Calendar of Scientific Pioneers.

March 3, 1702. Robert Hooke died.—One of the earliest and most vigorous members of the Royal Society, Hooke was Gresham professor of astronomy. He constructed the first Gregorian telescope, first applied a spiral spring for the regulation of watches, pointed out the real nature of combustion, and proposed to measure the force of gravity by means of a pendulum. He died in the old Gresham College, and is buried in St. Helen's Church, Bishopsgate.

March 3, 1808. Johann Christian Fabricius died.—Professor of natural history at Copenhagen and then at Kiel, Fabricius by his writings exercised great influence on the development of entomology.

March 3, 1879. William Kingdon Clifford died.—A brilliant mathematician and thinker, Clifford died at the age of thirty-three while occupying the chair of applied mathematics in University College, London.

March 5, 1827. Pierre Simon, Marquis de Laplace died.—The son of a poor farmer of Normandy, Laplace went to Paris at the age of eighteen. There he was befriended by D'Alembert, and speedily rose to a high position among the group of distinguished men of science who adorned France during the Revolutionary period. An astronomer, physicist, and mathematician, his "Mécanique Céleste," published in five volumes between 1799 and 1825, is regarded as one of the noblest monuments of human genius. His tomb is in the Père Lachaise Cemetery, near that of Molière's.

March 5, 1827. Alessandro Volta died.—Born in Como in 1745, Volta was for twenty-five years professor of natural philosophy at Pavia. His invention of the voltaic pile was made in 1799, and the following year he communicated his discovery through Sir Joseph Banks to the Royal Society. So great was the interest raised by Volta's invention that Napoleon called him to Paris in order to see the experiments. At the Centenary Exhibition at Como in 1899 Volta's books and papers and much of the apparatus he left were destroyed by fire.

March 5, 1866. William Whewell died.—A man of encyclopædic knowledge, Whewell was for many years Master of Trinity College, Cambridge. He wrote much on scientific subjects, and made important additions to the theory of tides.

March 6, 1908. William Edward Wilson died.—After accompanying Huggins on an eclipse expedition to Oran, Wilson set up an observatory at Danamona, Westmeath. He carried out notable investigations on the temperature of the sun.

March 7, 1904. Ferdinand André Fouqué died.—A professor of the Collège de France, Fouqué was one of the earliest workers in the field of the microscopic examination of rocks and minerals, of which Sorby was the great pioneer.

March 9, 1851. Hans Christian Oersted died.—Twenty years after Volta's invention of the voltaic pile, Oersted, then professor of natural philosophy at Copenhagen, made the observation that a wire uniting the ends of a voltaic battery affected a magnet in its vicinity. Following up this discovery, in 1820 he published his tract, "Experiments on the Effects of Opposing Electricity upon the Magnetic Needle," the effect of which was described by Forbes as instantaneous and wonderful. The ideas of Oersted were seized upon by Ampère, Arago, Davy, Seebeck, and Faraday, and in their hands led to rapid development of the science of electromagnetism, of which Oersted is rightly regarded as one of the founders.

E. C. S

Societies and Academies.

LONDON.

Royal Society, February 17.—Prof. C. S. Sherrington, president, in the chair.—Dr. C. **Chree**: A comparison of magnetic declination changes at British observatories. A comparison is made of mean monthly, daily, and hourly values at different stations, and of the relative amplitudes of the oscillatory movements which frequently occur even on comparatively quiet days. Use is made of magnetic curves from Eskdalemuir, Stonyhurst, Falmouth, and Kew observatories.—Prof. H. M. **Macdonald**: The transmission of electric waves around the earth's surface.—Prof. T. H. **Havelock**: The stability of fluid motion. The object is to illustrate the use of the criterion, introduced by Reynolds and modified by Orr, as a measure of the degree of stability of various fluid motions under different boundary conditions. Cases examined are the flow of a stream with a free surface, and the flow between fixed planes under different fields of force and boundary conditions of no slip or no tangential stress or constant normal pressure due to the disturbance from the steady state.—Prof. W. H. **Young**: The transformation of integrals.—Dr. J. L. **Haughton** and Kathleen E. **Bingham**: The constitution of the alloys of aluminium, copper, and zinc containing high percentages of zinc. The constitution of aluminium–copper–zinc alloys containing not more than 15 per cent. of aluminium and 10 per cent. of copper is discussed. The investigation has been carried out by the study of the heat absorptions and evolutions which take place in heating and cooling alloys between temperatures at which they are liquid and ordinary temperatures; by the measurement of electrical resistance at various temperatures; and by microscopic study of specimens which have been annealed for prolonged periods and quenched, or very slowly cooled and quenched. From the results obtained a model has been constructed to represent the constitution at temperatures above 250° C. The diagram advanced by Rosenhain and Archbutt has been used as one face of the ternary prism, the other binary system face being somewhat modified from Tafel's diagram.

