

### UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

THE geophysical discussions arranged by the Geophysical Committee of the British Association on November 7 and December 5 were well attended and very successful. The meetings will begin again in February, and will continue until June inclusive. At the February meeting Dr. A. Strahan will be in the chair, and the speakers will be Col. Close, on the effect of variation of barometric pressure on mean sea-level, and Major Henrici, on precise levelling. At the March meeting Sir Napier Shaw will be in the chair, and Prof. H. H. Turner will open a discussion on seismology, in which it is expected that Mr. G. W. Walker and Mr. R. D. Oldham will take part.

MR. BERTRAND RUSSELL'S lectures on the "Philosophy of Mathematics," at Dr. Williams's Library, Gordon Square, W.C.1, have been so successful that a second course, to be given after Christmas, has now been arranged. The new course will be quite distinct, and, like the present, will be designed to expound the logical basis of mathematics. The lectures presuppose no special mathematical training, and technical terms and symbols are dispensed with. The present course, which concludes on December 18, has dealt with the more specially mathematical questions. The new course will be devoted to philosophical problems, and Mr. Russell will expound his theory of logical atomism. The lectures are on Tuesday evenings at 5 o'clock; they will begin on January 22.

MR. ASQUITH, in his address in the Town Hall, Birmingham, on Tuesday, December 11, at a meeting promoted by the National War Aims Committee, referred to problems of reconstruction, and is reported by the *Daily Telegraph* to have said:—"In regard to these matters, you will not be surprised if I put in the forefront, as of paramount importance, a comprehensive rebuilding, and a far more adequate equipment, from the very bottom to the very top, of our system of national education, of which the Bill introduced by Mr. Fisher gives the hope, and, indeed, the promise. To put it from the lowest and most material point of view, it is largely, indeed mainly, through our educational deficiencies that we have either lost or never established some of those basic industries which no great country can afford to be without. The future relations of employers and employed will have to be readjusted, starting from the proposals, which I believe to be in spirit and principle almost universally accepted, of the Whitley Report, with developments for securing greater elasticity, more representative authority, and a more vital contact with new conditions, in the organisation of both; and, above all, with the purpose of achieving for men, women, and children opportunities, which were never given them under the old factory system, for a freer, a more self-developed, a humaner life."

### SOCIETIES AND ACADEMIES.

LONDON.

**Royal Society**, December 6.—Sir J. J. Thomson, president, in the chair.—Prof. W. H. Young: The series of Legendre.—L. Hartshorn: The discharge of gases under high pressures. It is well known that when gas discharges through an orifice from a vessel in which the pressure is  $p_0$  into one in which it is  $p_1$ , the rate of discharge is approximately constant from  $p_1=0$  upwards to some critical value, but then, as  $p_1$  further increases, the discharge falls off, slowly at first, afterwards with greater rapidity. In the present investigation, this phenomenon is examined with greater accuracy than has hitherto been obtained. In every

case it was found that the flow was constant to at least one part in 10,000 for a considerable range of  $p_1$ . The critical value of  $p_1$ , at which the flow began to change, varied widely for different nozzles, being about  $0.2 p_0$  for the convergent and parallel ones, but as high as  $0.7 p_0$  for certain divergent ones. Thus, the theoretical value for convergent nozzles, viz.,  $0.527 p_0$ , cannot be accepted as applying even approximately to all nozzles.—Lt.-Col. A. G. Hadcock: Internal ballistics. This paper deals with the burning of the explosive in the gun and the expansion of the gas, both before and after the charge has been consumed. On firing the gun the action is threefold:—(1) The driving band on projectile is forced into the rifling grooves. (2) In subsequent burning of charge, the gas from any fraction of charge expands with consequent reduction of temperature. The still burning powder gives additional heat. The expansion is thus partly adiabatic and partly isothermal. (3) After the charge is consumed the gas expands adiabatically. From expressions given in the paper, and knowing the rate of burning of cordite under various pressures, formulæ are developed for finding velocity of projectile, position in gun, and pressure of gas. The magnitude and position of maximum pressure are found by a further development of formulæ.—Dr. A. Russell: The electrostatic problem of a conducting sphere in a spherical cavity. The author gives formulæ by means of which the capacity, the electric force between the spheres, and the maximum electric stress on the dielectric between them can be readily computed in all cases to any required degree of accuracy. The solutions of these problems are required when determining the ratio of the measure of the electrostatic to the electromagnetic unit of charge by means of a spherical condenser for the calibration of a spherical condenser of variable capacity, for the calibration of a high-tension voltmeter, and for the determination of the electric strengths of insulating materials.—Prof. G. N. Watson: The zeros of Bessel functions. The paper contains a statement and discussion of some general theorems concerning the zeros of Bessel functions; the theorems are true for functions of any order, and, unlike results previously known, are of particular interest in the case of functions of high order. It appears that comparatively general considerations of a non-arithmetical type yield fairly precise information concerning the position and numbers of the zeros of the Bessel functions of the first kind. It is doubtful whether results of this character could be obtained without making use of the method of steepest descents which has been prominent in various recent investigations.

