

Calendar of Scientific Pioneers.

June 23, 1881. Matthias Jakob Schleiden died.—At first an advocate at Hamburg, Schleiden afterwards held the chairs of botany at Jena and Dorpat. He did much to establish the cell theory, while among his important writings was his "Principles of Scientific Botany."

June 23, 1891. Wilhelm Eduard Weber died.—Professor of physics in the University of Göttingen, Weber was associated with Gauss in some of his investigations, and did valuable work on the definition and determination of electrical units.

June 23, 1896. Sir Joseph Prestwich died.—While in business as a London wine merchant, Prestwich studied the geology of Hampshire and the London basin, the coal supply of England, and the antiquity of man. At the age of sixty-two he succeeded Phillips as professor of geology at Oxford.

June 25, 1868. Carlo Matteucci died.—The recipient in 1844 of the Copley medal for his electrical researches, Matteucci was professor of physics, first at Bologna, and then at Ravenna and Pisa. For some years he was connected with the Italian telegraphs.

June 26, 1793. Gilbert White died.—Educated at Oxford, and for a time senior proctor, White passed most of his life at Selborne. His well-known "Natural History and Antiquities of Selborne" was published in 1789.

June 26, 1831. Sophie Germain died.—A versatile and learned woman, Sophie Germain was distinguished for her mathematical writings on elastic surfaces.

June 26, 1883. Sir Edward Sabine died.—An officer in the Royal Artillery, Sabine made valuable pendulum and magnetical investigations which gave an impulse to the systematic study of terrestrial magnetism. From 1861 to 1871 he was president of the Royal Society.

June 27, 1829. James Smithson died.—Owing to circumstances of birth, Smithson was educated at Oxford under an assumed name. His knowledge of chemistry and mineralogy led to his being admitted as a fellow of the Royal Society in 1787. Most of his life was spent on the Continent, associating and corresponding with men of science. He died at Genoa, leaving his fortune of more than 100,000*l.* to the United States, the Government of which founded the famous Smithsonian Institution.

June 27, 1876. Christian Gottfried Ehrenberg died.—After travelling through East Russia with Humboldt, Ehrenberg became a professor at Berlin, and in 1842 was made secretary to the Berlin Academy of Sciences. He was the first to show that certain rocks consisted of minute forms of animals or plants. His "Mikrogeologie" was published in 1854.

June 27, 1892. Carl Schorlemmer died.—A student of Bunsen's, Schorlemmer in 1858 came to England as assistant to Roscoe, and in 1874 was appointed professor of organic chemistry at Manchester.

June 28, 1897. Paul Schutzenberger died.—The successor of Balard at the Collège de France, Schutzenberger made important researches on colouring matters, the constitution of alkaloids, and on platinum compounds.

June 29, 1895. Thomas Henry Huxley died.—As a naval surgeon Huxley cruised in H.M.S. *Rattlesnake*, and sent home important papers on the Hydrozoa. From 1854 to 1885 he was professor of natural history at the School of Mines. His scientific work embraced vertebrate and invertebrate morphology, comparative anatomy, histology, and palæontology. His lucid essays and crusade for freedom of thought attracted widespread attention, and as "a man and a citizen" he undertook much public work. E. C. S.

Societies and Academies.

LONDON.