Geological Society, February 2.—Mr. R. D. Oldham, president, in the chair.—H. **Bolton**: A new species of Blattoid (Archimylacris) from the Keele group (Stephanian) of Shropshire. The author describes the basal portion of a new type of Blattoid wing found by Mr. John Pringle in core-material of purple marly shale from a borehole for water. The wing belongs to the genus Archimylacris, and is closely allied to *A. Lerichei*, Pruvost, and *A. Dessaillyi*, Leriche, from the upper beds of the Westphalian of Liévin, Northern France.—C. E. **Tilley**: The granite-gneisses of Southern Eyre Peninsula (South Australia) and their associated amphibolites. Southern Eyre Peninsula is underlain by a complex series of pre-Cambrian rocks subject to prolonged erosion, but now in part covered by weathered products and recent æolian sediments. The fundamental platform of the eastern half of the peninsula consists of granite-gneisses, amphibolites, and hornblende-schists, embraced within the Flinders series. The petrography of the rocks is described and the significance of their mineralogical constitution discussed. The gneissic structure is a primary gneissic banding arising from flow-movements in a heterogeneous magma. The amphibolites are considered as representing more basic and earlier igneous intrusions, probably of the same igneous cycle and connected with the one great orogenic epoch, which have become thermally metamorphosed. Inter-

calated in bands in the gneisses of portions of the hundred of Lincoln is a series of dolerites which have suffered a metamorphism of the highest grade.

Zoological Society, February 8.—Prof. E. W. Mac-Bride, vice-president, in the chair.—Dr. C. F. **Sonntag**: The comparative anatomy of the tongues of the Mammalia, family Simiidæ.—D. M. S. **Watson**: Basis of classification of the Theriodontia.

Royal Meteorological Society, February 16.—Mr. R. H. Hooker, president, in the chair.—M. de Carle S. **Salter**: A new method of constructing average monthly rainfall maps. For the present purpose a new series of isomeric maps for the period 1881–1915 has been prepared, on the scale of 20 miles to 1 in., from 550 records. A map showing the distribution of average annual rainfall for thirty-five years has been compiled on the same scale (i) from Dr. H. R. Mill's survey maps on the scale of 2 miles to 1 in. prepared from all available data, and (ii) by computing 1700 additional average values for the districts not yet surveyed. The twelve monthly isomeric maps and the annual map were ruled in a network of squared lines 10 miles apart, and values interpolated at each of the points of intersection. The twelve percentage evaluations for each point were collected and severally applied to the value from the annual map, thus obtaining twelve monthly rainfall values applicable to the point in question. The latter were plotted on a fresh series of ruled maps, together with the actual average values for the 550 stations originally utilised, and the whole were used as a basis for isohyetal lines. The whole gave 2573 values for each month, and left no space of more than 10 miles without some means of controlling the drawing of the lines. The paper discusses the limits of error introduced by the method.—G. A. **Clarke**: An unusual pilot-balloon trajectory. A balloon observed by one theodolite was found to pursue a course so erratic that its results, if calculated by the method applicable to the one-theodolite ascents, would have shown a wind of more than 110 miles per hour from W.S.W. at 2500 ft., with a return wind of similar velocity from E.N.E. only 500 ft. higher. Such conditions in the atmosphere being extremely improbable, an endeavour was made to deduce the magnitude of the vertical currents, and it was found that the path described could be accounted for by a descending current of about 6 miles per hour, followed by an ascending one of somewhat similar velocity.

CAMBRIDGE.

