Calendar of Scientific Pioneers.

April 7, 1823. Jacques Alexandre Cesar Charles died.—The first to substitute hydrogen for the hot air used in Montgolfier's balloons, Charles was originally a clerk, but rose to be professor of physics in the Conservatoire des Arts et Métiers. He is remembered by "Charles's law."

April 7, 1912. Abbott Lawrence Rotch died.—A pioneer in the study of the upper atmosphere, Rotch in 1885 founded the Blue Hill Observatory, which he bequeathed to Harvard University.

April 9, 1626. Francis Bacon, Lord Verulam, Viscount St. Albans, died.—Bacon was the contemporary of Galileo, Kepler, and Napier. He took all knowledge as his province. His "Novum Organum"—which was written and rewritten several times with the most minute care—entitles him to be considered as one of the leaders in the reformation of modern science. He is buried at St. Albans.

April 9, 1889. Michel Eugène Chevreul died.—For many years Chevreul was connected with the Musée d'Histoire Naturelle. His researches related mainly to the chemistry of fats.

April 10, 1813. Joseph Louis Lagrange died.—Though his parents were of French extraction, Lagrange was born at Turin, where he spent the first thirty years of his life. In 1766, on the invitation of Frederick the Great, he went to Berlin. "The greatest king in Europe" wished to have "the greatest mathematician in Europe" at his Court. On Frederick's death Lagrange accepted an offer of Loüis XVI. and removed to Paris. Equally great as an investigator in pure mathematics and in applied mathematics, he has never been surpassed as a mathematical writer.

April 11, 1875. Samuel Heinrich Schwabe died.—The name of Schwabe, who lived and died at Dessau, is imperishably connected with the discovery of the periodicity of sun-spots.

April 11, 1884. Jean Baptiste André Dumas died.—Few scientific men in France have been held in higher esteem than Dumas. His success as a chemist was not less marked than his success as a public man, and in 1882 the French Academy struck a gold medal to commemorate his great services to science. His statue stands at Alais, where he was born in 1800.

April 11, 1895. Julius Lothar Meyer died.—The fellow-student of Roscoe in the laboratory of Bunsen at Heidelberg, Meyer afterwards held chairs of chemistry at Breslau, Neustadt, Karlsruhe, and Tübingen. His name is best known for the share he had in the periodic classification of the elements.

April 11, 1902. Marie Alfred Cornu died.—A brilliant experimentalist, Cornu in 1867 became professor of physics at the Ecole Polytechnique, and in 1896 was elected president of the Paris Academy of Sciences. His original work related mainly to optics. He also made a re-determination of the velocity of light.

April 12, 1897. Edward Drinker Cope died.—Curator to the Academy of Natural Sciences, and later professor of geology and palæontology at Philadelphia, Cope greatly extended the knowledge of fossil vertebrates.

April 13, 1855. Sir Henry Thomas de la Beche died.—Like Murchison, de la Beche left the Army at the end of the Napoleonic wars and devoted himself to geology. He became the first director of the Geological Survey of Great Britain, and founded the Museum of Practical Geology. E. C. S.

Societies and Academies.

LONDON.

Linnean Society, March 17.—Dr. A. Smith Woodward, president, in the chair.—W. B. **Alexander**: The vertebrate fauna of Houtman Abrolhos Islands, West Australia. Prof. P. **Fauvel**: "Annélides Polychètes de l'Archipel Houtman Abrolhos, recueillies par M. le Prof. Dakin."—F. **Chapman**: Sherbornina, a new genus of fossil Foraminifera from Table Cape, Tasmania.—Miss E. L. **Turner**: Some birds from Texel. The author devoted most of her attention whilst on the Island of Texel to the avocets, ruff and reeve, godwit, and two species of tern, describing the habits of the birds observed, especially during the nesting period.