Royal Society, June 16.—Prof. C. S. Sherrington, president, in the chair.—H. B. Dixon, Dr. C. Campbell, and Dr. A. Parker: The velocity of sound in gases at high temperatures, and the ratio of the specific heats.—Prof. J. R. Partington: The ratio of the specific heats of air and of carbon dioxide. The ratio of the specific heats, $\gamma = c_{-p}/c_{-v}$, has been determined by the method of adiabatic expansion for the gases air and carbon dioxide. The gas was contained in a 120-litre vessel, and the temperature change immediately after expansion followed by a platinum thermometer, with compensating leads of wire 0.001 mm. diameter, the resistance of which was observed by an Einthoven string galvanometer of 0.01 seconds period. The fundamental temperature measurements were made by a mercury thermometer. The results were calculated by the characteristic equation of D. Berthelot, so that deviations from the ideal gaseous state were allowed for. The final results, accurate to 1 part in 1000, are: γ for air at 17° C. = 1.4034; γ for carbon dioxide at 17° C. = 1.3022, whence c_{-p} for air at 17° C. = 0.2387 cal. and c_{-p} for carbon dioxide at 17° C. = 0.1996 cal. All the values refer to atmospheric pressure.—Dr. A. B. Wood and Dr. F. B. Young: (1) "Light-body" hydrophones and the directional properties of microphones. A light prolate ellipsoid possesses directional properties by virtue of its shape. Quantitative results obtained agree with calculated values supplied by Prof. Lamb. Owing to the pronounced intrinsic directional properties of the microphone, a spherical "light-body" hydrophone is practically equal in directional efficiency to one of ellipsoidal form. "Light-body" hydrophones are of value as experimental exploring instruments. (2) The acoustic disturbances produced by small bodies in plane waves transmitted through water, with special reference to the single-plate direction finder. Sound distribution was explored round a number of discs immersed at a distance from a small submerged source of sound. By means of a pair of miniature hydrophones—one bi-directional, the other non-directional—it was possible to chart (1) direction of oscillation of the water particles; (2) relative amplitude of the movements; and (3) relative amplitudes of the pressure oscillations. The charts obtained fall broadly into two classes, according as the discs are solid or contain air-filled cavities, very minute air-filled spaces giving marked effects. The behaviour of a typical baffle-plate is investigated, but no satisfactory theory of the baffle is offered.—M. A. Giblett: Some problems connected with evaporation from large expanses of water. The problems of distribution and amount of water-vapour present are considered for a current of air of uniform speed moving over a water-surface of uniform temperature. Near the surface is a thin layer of air, through which water-vapour diffuses slowly by molecular processes, but above this is a rapid transition to a turbulent régime, where diffusion becomes much more rapid. At and near the water-surface the problem is treated as one of eddy diffusion. Formulæ are obtained for humidity at any point of the air-current, and for rate of evaporation from stretches of water extending any distance downwind. The distribution of water-vapour is obtained for some typical cases, and an estimate made of the rate of evaporation from long stretches of water under various conditions of wind, water-surface, temperature, and turbulence. The effects which each of these elements exerts, when varied within their natural range, are examined. The results emphasise the control exercised by atmospheric turbulence over evapora-

tion from large areas.—F. C. Toy: The photographic efficiency of heterogeneous light. Two possible laws of action are discussed:—(1) All radiations composing the heterogeneous beam may act simultaneously but independently; and (2) all radiations may act simultaneously but not independently. The possibility of testing the laws depends on the form of law connecting the probability of a single grain of the photographic emulsion being made developable with the intensity of the exciting light. The form of this law proved experimentally by Slade and Higson is considered, and a result is deduced which can be tested by experiment. From the evidence obtained it is concluded that over the spectral range used in the experiments (λ_{4350} to λ_{4000}) radiations of different frequencies act simply as a total amount even when a difference in quality exists.

Linnean Society, June 2.—Dr. A. Smith Woodward, president, in the chair.—Prof. W. Garstang: Haeckel's biogenetic law: A theory of ancestral heredity. Ancestors created, heredity transmitted, and development repeated the order of creation. A generalised recapitulation of the essential grades of ancestral structure was also possible without involving successive adult images in the ontogeny. The morphological test to apply to these theories was whether the stages of ontogeny resemble successive adult organisations more closely than the corresponding formative stages of ancestral ontogeny. This test was invariably in favour of the "persistence theory" of recapitulation and against the theory of accelerated adult incorporations.