Philosophical Society, February 7.—Prof. Seward, president, in the chair.—G. E. **Briggs**: The development of photosynthetic activity during germination.—Prof. G. H. **Hardy**: A theorem concerning summable series.—E. A. **Milne**: Vectors and tensors. The usual intuitive concept of a vector useful in three dimensions no longer serves in four dimensions, and a more precise definition is required, in which, however, the notion of a permanency independent of any particular co-ordinate system is preserved. Consider the class of co-ordinate systems and the class of representations of a particular vector (by means of sets of components) associated with them: it is suggested that a vector be defined as the *class* of such correlated sets.—H. C. **Pocklington**: (*a*) Standing waves parallel to a plane beach. (*b*) A kinetic theory of the universe.—Prof. H. F. **Baker**: (*a*) A configuration in four dimensions. (*b*) The representation of a cubic surface on a quadric surface. (*c*) Delaunay's method in planetary theory. (*d*) A periodic motion in dynamics.

February 21.—Prof. Seward, president, in the chair.—Dr. **Hartridge**: The present position of the Helmholtz theory of hearing.

MANCHESTER.

Literary and Philosophical Society, January 11.—Mr. Francis Jones, vice-president, in the chair.—Dr. A. A. **Mumford**: Testing and grading of health and physical fitness. The author urged the necessity of fresh physical fitness tests for school-children—the present tests mainly dealt with exceptional children, such as the deformed, diseased, and mentally unfit—based on the capacity to put forth effort, and thus considering the work of the heart, lungs, and the nervous system. The tests, brought into prominence by the work of the Air Force, mainly concerned breathing, and were now being adapted to boys in the Manchester Grammar School. The first test, dealing with the amount of air used in respiration, was measured by the spirometer; the second, dealing with the force of respiration, was measured by pressure against a column of mercury; and the third concerned the movements of the chest, which could be examined by means of a specially designed waistcoat.

January 25.—Sir Henry A. Miers, president, in the chair.—W. E. **Alkins**, M. **Cook**, and J. **Harwood**: Variation in Sphæria—(i) *S. lacustre,* Muller; (ii) *S. corneum,* Linné; (iii) *S. pallidum,* Gray. These three papers were mainly confined to the presentation of results and a comparison of species, a general discussion of the significance of the results being reserved for a fourth and concluding paper on *S. rivicola.* Two hundred specimens of *S. lacustre* from Three Lows, North Staffordshire, and five hundred each of *S. corneum* and *S. pallidum* from the Ashton and Guide Bridge Canal, near Dukinfield Station, had to be examined. The authors have studied the variation of width, length, and thickness.

PARIS.

Academy of Sciences, February 7.—M. Georges Lemoine in the chair.—G. **Gouy**: Systems of prisms with parallel edges.—R. **Birkeland**: The resolution of the general algebraic equation by hypergeometric functions of several variables.—E. **Jouguet**: The case of Poincaré in the theory of elasticity. Poincaré has studied the small deformations of an elastic solid, starting with an initial state in which the tensions are not zero. The author examines some thermodynamic properties of elastic solids with similar deformations.—A. **Guillet**: A chronograph recording photographically for the measurement of short periods in harmonic motion or with circular uniform movement by means of Lissajous's figures.—C. **Féry**: A battery depolarised by air. A modification of the Leclanche cell. The zinc is in the form of a horizontal disc placed at the bottom of the cell; the carbon is a cylinder the lower flattened edge of which is immediately above the zinc plate. The removal of the polarising hydrogen by the air causes currents between the upper and lower ends of the carbon cylinder. It is claimed for this battery that no peroxide of manganese is required, local action is absent, and its e.m.f. during use is very constant. It has received practical application in the French Posts and Telegraphs Department, and it has been shown that it lasts three times as long as the old form.—P. **Chevenard**: The expansion anomaly accompanying the magnetic transformation of pyrrhotine and magnetite. In the neighbourhood of 320° C. pyrrhotine suddenly increases in length, corresponding very probably to a true allotropic transformation analogous to the change of α-iron into γ-iron. This hypothesis is confirmed by the fact noted by Weiss, that the magnetisation coefficient of pyrrhotine is nearly independent of the temperature round about 320° C. Magnetite also shows an anomaly in expansion at 570° C.—a temperature near the magnetic Curie point determined by

