Calendar of Scientific Pioneers.

October 6, 1825. Bernard Germain Etienne de la Ville, Comte de Lacépède, died.—The disciple and friend of Buffon, Lacépède, after the Revolution, was appointed to a chair of zoology in the Jardin des Plantes, and published various works on natural history.

October 6, 1880. Benjamin Peirce died.—A leader in the American world of science, Peirce was professor of astronomy and mathematics at Harvard, and for some time superintendent of the U.S. Coast Survey. He wrote many treatises, and was a founder of the American Academy of Sciences.

October 6, 1894. Nathanael Pringsheim died.—The founder in 1858 of the Jahrbuch für Wissenschaftliche Botanik, and in 1882 of the German Botanical Society, Pringsheim contributed much to the study of sex in plants, of algæ, and of alternations of generations.

October 6, 1902. John Hall Gladstone died.—Following in the footsteps of Graham, Gladstone devoted himself mainly to physical chemistry, and especially studied the relation of the elements and compounds to light. Of independent means, he gave much time to educational and social matters. He was the first president of the Physical Society.

October 6, 1911. John Hughlings Jackson died.—Physician to the London Hospital and the Hospital for Epileptics, Jackson was one of the first in England to use the ophthalmoscope, and was distinguished by his work on the nervous system and epilepsy.

October 7, 1847. Alexandre Brongniart died.—A famous mineralogist and the associate of Cuvier, Brongniart, after serving in the army, became director of the Sèvres porcelain factory, and in 1822 succeeded Haüy at the École des Mines.

October 8, 1647. Christian Severinus Longomontanus died.—An assistant to Tycho Brahe at Hven, Longomontanus, or Longberg, accompanied Tycho to Bavaria, and from 1605 onwards was professor of mathematics at Copenhagen. His "Astronomica Danica," 1622, is an exposition of the Tychonic system of the world.

October 9, 1869. Otto Linné Erdmann died.—For nearly forty years professor of technical chemistry at Leipzig, Erdmann made valuable researches on nickel and on indigo and other dyes, and with Marchand made determinations of atomic weight.

October 10, 1679. John Mayow was buried.—Remembered for his advanced views on combustion and respiration, Mayow, who was a physician, died in London in September, 1679, and was buried on October 10 in St. Paul's, Covent Garden. It has been said that his premature death retarded the advance of modern chemistry by a century.

October 10, 1708. David Gregory died.—Nephew to James Gregory, the inventor of the reflecting telescope, David Gregory owed his fame to his advocacy of the Newtonian philosophy, which he was the first publicly to teach. From 1691 he was Savilian professor of astronomy at Oxford.

October 11, 1708. Ehrenfried Walter Graf von Tschirnhausen died.—A mathematician, Tschirnhausen was the founder of catacaustics, and was known as the maker of large burning glasses.

October 11, 1889. James Prescott Joule died.—The favourite pupil of Dalton, and one of the most intimate friends of Kelvin, with whom he collaborated, Joule is universally known for his determination of the mechanical equivalent of heat, and for his share in establishing the law of the conservation of energy. His epoch-making papers were read in 1843, 1845, 1847, and 1849. The Copley medal was awarded to him in 1870.

E. C. S.

Societies and Academies.

BIRMINGHAM.