**Aristotelian Society**, December 3.—Dr. H. Wildon Carr, president, in the chair.—F. C. Bartlett: The development of criticism. An attempt to trace broadly the development of criticism reveals four main stages—the simply appreciative, the conventional, the rational, and the intuitional. At the first, criticism is the immediate outcome of the feeling accompanying ease or hesitation of reaction; at the second, a situation or object is criticised by virtue of its relation to a mass of preceding experience, the latter remaining relatively vague and unanalysed; at the third, definite rules of criticism are developed; at the fourth, the verdict passed is regarded as the outcome, on one hand, of the peculiar nature of the object, and, on the other, of the relation of the object to the critic. Affective factors play a dominant part throughout in the production of criticism, while the direction of development is determined by a persistent "effort after meaning."

**Mathematical Society**, December 6.—Prof. H. Hilton, vice-president, in the chair.—Col. R. L. Hippiusley: A new method of describing a three-bar curve.—O.

**Hoppe**: Proof of the primality of  $N = \frac{1}{2}(10^{19} - 1)$ .—Messrs. **Hardy** and **Littlewood**: New Tauberian theorems.—**C. V. H. Rao**: The curves which lie on the quartic surface in space of four dimensions, and the corresponding curves on the cubic surface and the quartic with a double conic.—**Prof. W. H. Young**: (1) The connection between Legendre series and Fourier series. (2) Series of Bessel functions.

## PARIS.

**Academy of Sciences**, November 26.—**M. Camille Jordan** in the chair.—**G. Humbert**: The development of irrational quadratics in a Stephen Smith continued fraction.—**H. Le Chatelier** and **B. Bogitch**: Silica bricks were prepared with different proportions of large quartz grains (4 mm.), and fine (0.1 mm.) or alternatively impalpable (0.01 mm.) quartz powder. The resistance to crushing of the silica bricks was determined at 1600° C., and cold. The substitution of fine quartz for impalpable reduced the strength at 1600° C. in a very marked manner; 75 per cent. of quartz grog to 25 per cent. impalpable quartz powder, with 2 per cent. of lime as cement, gave the best results. The crushing resistances of silica bricks, measured cold, do not necessarily correspond with the resistances measured at 1600° C.—**E. Perrier**: The exchanges of fauna between the sea and fresh water and the consequences from the point of view of sexuality.—**E. L. Bouvier**: The distribution of fresh-water crabs of the family of the Potamonidae.—**C. Guichard**: The C networks such that the Laplace equation which corresponds with them is integrable.—**P. Humbert**: Expression of the Legendre function of the second species.—**F. Ventre**: Theorem on rolling loads.—**Mlle. Y. Dehorne**: The microscopic constitution of the skeleton of the Stromatoporidae.—**J. Feytaud**: The parthenogenetic reproduction of *Otiiorhynchus sulcatus*.—**A. Vernes**: The precipitation of colloidal ferric hydroxide by human serum, normal or syphilitic. If human serum is added in gradually decreasing quantities to the same amount of colloidal ferric hydroxide, with subsequent digestion at 37° C., at first there is no flocculation, then for a certain concentration of the serum there is complete flocculation. The phenomenon is periodic, decreasing amounts of serum giving alternately flocculation and no flocculation. With syphilitic serum the results are different, and it is possible to prepare a fine suspension of a determined stability which will flocculate with a certain amount of syphilitic serum, but will not flocculate with the same amount of normal serum.—**I. Duceing**: The publication of MM. Heitz-Boyer and Scheikevitch concerning the rôle of bone in osteogenesis in the adult, the relations of osteogenesis with infection, and the corresponding applications.

## BOOKS RECEIVED.

My Four Years in Germany. By J. W. Gerard. Pp. xiv+320. (London: Hodder and Stoughton.) 7s. 6d. net.