Weiss.—A. **Liénard** : Electromagnetic energy and thermodynamic potential of a system of currents.—A. **Portevin** and J. **Durand** : Anomaly of expansion of the gold–copper alloys.—L. **Forsén** : The constitution of the derivatives of molybdic acid.—J. **Martinet** and O. **Dornier** : Isatin 5-sulphonic acid. Isatin has not hitherto been directly sulphonated. Details are given for the preparation of isatin 5-sulphonic acid from isatin and fuming sulphuric acid, and some of its salts are described.—H. **Bouygues** : Considerations on the endoderm.—M. and Mme. G. **Villedieu** : The non-toxicity of copper for mildew. The results of experiments on *Phytophthora infestans* (the mildew of potato), controverting the usually accepted view that it is the copper in anticryptogamic mixtures which is efficacious in destroying mildew.—W. **Kopaczewski** : The *rôle* of surface tension in the phenomena of shock. The surface tension of serum is reduced by the addition of a solution of sodium hyposulphite. The author attributes the suppression of the anaphylactic shock by sodium hyposulphite solutions to this change in surface tension, and not to the effect of this salt in dispersing flocculated serum.—A. **Trillat** : The influence of the state of division of droplets containing bacteria on the infection of culture media.—MM. **Desgrez, Guillemard**, and **Labat** : The use of the alkaline polysulphides for the neutralisation of certain toxic gases. Spraying with a sodium polysulphide soap solution, originally suggested for the removal of chloropicrin vapour from air, has been found to be also efficacious in removing other toxic gases. Figures are given for the amounts required to remove chlorine, phosgene, acrolein, bromoacetone, and other noxious vapours.

Books Received.

The Government of the Philippine Islands. Philippine Census, A.D. 1918. Manila : The Climate and Weather of the Philippines, 1903 to 1918. By the Rev. J. Coronas. Pp. 195. (Manila : Bureau of Printing.)

What to Read on Social and Economic Subjects. A Select Bibliography Compiled by the Fabian Society. Sixth edition. Pp. xii+80. (London : The Fabian Society; G. Allen and Unwin, Ltd.) 2s. net.

The Boy in Industry and Leisure. By the Rev. R. R. Hyde. (Social Service Library.) Pp. xxviii+281. (London : G. Bell and Sons, Ltd.) 6s. net.

Small Single Phase Transformers. By E. T. Painton. Pp. x+95. (London : Sir I. Pitman and Sons, Ltd.) 2s. 6d. net.

Elementary Principles of Continuous-Current Armature Winding. By F. M. Denton. Pp. x+102. (London : Sir I. Pitman and Sons, Ltd.) 2s. 6d. net.

A Guide to the Preparation of a Note-Book of Biology. By E. W. Shann. Pp. 48. (London : G. Bell and Sons, Ltd.) 2s. 6d. net.

Mitteilungen der Naturforschenden Gesellschaft in Bern aus dem Jahre 1919. Pp. lxxv+231+v Tafel. (Bern : K. J. Wyss Erben.)

The Breeding and Feeding of Farm Stock. By J. Wilson. Pp. vii+152. (London : Methuen and Co., Ltd.) 6s. net.

A Book of Butter : A Text on the Nature, Manufacture, and Marketing of the Product. By Prof. E. S. Guthrie. Pp. xv+270. (New York : The Macmillan Co.; London : Macmillan and Co., Ltd.) 12s. net.

Report of the Indian Association for the Cultivation of Science and Proceedings of the Science Convention for the Year 1918. Pp. iii+199+xxxi+plates. (Calcutta.)

Economic Mineralogy : A Practical Guide to the Study of Useful Minerals. By T. Crook. Pp. xi+492. (London : Longmans, Green and Co.) 25s. net.

Insect Life. By C. A. Ealand. Pp. xii+340+lxxiv plates. (London : A. and C. Black, Ltd.) 30s. net.

In Farthest Burma : The Record of an Arduous Journey of Exploration and Research through the Unknown Frontier Territory of Burma and Tibet. By Capt. F. K. Ward. Pp. 311. (London : Seeley, Service and Co., Ltd.) 25s. net.

The Subject Index to Periodicals, 1917–19. B–E : Historical, Political, and Economic Sciences. Pp. 248. (London : The Library Association.) 21s. net.

Transactions of the Norfolk and Norwich Naturalists' Society. Presented to Members for 1919–20. Vol. xi., part 1, December. Pp. xiii+101. (Norwich.) 7s. 6d.