Mineralogical Society, March 22.—Dr. A. E. H. Tutton in the chair.—Prof. H. **Hilton**: The vibrations of a crystalline medium. The paper attempts to give an indication of the kind of vibrations which the molecules of a crystal may be expected to make about their positions of equilibrium. The case of an orthorhombic crystal in the form of a rectangular parallelepiped is considered in detail, and the normal modes of the molecular motion are completely determined.—Prof. R. **Ohashi**: Augite from Nishigatake, Japan. The crystals have been detached from basalt by natural weathering; the specific gravity is 3·338 at 4° C. The prism angle agrees with that of diopside, but that of the pyramid does not. Etched figures show that the crystal belongs to the holosymmetric class. Both the optical properties and chemical composition show that in this augite the diopside molecule predominates.—Dr. G. T. **Prior**: The chemical composition of the Adare and Ensisheim meteorites. The results of the analyses supported the idea that in meteoric stones the ratio of MgO to FeO in the magnesium silicates varies directly with the ratio of Fe to Ni in the nickel-iron. For Adare these ratios were respectively $4\frac{1}{2}$ and 11, and for Ensisheim 3 and $3\frac{1}{2}$.—W. **Barlow**: Models representing the atomic structure of calcite and aragonite.

CAMBRIDGE.

Philosophical Society, March 7.—Prof. A. C. Seward, president, in the chair.—Prof. R. C. **Punnett**: A peculiar case of heredity in the sweet pea.—C. G. **Lamb**: (1) Insect oases. Certain species of Diptera occur for several consecutive years in extremely localised patches in a certain locality which was characterised by extreme uniformity in respect to its flora, etc. Several of the species are so far only known from that locality, and are of South European distribution. The suggestion was made that the species is putting up its last fight against extinction. (2) Venational abnormalities in Diptera. The great rarity of teratological conditions in the wings of flies other than the Nematocera was illustrated. An exception exists in the Ortalid, *Ptilonota guttata*. The instability of the species is confirmed by the commonness of great diversity in the acrostichal bristles, and by its having afforded the only known dipterous case of Batesonian teratology in an antenna.—Prof. S. J. **Hickson**: Some Alcyonaria in the Cambridge Museum. Two specimens collected by Darwin in the *Beagle* in the Galapagos Islands in 1835. One is clearly a representative of a species that has not hitherto been described, and the author proposes to name it *Cavernularia Darwinii*. The character which distinguishes it from all other species that have been described is seen in the spicules, which are short rods with two, three, or four knobs at each end. The other specimen preserved by Darwin in the Galapagos Islands is a frag-

ment of a Gorgonid, probably belonging to the genus Septogorgia. There are two other species of the genus Cavernularia in the collection, one *C. Chuni*, from the coast of Borneo, and the other *C. analabarica*, from the Bay of Bengal. They are the only sea-pens that have been described by the collectors as "washed ashore," and must therefore have either a floating habit or a very feeble attachment to the bottom. Specimens of the genus Pseudocladochonus from the coast of Japan have been hitherto recorded only from the Malay Archipelago. They show a remarkable resemblance to the extinct Carboniferous fossil Cladochonus of the family Auloporidæ, but, as pointed out by Versluys, the resemblance is probably due to convergence. A re-examination of some specimens of the genus Vergularia from the coast of Victoria, Australia, shows that they cannot satisfactorily be separated from the British and North Atlantic species *Vergularia mirabilis*. An Alcyonarian belonging to the genus Sarcodictyon came from the coast of South Australia, and is difficult to separate from the species *S. catenata*, which has hitherto been recorded only from the British area. These two species offer examples of geographical discontinuity.—J. **Gray**: The mechanism of ciliary movement. The movement of the cilia on the gills of *Mytilus edulis* was described. The effects of acids and of certain metallic ions seem to indicate that the mechanism of ciliary and muscular activity is essentially the same.—A. B. **Appleton**: The influence of function on the conformation of bones. A summary was presented of the effects produced on the mammalian femur of those muscular specialisations characteristic of cursorial, jumping, and arboreal types respectively. Consideration of the maximum effective leverage attainable by the adductor and femorococcygeus muscles in different positions of the thigh was shown to harmonise with some variations in their attachment in various mammalian groups.—J. T. **Saunders**: A note on the hydrogen-ion concentration of some natural waters. The hydrogen-ion concentration of waters occurring naturally in those districts where chalk, gault, or lime is present in the soil or subsoil is remarkably constant. Divergences are caused by the presence of large masses of vegetation, by débris stirred up from the bottoms by currents, or by the presence of sewage or other decaying organic matter.—P. A. **Buxton**: Animal ecology in deserts. The paper recorded some incomplete observations on desert life, the majority made in Mesopotamia under war conditions. Heat, dryness, terrific winds, low relative humidity, great diurnal range of temperature, the heat of the surfaces on which many of the desert animals crouch, and the brilliant direct sunshine are characteristic of the region. Protective coloration is a well-known characteristic of desert animals; it is difficult to see of what advantage it can be to purely nocturnal animals. The coloration of the courser is not efficient, because the bird's legs are long and it casts a sharp black shadow. The animals which are not protectively coloured are black. These are all probably protected by characters other than colour. The development of certain insects is inhibited in summer; probably the inhibitory factor is high temperature or low relative humidity; it is certainly not due to a drying up of the food-plant.—J. **Line**: The biology of the crown gall fungus of lucerne. The thallus of this fungus, *Urophlyctis alfalfae* (Lagerh.), P. Magnus, is described. Resting spores are developed as simple terminal proliferations from the swollen hyphal ends, no conjugation process taking place. They produce a large number of zoospores on germination, which normally infect only the young adventitious buds of *Medicago sativa* and possibly *M. falcata*, causing the formation of galls.