Institute of Metals.—Annual autumn meeting, September 21.—Prof. A. A. **Read** and R. H. **Greaves**: The properties of some nickel-aluminium-copper alloys. In some of the copper-rich nickel-aluminium-copper alloys the α-solution will retain more nickel and aluminium at 900° C. than at the ordinary temperature. These alloys, while relatively soft on quenching from 900° C., are hardened by slow cooling or by reheating to lower temperatures. This change is the result of the appearance of a new constituent, probably a nickel-aluminium-copper solid solution, the separation of which is accompanied by changes in density and electrical conductivity, in addition to its effect on tensile, hardness, notched bar, and other tests. The separation of this special constituent takes place slowly, so that chill-cast alloys and hot-rolled rods of small section consist almost wholly of the α-constituent. On annealing the cold-rolled alloys softening proceeds slowly up to 500° C., when precipitation of the nickel-aluminium-rich constituent begins to take place. If the separation is sufficient, this may give an alloy of high elastic limit and tensile strength and good elongation. The hardest product is obtained by reheating the quenched alloy for some time at 600–700° C. Alloys so treated generally give better properties than those obtained by uniform rates of slow cooling, and show considerable endurance under alternating stresses above their true fatigue limit.—R. T. **Rolfe**: The effect of increasing proportions of lead upon the properties of Admiralty gunmetal, with an appendix dealing with the effect of lead on gunmetal containing copper 85 per cent., tin 5 per cent., and zinc 10 per cent. Synthetic alloys containing increasing proportions of lead up to 1·68 per cent. were examined. In sand-cast gunmetal lead gradually increases the strength, ductility, and softness of the alloy up to about 1·5 per cent. of lead, but above this proportion causes a decrease in all three. It does not affect the soundness. In chill-cast gunmetal the effect on the hardness parallels that of the sand-cast metal, with a change-point at about 1·5 per cent. of lead, but associated with a minimum rather than a maximum strength figure. It does not affect the soundness. The influence of lead on liquation, machinability, corrosion, and behaviour for bearing purposes is discussed, and it is suggested that in sand-cast gunmetal the proportion of lead permitted by the Admiralty specification might with advantage be increased from 0·5 to 1 per cent.—R. **Genders**: The casting of brass ingots. The failure of hollow-drawn articles made from brass rod has generally been found to be due to the presence of non-metallic inclusions which originated in the cast ingot. The methods used in casting ingots of brass vary, much consideration being given to the saving of rolling. When a hollow article subject to expanding stresses is to be made, the avoidance of inclusions of foreign matter is vital, and the form of ingot requires modification. The ingots made were 3 in. square and 30 in. in length, as compared with the ingots 6–7 ft. in length and 1½ in. square section in common use. A hot sinking head or "dozzle" was introduced, and molten brass is poured through the "dozzle." No pipe is formed in the ingot proper, and additions of metal may be made at any time to the metal in the "dozzle" without risk of introducing defects into the ingot, any dross rising to the top of the still fluid head. The moulds were tapered, the top being enlarged by increasing amounts in successive experiments, and ingots were cast at the usual foundry speed.—T. G. **Bamford**: The density

of the zinc–copper alloys. Experiments were conducted with alloys made from pure metals and cast in sand- and chill-moulds respectively. There is a contraction in volume due to alloying with mixtures containing more than 25 per cent. of copper, and the density of the sand-cast or slowly cooled alloys is generally less than that of the chill castings; at points where the liquidus and solidus coincide on the constitutional diagram, chill castings and sand castings give the same values. The expansion recorded by Turner and Murray with alloys containing less than 30 per cent. of copper is confirmed, and is shown to be connected with a new form of porosity different from ordinary unsoundness.—Dr. F. **Johnson**: Experiments in the working and annealing of copper. Part 1: Critical ranges of deformation probably result from stages of abnormal plasticity during rolling of the metal. It is suggested that during these stages the metal actually loses some of the increase of hardness conferred in earlier "passes." A decrease of volume up to 85 per cent. occurs; the increase of volume which then sets in may correspond to the inception of permanent disability which cannot be eradicated by annealing. Part 2: At 200° C. for one hour softening occurs in all strips rolled beyond 40 per cent. reduction. Test-pieces from the axes of the strips undergo softening to a greater extent than edge-specimens from the same series when annealed under the same conditions, thus indicating a greater intensity of strain at the centre than at the edges. High-temperature annealing at 750° C. shows that at 87 per cent. reduction a rapid decrease in strength sets in. Part 3: Low-temperature annealing of cold-drawn copper rods of varying compositions. "Tough-pitch" arsenical rods retain their strength practically unimpaired up to 300° C., whereas "tough-pitch" electrolytic copper undergoes considerable loss of strength. The presence of silver in arsenical rods raises slightly the annealing temperature. The substitution of iron for oxygen in arsenical copper retards the rate of softening.—W. E. **Alkins** and W. **Cartwright**: The effect of progressive cold-drawing upon some of the physical properties of low-tin bronze. The tin content varied from about 0·7 to about 1·0 per cent. in the three samples of bronze studied. The most important and rapid changes in properties occur after a reduction of 85 per cent. of the original area, *i.e.* over the range where practical difficulties are met with during drawing. The extent of the variation in tensile strength, specific volume, and scleroscope hardness is very similar to that previously found in the case of copper.