Aristotelian Society, June 6.—Prof. Dawes Hicks, vice-president, in the chair.—Dr. Dorothy Wrinch: The structure of scientific inquiry. In the earlier stages of empirical generalisations results of a general character are built up and applied by means of the forms of reasoning employed in probability inference, viz. induction and analogy. In the more advanced stage the aim of science is to arrange the general propositions which cover, as particular cases, the phenomena of which we are aware in such a way that the phenomena of the world are deducible from the smallest possible number of assumptions. Logical necessity alone can knit together theories and the experimental results which go with them. It is found that logic consists of relations between sets of properties. The general study of the formal and abstract properties is at the foundation of the great advance in modern science. In particular the process of *true analogy*, whereby the problems of electrostatics, current electricity, thermodynamics, and hydrodynamics are simultaneously solved, is of the utmost importance.

PARIS

Academy of Sciences, May 30.—M. Georges Lemoine in the chair.—A. Blondel: The application of distributed static transformers to the regulation of high-voltage mains.—B. Jekhowsky: Bessel's functions with two variables.—E. Kogbetliantz: The developments of Jacobi.—Et. Delassus: A consequence of the laws of friction.—J. Vallot: Diffuse radiation at Mont Blanc Observatory compared with that at lower altitudes. The stations chosen were at the altitudes 50, 1100, 2500, 4250, and 4350 metres above the sea. A table is given showing mean values for the observations on several exceptionally fine days. The diffuse radiation diminishes at first up to an altitude of 2500 metres, and then at the top of Mont Blanc increases suddenly to nearly double. This is explained by the intense radiation of the snow.—A. Schamasse: Observations

of the Dubiago comet (1921c) made with the bent equatorial at the Observatory of Nice. Positions given for May 24 and 25. The comet was of the 11.5 magnitude, and showed a slight central condensation.—G. Bruhat and Mlle. M. Hanot: The Lippich black fringe and the precision of polarimetric measurements. From calculations and experiments cited it is concluded that even after choosing the best position of the line of separation it is not possible, with Nicol prisms, to measure a rotation of the order of 20° with an error less than one minute. With more intense sources of light, such as the mercury arc, this error can be reduced by one half.—R. Boulouch: The problem of achromatism of thick-centred systems.—M. Rothé: Radiogoniometry and atmospheric influences. Earlier observations (1914) had shown that in the course of the day Hertzian waves were absorbed by the atmosphere. The present research was an attempt to find out whether, in addition to absorption, the direction of the waves was modified. The deviations observed were of the order of the experimental error, and consequently no certain conclusion could be drawn as to the cause of the small variations observed.—G. Déjardin: The ionisation of argon by slow electrons. An account of the application of the lamp with three electrodes, of the type commonly employed in military wireless telegraphy, to the determination of the ionisation potential of argon. The value found was 15 volts.—A. Dauvillier: The L series of uranium and the principle of combination in X-ray spectra.—A. Caprier: An automatic lighting and extinguishing apparatus for street gas lamps. An account of an apparatus which has been in use for eight years, and comparison with a similar apparatus recently described by Paul Bernard and Barbe.—V. Auger: Double catalysis of vanadic acid and hydrogen peroxide. Vanadic acid may be reduced to vanadyl sulphate or oxidised to pervanadic acid by hydrogen peroxide in the presence of sulphuric acid, the direction of the change being conditioned by the amount of acid present.—Mlle. Wolff: Furfuralcamphor and some of its derivatives. An account of the product of condensation of furfural with camphor and the substances obtained by reduction.—M. Manolesco: The action of ethylmagnesium bromide on dibenzylidene cyclohexanone and γ -methylcyclohexanone.—G. Tanret: The influence of ammonium molybdate on the rotatory power of some sugars. Changes in the rotatory power produced by adding solutions of ammonium molybdate to solutions of xylose, glucose, rhamnose, arabinose, galactose, sorbose, lævulose, and mannose are given. No change was produced in the rotation of saccharose, maltose, trehalose, lactose, melezitose, raffinose, stachvose, inulin, quercite, and inosite. In the cases of the sugars whose rotation was affected, some evidence is adduced of the formation of a compound between the sugar and the molybdate.—F. Bourion and Ch. Courtois: The formation of Julin's chloride in the preparation of electrolytic chlorine. In certain cases acicular crystals were found in considerable quantities in electrolytic cells. These have been collected, purified, and shown to consist mainly of hexachlorobenzene.—F. Roman and P. de Brun: The structure of the Alpine chain.—Mlle. G. Cousin: The individual variations of *Psiloceras planorbis*.—M. Flajolet: The strong magnetic perturbation of May 14–15, 1921. An account of the magnetic disturbance as shown on the recording instruments at the Lyons Observatory. The needle was at times beyond the limits of registration, and all the telegraphic circuits were seriously affected.—G. Dupont: Contribution to the study of the acid constituents of the secretion of the maritime pine.