EDINBURGH.

Royal Society, March 21.—Prof. F. O. Bower in the chair.—Prof. H. **Briggs**: An experimental analysis of the losses due to evaporation of liquid air contained in vacuum flasks. Liquid air and liquid oxygen are now being employed not only in the laboratory, but also to serve the airman in high flying, for mine rescue apparatus and blasting in mines and quarries, for evacuation plant, and for medical purposes. If a European war were ever to break out again, oxygen would, owing to the probable use of poison gases in enormous quantities, become the chief remedial measure, and would be required on a colossal scale. The experiments described in the paper gave a quantitative measure of the proportion of heat entering a vacuum flask containing liquid air (*a*) by conduction through the vacuum, (*b*) by radiation across the vacuum, and (*c*) by conduction along the neck; they further provided data for calculating the pressure in the vacuum space and the emissivity of the reflected surfaces bounding that space. The purpose of the investigation was to get information to assist in the design of metallic vacuum vessels.—Dr. J. **Marshall**: A generalisation of Lagrange's equations of motion and their Hamiltonian forms.—Sir T. **Muir**: Note on a continuant of Cayley's of the year 1874.

PARIS.

Academy of Sciences, March 14.—M. Georges Lemoine in the chair.—E. **Picard**: The determination of the axis of rotation and velocity of rotation of a solid body.—H. **Douvillé**: A brackish-water fauna at the top of the Lower Cretaceous near Bayonne.—G. **Gouy**: Imperfect aplanetism.—L. E. **Dickson**: The composition of polynomials.—A. **Witz**: An aviation motor admitting of a constant mass, with constant compression at all altitudes.—Sir George Greenhill was elected a correspondant for the section of mechanics in succession to the late M. Voigt.—G. J. **Rémoundos**: Couples of algebroid functions of one variable corresponding to the points of an algebraic curve of higher order than unity.—C. E. **Traynard**: Singular hyperelliptic functions.—N. **Abramesco**: Developments in series according to the inverse of given polynomials.—T. **Varopoulos**: Some points in the theory of functions and the theory of numbers.—A. **Denjoy**: A calculation of totalisation.—T. **Carleman**: A class of integral equations with asymmetrical nucleus.—H. **Mellin**: Solution of the general algebraical equation with the aid of the Γ function.—J. L. **Walsh**: The position of the roots of the derived functions of a polynomial.—P. **Le Rolland**: The deviations from the law of isochronism produced by the suspension strip of the pendulum. The suspension of a pendulum by an elastic strip of metal partially compensates the circular error for large amplitudes, but compensation is not possible at all amplitudes.—A. **Véronnet**: Hypotheses on the formation of new stars.—J. B. **Charcot**: The Island of Jan Mayen. This island was supposed to have been first discovered in 1611 by the Dutch sailor whose name it bears. The descriptions in the "Légende Latine" (ninth century) of the voyages of the Irish monk, Brennain Mac Finlonga (St. Brandan), include such an exact account of this island that the author agrees with E. Beauvois that the Irish monk must have been the first discoverer.—F. **Schrader**: The new universal atlas of Vivien de Saint-Martin and Schrader.—M. **Pariselle**: The hydrates of pyridine. Nine different hydrates of pyridine have been described. From a critical discussion of the data it is concluded that in no case is the evidence sufficient to prove the existence of a definite combination of pyridine and water.—R. **Audubert**: The elementary quantity of energy concerned in solu-