September 22.—R. **Genders**: The extrusion defect. Experiments have been carried out with the object of devising a method of extrusion which would avoid the formation of the defect known as "piping," which is commonly found in some centrally extruded rod made from brass and other non-ferrous alloys by the usual hot-extrusion process. The defect is tubular in the interior of the rod, and generally exists in the last portion extruded. When a defective rod is broken across, the core frequently breaks at a different point from the outer ring. The defect consists of foreign matter, oxide and dezincified brass, which constituted the skin of the original billet. Billets extruded to various stages and sectioned axially show the presence of the defect in the shape of a funnel. The defect can be largely overcome by the use of a ram smaller in diameter than the billet, which causes the outer layer of the billet to remain in the receiver as a thin cylinder, but the method would probably be too wasteful on a large scale. By inverting the process so that the die is pushed through the billet the mode of flow is altered. There is no relative movement between the billet and receiver, and flow is confined to the region of the die. The power required is less than with the method at present in use. The method is in use in many places for the production of tubes and rod from soft metals.—F. S. **Tritton**: The use of the scleroscope on light specimens of metals. Errors were detected when using the ordinary methods of support, and to reduce them pitch and glucose were selected. The use of pitch requires a special clamp, a new type of which is described. A solution of glucose considerably stiffer than treacle gave good results, the specimens being attached by means of the glucose to a hard steel base. The hardness of specimens having both flat and curved surfaces can be tested provided that a recessed support be made to fit the specimens.—D. H. **Ingall**: The relation between mechanical properties and microstructure in pure rolled zinc. The material as rolled, and also when annealed, at 100° and 150° C., is ductile "with" and brittle "across" the direction of rolling, with reduction from 77 to about 87 per cent.; it is ductile in all directions with 96 per cent. reduction by rolling, where the strength has risen from about 6 to about 13 tons per sq. in. An equi-axed structure exists in all cases. Annealing for thirty minutes at 200° C. renders the material completely brittle and weak, due to a crystallisation.—Dr. D. **Hanson** and Marie L. V. **Gayler**: The constitution and age-hardening of the alloys of aluminium with magnesium and silicon. The ternary system aluminium, magnesium, and silicon, containing up to 35 per cent. of magnesium and 11 per cent. of silicon, has been investigated. Thermal curves and microscopic examination prove that magnesium and silicon form a chemical compound having the formula Mg_2Si, which with aluminium forms a eutectiferous binary system, having an eutectic containing 13 per cent. of Mg_2Si, and melting at 590° C. The aluminium–Mg_2Si–silicon system possesses a ternary eutectic that melts at 550° C.; the ternary eutectic of the aluminium–Mg_2Si–magnesium system melts at 450° C. The solubility of Mg_2Si in solid aluminium is 1·6 per cent. of Mg_2Si at 580° C. and about 0·5 per cent. at 30° C. Excess of silicon has little effect, but magnesium reduces the solubility at high temperatures. The difference in the solubility of Mg_2Si at high and low temperatures is the cause of the age-hardening property of these alloys, which in a series of alloys containing increasing amounts of Mg_2Si rises progressively until the limit of the solubility of Mg_2Si in aluminium at the quenching temperature is reached, beyond which the total increase in hardness remains constant. The increase in hardness is roughly proportional to the amount of Mg_2Si retained in solution by quenching.—F. **Adcock**: The electrolytic etching of metals. A solution of citric acid as an electrolyte in the etching bath gave good results with cupro-nickel (80 : 20), silver, nickel-silver, and some other metals. Certain specimens of silver showed on etching a cell-structure or network which was smaller than, and in some cases independent of, the existing crystal grains. Another electrolyte made by dissolving molybdic acid in excess of ammonia solution gave similar results, and revealed a subsidiary cell-formation or network in the β-regions of a $\beta+\gamma$ brass containing 6 per cent. of aluminium. By using hydrofluoric acid, chromic acid, and bromine water, both the cores and the crystal-grain boundaries of cast cupro-nickel were disclosed simultaneously.—S. **Beckinsale**: The magnesium alloy "electron." Samples of the new high magnesium alloy "electron" contained about 95 per cent. of magnesium, 4·5 per cent. of zinc, and 0·5 per cent. of copper. The alloys machined well,

and compared very favourably with aluminium alloys in tensile properties (allowance being made for the much lower specific gravity), but they were not so ductile in compression.