Lævopimaric acid is readily isomerised by heat, acetic, and hydrochloric acids, whilst the dextro-acid is unaffected. With hydrochloric acid the change is effected in two stages, first into α -pimarabietic acid, and this into the stable form, β -pimarabietic acid. The latter acid has been isolated and identified with the pure abietic acid isolated by Schultz.—N. A. **Barbieri**: Anatomical study on the aretinal termination of the optic nerve in the animal series. Results of anatomical analysis are given which, in the author's opinion, prove the complete and reciprocal independence of the retina and the optic nerve in animals. This would suggest the possibility of surgical intervention in the posterior chamber of the eye.—R. **Noel**: Some functional attitudes of the chondriome of the hepatic cell.—L. M. **Bétances**: Cells with eosinophil granulations of histioid origin in the blood circulating in the embryo.—C. **Gorini**: Sudden physiological mutations in lactic ferments by divergent individuals.—M. **Dervieux**: Method of individual diagnosis of the blood and of sperm. A serum is prepared by sensitising a rabbit by injections of human sperm. This serum gives precipitations with human sperm and human blood, and various applications in diagnosis are suggested. By its means it can be determined whether a given sample of blood is that of a man or a woman.—W. **Kopaczewski**: Food anaphylaxy and its therapeutics. In cases where horse flesh has been taken as food, or where infants have been nourished on the milk of the horse, exceptionally grave symptoms have been observed to follow the injection of antidiphtheric serum produced through the horse. It would appear to be probable that the body can be sensitised to a serum by food.—R. **Bayeux**: The use of oxygen mixed with carbon dioxide in subcutaneous injections, as a treatment of mountain sickness and certain toxic dyspnoea.—R. **Sazerac** and C. **Levaditi**: The action of bismuth on syphilis and on the Nagana trypanosome. Potassium tartarobismuthate exerts a marked curative action on experimental syphilis of the rabbit and on the spontaneous spirillosis of the same animal. The curative effects on Nagana trypanosomiasis, although clear, are inferior to the two above mentioned.

Books Received.

British Museum (Natural History). British Antarctic (*Terra Nova*) Expedition, 1910. Natural History Report. Zoology, vol. iii., No. 9, Insecta. Part i.: Collembola. By Prof. George H. Carpenter. Part ii.: Mallophaga. By James Waterston. Pp. 259-72+i plate. (London: British Museum (Natural History).) 2s. 6d.

Proceedings of the Cambridge Philosophical Society. Vol. xx., part iii. (Lent Term, 1921.) Pp. 285-397. (Cambridge: At the University Press.) 8s. 6d. net.

Traité de Dynamique. By Jean d'Alembert. (Les Maîtres de la Pensée scientifique.) No. i. Pp. x1+102. No. ii. Pp. 187. (Paris: Gauthier-Villars et Cie.)

Les Mouvements des Végétaux. Du Réveil et du Sommeil des Plantes. By René Dutrochet. (Les Maîtres de la Pensée scientifique.) Pp. viii+121. (Paris: Gauthier-Villars et Cie.)

Contributions to West Australian Botany. Part iii., Additions and Notes to the Flora of Extra-Tropical West Australia. By C. H. Ostenfeld. Pp. 144+xii plates. (København: A. F. Høst and Son.)