tion. An attempt to discover for the dissolved state a law equivalent to Trouton's law for the gaseous state. Calling ρ the molecular latent heat of solution and T the temperature which corresponds for the state of saturation to an osmotic pressure of one atmosphere, ρ/T should be constant if an analogous relation holds. For various salts in solution this ratio has a value of about 32.—J. **Meunier**: The principles of analysis by means of reducing flames; the detection of traces of manganese in the presence of iron or other substances. The material in the form of powder is carried away as dust in a stream of hydrogen which is ignited and the flame examined spectroscopically.—L. **Forsén**: The constitution and systematic representation of the complex derivatives of the molybdic acids.—R. **Fosse** and G. **Laude**: Syntheses of cyanic acid and urea by the oxidation in alcoholic ammoniacal solution of phenols and aldehydes. The production of ammonium cyanate and urea by the oxidation of ammonia and alcohols is favoured by the presence of copper. Thus with ethyl alcohol the yield of urea is increased from 0·85 to 8·32 grams per 100 c.c. of alcohol by the addition of copper salts. Details of the amounts of urea obtained are given for various alcohols, phenols, and aldehydes.—M. **Godchot**: Some derivatives of thuyamenthone.—O. **Bailly**: The action of epichlorohydrin on disodium hydrogen phosphate in aqueous solution and the stability of a monoglyceromonophosphoric ester.—A. **Mailhe**: The preparation of the amines of secondary alcohols. The method of reduction of ketazines by hydrogen in presence of reduced nickel described in an earlier communication has been extended to ketazines of the formula R·CO·R′. Several new primary and secondary amines have been prepared.—P. **Gaubert**: The interference colours produced by thin crystalline plates.—A. **Briquet**: The low country of Picardy north of the Somme: the existing shore-line.—R. **Dongier**: The simultaneous oscillations of temperature and wind at the top of the Eiffel Tower and their relation with the Bjerknes steering surface of a depression. Two temperature charts on different days are given, showing the variations of temperature at the summit of the tower and at three lowel levels; the variations of the velocities of the wind at the summit are also shown. The diagrams prove the existence of a current of warm air set in motion above the colder layers by forces always present in a depression. This is in good agreement with the views of Bjerknes on the structure of cyclones in movement.—M. **Delcambre**: A case of sudden filling of an atmospheric depression.—R. **Souèges**: The embryogeny of the Scrofulariaceæ: development of the embryo in *Veronica arvensis*.—P. **Nobécourt**: The action of some alkaloids on *Botrytis cinerea*.—Mlle. D. **Kohler**: The variation of organic acids in the course of anthocyanic pigmentation. Details of experiments proving that anthocyanic pigmentation is not accompanied by an increase in the amount of organic acids.—E. **Couvreur** and X. **Chahovitch**: A natural mode of defence against microbe infections in the invertebrates. Micro-organisms (pyocyanic and coli bacilli) are destroyed by the blood and digestive fluids of certain invertebrates.—A. **Thooris**: The morphological classification of fifty champion athletes. Metric verification by radioscopy.—L. **Mercier**: *Apterina pedestris*. The flight muscles in certain Diptera, wingless or with rudimentary wings.—A. **Lécaillon**: The action exerted by concentrated sulphuric acid on the eggs of *Bombyx mori*.—H. **Drouin**: Changes in the absorption by skin and muscular tissue brought about by the addition of lipoids to stannous solutions.—W. **Kopaczewski**: A simple apparatus for measuring surface tension.—G. **Blanc**: Experimental researches on the virus of herpes.