Annuaire Astronomique et Météorologique pour 1921. 57 Annee. By C. Flammarion. Pp. 251. (Paris : E. Flammarion.) 8 francs.

Department of Applied Statistics (Computing Section), University of London, University College. Tracts for Computers. Edited by Karl Pearson. No. iv. : Tables of the Logarithms of the Complete Γ-function to Twelve Figures. Originally computed by A. M. Legendre. Pp. 4+10. (London : Cambridge University Press.) 3s. 9d. net.

The National Physical Laboratory. Collected Researches. Vol. xv., 1920. Pp. iv+329+plates. (London : H.M. Stationery Office.) 20s. net.

Diary of Societies.

THURSDAY, MARCH 3.

ROYAL INSTITUTION OF GREAT BRITAIN, at 3.—F. Balfour Browne : Mason Wasps.

ROYAL SOCIETY, at 4.30.—Discussion on Isotopes to be opened by Sir J. J. Thomson, followed probably by Dr. F. W. Aston, Prof. F. Soddy, Prof. T. R. Merton, and Prof. F. A. Lindemann.

ROYAL AERONAUTICAL SOCIETY (at Royal Society of Arts), at 5.—J. W. W. Dyer : Airship Fabrics.—Major T. Orde Lees : Parachutes.

LINNEAN SOCIETY, at 5.—R. T. Günther : A Manuscript of Matthias de Lobel, from the Library of Magdalen College, Oxford.—Dr. B. Daydon Jackson : Naturalists and their Indebtedness to the National Trust.

ROYAL COLLEGE OF PHYSICIANS OF LONDON, at 5.—Dr. G. Graham : Glycæmia and Glycosuria (Goulstonian Lecture).

CHILD-STUDY SOCIETY (at Royal Sanitary Institute), at 6.—Miss M. C. Buysman : The Value of the Drama in the Training of the Child's Emotions.

CHEMICAL SOCIETY, at 8.—C. K. Ingold and J. F. Thorpe : The Chemistry of the Glutaconic Acids. Part XII. The Simultaneous Occurrence of 1 : 2- and of 1 : 3-Addition to Glutaconic Ester. A Study in Mobile Equilibrium involving the Utilisation of the Labile Ester in the " Nascent " Condition.—E. C. C. Baly and W. F. Barker : The Photochemical Reaction between Hydrogen and Chlorine, and its Variation with the Intensity of the Light.—J. Kenner and W. V. Stubbings : A Second Form of 6 : 6'-Dinitrodiphenic Acid and its Conversion into New Cyclic Systems.—J. Moir : The Calculation of the Colour of Monocyclic Coloured Substances.—N. V. Sidgwick and E. K. Ewbank : The Stability of Tautomeric Formaldehydrazones.—F. W. Atack and L. Whinyates : The Structural Isomerism of Oximes. Part III. A Fourth Benzildioxime.

ROYAL SOCIETY OF MEDICINE (Obstetrics and Gynæcology Section), at 8.—Dr. G. Evans : A Study of the Condition of the Arteries in a Uterus Removed 24 Days after Delivery.—Dr. A. Bourne : Puerperal Salpingo-peritonitis.

FRIDAY, MARCH 4.

ROYAL SOCIETY OF MEDICINE (Laryngology Section), at 4.

ROYAL SOCIETY OF ARTS (Indian Section), at 4.30.

ROYAL ASTRONOMICAL SOCIETY (Geophysical Discussion), at 5.—Problems of Seismology : opened by Prof. H. Lamb, followed by Dr. G. W. Walker, R. D. Oldham, and J. J. Shaw. Chairman : Prof. H. H. Turner.

INSTITUTION OF MECHANICAL ENGINEERS AND THE SOCIETY OF CHEMICAL INDUSTRY (Joint Meeting), at 6.—P. Kestner : Degassing and Purification of Boiler Feed-Water.

INSTITUTION OF ELECTRICAL ENGINEERS (Students' Meeting) (at Faraday House), at 6.30.—A. Rosen : Telephonic Transmission through Submarine Cables.

JUNIOR INSTITUTION OF ENGINEERS (at Caxton Hall), at 8.—W. H. Simmons : Manufacture of Gun-cotton.