Il nostro Soldato Saggi di Psicologia Militare. By A. Gemelli. Pp. xii+339. (Milano: Fratelli Treves.)

Report on Agricultural Damage by Vermin and Birds in the Counties of Norfolk and Oxfordshire in 1916. By R. T. Gunther. Pp. 92. (London: Oxford University Press.) 2s. 6d. net.

## DIARY OF SOCIETIES.

THURSDAY, DECEMBER 13.

ROYAL SOCIETY, at 4.30.—The Formation of Nitrites from Nitrates in Aqueous Solution by the Action of Sunlight and the Assimilation of the Nitrites by Green Leaves in Sunlight: Prof. B. Moore.—The Transition from Rostro-carinate Flint Implements to the Tongue-shaped Implements of River-terrace Gravels: J. R. Moir.

LINNEAN SOCIETY, at 5.—Seeds with a Stony Endocarp and their Germination: A. W. Hill.—*Inter se* Experiments in Pheasant Crossing in evidence of Mendel's Law: Mrs. R. Haig Thomas.

ROYAL SOCIETY OF ARTS, at 4.30.—The Trade of India with Russia, France, and Italy: D. T. Chadwick.

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OPTICAL SOCIETY, at 8.—Proposed Standard Optical Notation and Sign Convention: J. W. French.—Optical Nomenclature and Symbolism: T. Smith.

INSTITUTION OF ELECTRICAL ENGINEERS, at 6.—Discussion on the Metric System. Introductory Papers by L. B. Atkinson and A. J. Stubbs.

FRIDAY, DECEMBER 14.

ROYAL ASTRONOMICAL SOCIETY, at 5.—(1) The Determination of Photographic Magnitudes. II.; (2) Prof. Sampson's Note on the Southern Magnitude Distribution: J. Halm.—The Classification of Long-Period Variable Stars: H. H. Turner.—The Resonance Theory of the Origin of the Moon: H. Jeffreys.—Variations in the Fourteen Months' Component of the Polar Motion: Hisashi Kimura.—Further Notes on the General Solution of Hill's Equation: E. Lindsay Ince.—The Errors in a Sum of Tabular Quantities: H. C. Plummer.—*Probable Paper*: The Short-Period Variable RZ Cephei: C. Martin and H. C. Plummer.

INSTITUTION OF MECHANICAL ENGINEERS, at 6.—The Use of Soap Films in Solving Torsion Problems: A. A. Griffith and G. I. Taylor.

MONDAY, DECEMBER 17.

ARISTOTELIAN SOCIETY, at 8.—The Conception of Reality: Dr. G. E. Moore.

ROYAL GEOGRAPHICAL SOCIETY, at 5.—The Drift of the *Endurance*: 2nd Lieut. J. M. Wordie.

ROYAL SOCIETY OF ARTS, at 4.30.—Progress in the Metallurgy of Copper: Prof. H. C. H. Carpenter.

VICTORIA INSTITUTE, at 4.30.—The Mosaic Origin of the Pentateuch: Rev. A. H. Finn.

SOCIETY OF ENGINEERS, at 5.—High-speed Railways: E. W. C. Kearney.

TUESDAY, DECEMBER 18.

INSTITUTION OF CIVIL ENGINEERS, at 5.30.—The Buenos Aires Western Railway Tunnels under the City of Buenos Aires: W. L. L. Brown.

ROYAL STATISTICAL SOCIETY, at 5.15.

ILLUMINATING ENGINEERING SOCIETY, at 5.—Presidential Address: A. P. Trotter.

INSTITUTION OF PETROLEUM TECHNOLOGISTS, at 8.—The Prospective Oil-fields of Barbadoes: E. H. C. Craig.

WEDNESDAY, DECEMBER 19.

ROYAL METEOROLOGICAL SOCIETY, at 5.—Computation of Wind Velocity from Pilot-Balloon Observations: P. Bolton.—The Use of Monthly Mean Values in Climatological Analysis: E. G. Bilham.

ROYAL SOCIETY OF ARTS, at 4.30.—Science and the Cold Storage Industry: Prof. J. Wemyss Anderson.

GEOLOGICAL SOCIETY, at 5.30.

ROYAL MICROSCOPICAL SOCIETY, at 8.—Cytology and Genetics: Prof. W. Bateson.

THURSDAY, DECEMBER 20.

INSTITUTION OF MINING AND METALLURGY, at 5.30.—A Neglected Chemical Reaction and an Available Source of Potash: E. A. Ashcroft.—Syphoning Gravel: J. Jervis Garrard.

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