Books Received.

Artificial Light: Its Influence upon Civilization. By M. Luckiesh. (Century Books of Useful Science.) Pp. xiv+366. (London: University of London Press, Ltd.) 12*s*. 6*d*. net.

Creative Chemistry: Descriptive of Recent Achievements in the Chemical Industries. By Dr. Edwin C. Slosson. (Century Books of Useful Science.) Pp. xvi+311. (London: University of London Press, Ltd.) 12*s*. 6*d*. net.

Field Methods in Petroleum Geology. By Dr. G. H. Cox and others. Pp. xiv+305+xi plates. (New York and London: McGraw-Hill Book Co., Inc.) 24*s*. net.

The Chemistry of Plant Life. By Dr. Roscoe W. Thatcher. (Agricultural and Biological Publications.) Pp. xvi+268. (New York and London: McGraw-Hill Book Co., Inc.) 18*s*. net.

The Fauna of British India, including Ceylon and Burma. Mollusca, iii.: Land Operculates (Cyclophoridæ, Truncatellidæ, Assimineidæ, Helicinidæ). By G. K. Gude. Pp. xiv+386. (London: Taylor and Francis; Calcutta: Thacker, Spink and Co.; Bombay: Thacker and Co., Ltd.) 35*s*.

Thoughts of a Nature Lover. By Kenneth Rogers. Pp. 125. (London: Holden and Hardingham, Ltd.) 5*s*. net.

Municipal Engineering: Surveying the Scope of Municipal Engineering and the Statutory Position, the Appointment, the Training, and the Duties of a Municipal Engineer. By H. Percy Boulnois. (Pitman's Technical Primers.) Pp. vii+103. (London: Sir I. Pitman and Sons, Ltd.) 2*s*. 6*d*. net.

The Essentials of Mental Measurement. By Dr. William Brown and Prof. Godfrey H. Thomson. (Cambridge Psychological Library.) Pp. x+216. (Cambridge: At the University Press.) 21*s*. net.

A Short Manual of Forest Management. By H. Jackson. Pp. x+70. (Cambridge: At the University Press.) 7*s*. net.

Board of Education. Illustrated Catalogue of the Collections in the Science Museum, South Kensington, with Descriptive and Historical Notes: Machine Tools. Pp. 61+iii plates. (London: H.M. Stationery Office.) 1*s*. net.

Transactions of the Royal Society of Edinburgh. Vol. lii., part iv., No. 29. Isle of Wight Disease in Hive Bees. Pp. 737–79. (Edinburgh: R. Grant and Son; London: Williams and Norgate.) 9*s*.

Geological Survey of Nigeria. Bulletin No. 1: The Geology of the Plateau Tin Fields. By Dr. J. D. Falconer. Pp. 55+x plates. (Nigeria.) 10*s*. net.

Medical Research Council and Department of Scientific and Industrial Research. Reports of the Industrial Fatigue Research Board, No. 11. Preliminary Notes on Atmospheric Conditions in Boot and Shoe Factories. (Boot and Shoe Series, No. 2.) Pp. 69. (London: H.M. Stationery Office.) 3*s*. net.

A New British Flora: British Wild Flowers in their Natural Haunts. Described by A. R. Horwood. Vol. iii. Pp. xi+251+xviii–xxxi plates. Vol. iv. Pp. xi+257+xxxii–xlix plates. (London: Gresham Publishing Co., Ltd.) 12*s*. 6*d*. net each vol.

Bibliographie des Livres Français de Médecine et de Sciences. Publiée par la Section de Médecine du Syndicat des Editeurs. 1908–20. Pp. xiii+146. (Paris.)

Legislative Assembly, New South Wales. Report of the Director-General of Public Health, New South Wales, for the year 1919, including a Report on the Influenza Epidemic, 1919. Pp. v+272+x plates. (Sydney: W. A. Gullick.) 6*s*. 9*d*.

Universities and their Freedom. By W. M. Childs. Pp. 56. (London: A. L. Humphreys.) 2*s*. net.