The Analysis of Mind. By Bertrand Russell. (Library of Philosophy.) Pp. 310. (London: G.

Allen and Unwin, Ltd.; New York: The Macmillan Co.) 16s. net.

Mediaeval Contributions to Modern Civilisation: A Series of Lectures delivered at King's College, University of London. Edited by Prof. F. J. G. Hearnshaw. Pp. 268. (London and Sydney: G. G. Harrap and Co., Ltd.) 10s. 6d. net.

A Manual of Seismology. By Dr. Charles Davison. (Cambridge Geological Series.) Pp. xii+256. (Cambridge: At the University Press.) 21s. net.

Studies on Arthropoda. By Dr. H. J. Hansen. No. 1. Pp. 80+iv plates. (Copenhagen and London: Gyldendalske Boghandel.)

A History of Persia. By Brig. Gen. Sir Percy Sykes. (In 2 vols.) Second edition. Vol. i. Pp. xxviii+563. Vol. ii. Pp. xx+594. (London: Macmillan and Co., Ltd.) 70s. net.

Greenwich Catalogue of Stars for 1910-0. Part 1: Fundamental Stars. Part 2: Stars in the Zone +24° to +32° 0'. From Observations with the Transit Circle made at the Royal Observatory, Greenwich, 1906-1914, under the Direction of Sir Frank W. Dyson. Pp. xvii+Axvii+A32+Bxxxvii+B249. (London: H.M. Stationery Office.)

Condensed Description of the Manufacture of Beet Sugar. By Dr. Franz Murke. Pp. v+175. (New York: J. Wiley and Sons, Inc.; London: Chapman and Hall, Ltd.) 15s. net.

Analyses and Energy Values of Foods. By Dr. R. H. A. Plimmer. Pp. 255. (London: H.M. Stationery Office.) 6s. net.

A Dictionary of Applied Chemistry. By Sir Edward Thorpe. Vol. ii.: Calculi to Explosion. Revised and enlarged edition. Pp. viii+717. (London: Longmans, Green and Co.) 60s. net.

Koninklijk Nederlandsch Meteorologisch Instituut. No. 106. Ergebnisse Aerologischer Beobachtungen. No. 7, 1918. Pp. x+76. No. 110. Oceanographische en Meteorologische Waarnemingen in den Atlantischen Oceaan, December, Januari, Februari, 1870-1914. Pp. ix+217. (Utrecht: Kemink & Zoon.) 7 florins.

Publications of the Astronomical Laboratory at Groningen. No. 30. Pp. vi+110. No. 31. Pp. iii+83+2 plates. (Groningen: Hoitsema Bros.)

Annalen van de Sterrewacht te Leiden. Deel X., Eerste Stuk. Beobachtungen am Meridiankreis in den Jahren 1899-1902 und Deren Bearbeitung. Pp. A112+111. By Dr. E. F. van de Sande Bakhuyzen and Dr. A. Pannekoek. Deel XII., Eerste Stuk. Outlines of a New Mathematical Theory of Jupiter's Satellites. By W. de Sitter. Pp. 53. Deel XII., Tweede Stuk. Analytical and Numerical Theory of the Motions of the Orbital Planes of Jupiter's Satellites. Secular Terms. By Dr. A. J. Leckie. Pp. iii+100. (Leyden.)

Arabian Medicine: Being the Fitzpatrick Lectures delivered at the College of Physicians in November, 1919, and November, 1920. By Prof. Edward G. Browne. Pp. viii+138. (Cambridge: At the University Press.) 12s. net.

Prehistory. A Study of Early Cultures in Europe and the Mediterranean Basin. By M. C. Burkitt. Pp. xx+438. (Cambridge: At the University Press.) 35s. net.

The Principles of Immunology. By Prof. Howard T. Karsner and Dr. Enrique E. Ecken. Pp. xvii+309+2 plates. (London: J. B. Lippincott Co.) 21s. net.