powder and magnesia, heated to 1200° C. in a vacuous steel tube, the upper portion of which was kept cool, gave metallic magnesium as crystals in the cold portion. The yield of magnesium was good.—**L. C. Maillard**: The formation of humus by the action of polypeptides on sugars.—**Paul Gaubert**: The polymorphism of codeine, thebaine, and narcotine. A new type of sphaerolite.—**L. Collot**: The celestine of the sedimentary strata.—**G. André**: The evolution of the mineral and nitrogenous materials in some annual plants.—**F. Baco**: Comparative budding of grafted and ungrafted vines.—**Jules Glover**: An intensive physiological telephone. The action of the current on the receiving magnet of the telephone does not depend on its strength so much as on the variations in strength. The new arrangement described is based on the study of the physiological causes of these variations.—**B. Roussy**: The mathematical theory of the geometric law of the surface of the human body. The body is pictured as consisting of twenty-six truncated cones and a formula derived for obtaining the true surface. Various approximations are discussed.—**Raphaël Dubois**: Microzymas, coccoliths, and vacuolids.—**Charles Nicolle, A. Cuénod, and L. Blaizot**: Some properties of the virus of trachoma. Immunity in trachoma. The Algerian ape (*Macacus inuus*) contracts trachoma, but throws off the disease completely in from one to three months. Immunisation experiments were carried out on this animal with successful results; results of the application of similar treatment to man are also given.—**Charles Lepierre**: The replacement of zinc by uranium in the culture of *Aspergillus niger*. Uranium can replace zinc in Raulin's fluid: the stimulation of growth of the mould is less intense, however, with uranium than with zinc.—**E. Voisenet**: New researches on a ferment of bitter wines. A bacillus has been isolated, named *Bacillus amaracrylus*, which produces all the characteristics

of bitterness in wines. It converts glycerol partially into acrolein, to which the bitter taste is due, the other products formed including hydrogen, carbon dioxide, ethyl alcohol, and various fatty acids.—**M. Piettre and A. Vila**: The preparation of fibrinogen by dialysis on saccharose syrup.—**L. Cayeux**: The sedimentary iron minerals considered in their relations with the destruction of mountain chains.—**I. Assada**: The levels of the Lyons plateau.—**M. Durand-Gréville**: The laws relating to wind-storms causing a kink in the barometric chart.—**De Montessus de Ballore**: Destructive earthquakes and atmospheric precipitations.

CALCUTTA.

Asiatic Society of Bengal, April 2.—**R. Gurney**: Entomostraca from Lake Tiberias. Dr. Annandale obtained eight species of Entomostraca in the Lake of Tiberias and in small pools near it. Eight other species were bred from earth taken from a dried-up pool between Tiberias and Nazareth. The collection does not comprise any forms hitherto unknown.—**D. Hooper**: Sarcocolla. This is a description of a drug known to the early Greek and Arabian physicians, and used largely in India. It is the gum of *Astragalus fasciculifolius*, Buissier, a spiny shrub growing in Persia. Chemical examination shows that it consists principally of a peculiar glucoside differing from saponin and glycyrrhizin.

BOOKS RECEIVED.

Bulletin International. Résumés des Travaux Présentés. Classe des Sciences Mathématiques, Naturelles et de la Médecine. xvii^e Année. Pp. iii+419+plates. (Prague: L'Académie de Sciences de l'Empereur François Joseph.)

Icones Plantarum Formosanarum nec non et Contributiones ad Floram Formosanam, or Icones of the Plants of Formosa, and Materials for a Flora of the Island, based on a Study of the Collections of the Botanical Survey of the Government of Formosa. By B. Hayata. Fasc. ii. Pp. ii+156+xl plates. (Taihoku: Bureau of Productive Industries, Government of Formosa.)

Reprints of Papers from the Science Laboratories of the University of Sydney, 1908-9 to 1911-12. (Sydney.)

A Manual of Agricultural Chemistry. By H. Ingle. Third edition. Pp. 397. (London: Scott, Greenwood and Son.) 7s. 6d. net.

The Fauna of British India, including Ceylon and Burma. Hymenoptera. Vol. iii. By C. Morley. Pp. xxxvi+531+1 plate. (London: Taylor and Francis.) 20s.

Nomography, or the Graphic Representation of Formulæ. By Capt. R. K. Hezlet. Pp. iv+54. (Woolwich: Royal Artillery Institution.) 2s. 6d.

A Handbook of Forestry. By W. F. A. Hudson. Pp. ix+82. (Watford: Cooper Laboratory for Economic Research.) 2s. 6d. net.

Verhandlungen der Schweizerischen Naturforschenden Gesellschaft. 95 Jahresversammlung vom 8-11 September 1912 in Altdorf. Teil I. Pp. vii+210+171+plates. Teil II. Pp. vii+251+2 plates. (Aarau: H. R. Sauerländer et Cie.)

The Works of Aristotle, translated into English. De Coloribus. By T. Loveday and E. S. Forster. (Oxford: Clarendon Press.) 5s. net.

A Manual of Petrology. By F. P. Mennell. Pp. iv+256. (London: Chapman and Hall, Ltd.) 7s. 6d. net.