PARIS.

Academy of Sciences, September 19.—M. Georges Lemoine in the chair.—The President announced the death of Alfred Grandidier, member of the section of Geography and Navigation.—J. **Kampé de Fériet**: Some properties of hypergeometrical functions of higher order with two variables.—MM. **Barbillion** and M. **Dugit**: A simple apparatus for obtaining the deviation of the edge of an aeroplane due to the effect of the wind.—M. **d'Azumbuja**: A method for the synchronisation of clock mechanism and of pendulums employed in astronomy. The clockwork mechanism generally used in observatories for controlling the motion of telescopes or mirrors do not possess the accuracy of astronomical clocks, and when used for long photographic exposures frequent rectifications by the observer are necessary. In the apparatus proposed by the author, which has been set up at Meudon, a weight-driven motor is controlled electrically by a pendulum. A diagram of the arrangement is given; it has been in use at Meudon for more than a year, and has proved satisfactory.—A. **Kozlowski**: The origin of the oleoleucites in the liverworts carrying leaves. The examination of living specimens of *Lophocolea heterophylla, L. bidentata, Lepidozia reptans,* and *Mastygobryum trilobatum* leads to the conclusion that Pfeffer's hypothesis on the formation of oleoleucites by the agglomeration of droplets is justified, in spite of the contrary opinions of Wakker, Raciborski, and Garjeanne.—M. **Romieu**: Morphology of the spermatozoid of Chætopterus.—M. **Bridel**: the action of emulsin from almonds on lactose in 85 per cent. ethyl alcohol. The reaction is a complex one: galactose and β-ethylgalactoside were isolated, the former in crystalline form.

SYDNEY.

Royal Society of New South Wales, August 3.—Mr. E. C. Andrews, president, in the chair.—R. H. **Cambage**: Acacia seedlings. A seed of *Acacia melanoxylon* from Jenolan Caves had germinated after having been immersed in sea-water for four years and one month. The rapid germination of *A. Oswaldi*, which grows in the dry interior, is noted. This character may have been developed through the habit of germination after thunderstorms, when the young plant has to establish itself before the succeeding dry weather overtakes it.—G. D. **Osborne**: A preliminary examination of the late Palæozoic folding in the Hunter River District, New South Wales. By the aid of a diagram, giving the elemental features of the diastrophism, it is shown that the earth's segment in the district has undergone a crustal shortening of 7·46 miles, the original width of 77·96 miles now being compressed into 70·50 miles. The depth of the earth block involved has been calculated, and the effects of the strike faulting, in relation to the determination of the vertical bulging resultant upon the thrusting, are discussed.—A. R. **Penfold**: Note on the position of the double linkage in piperitone. On oxidation with neutral potassium permanganate solution diosphenol in monoclinic needles of melting point 82° C. was obtained. This body possesses a well structure of which the double linkage is in the 1 position. Piperitone must therefore be Δ-1-menthone-3.—Dr. L. A. **Cotton**: Earth movements at Burrinjuck, as recorded by horizontal pendulum observations. Horizontal pendulums were installed to measure the movement of the rocks under the load of water impounded by the Burrinjuck Dam, and the relation between the movements of the pendulums and the temperature changes registered by a thermometer placed within the concrete dam, at a distance of 80 ft. from the surface, were investigated. The rock movements are seasonal in character, with a lag of several months, corresponding closely to the temperature lag. The actual movement is from five to ten seconds of arc, which is probably sufficient to cause considerable strain in the rock-masses involved.

Books Received.

The Rift Valleys and Geology of East Africa: An Account of the Origin and History of the Rift Valleys of East Africa and their Relation to the Contemporary Earth-Movements which Transformed the Geography of the World. By Prof. J. W. Gregory. Pp. 479. (London: Seeley, Service and Co., Ltd.) 32*s.* net.

Zoology for Medical Students. By Prof. J. Graham Kerr. Pp. x+485. (London: Macmillan and Co., Ltd.) 25*s.* net.

A Text-book of Qualitative Analysis of Inorganic Substances. By Dr. S. A. Kay. Pp. vii+80. (London: Gurney and Jackson; Edinburgh: Oliver and Boyd.) 7*s.* 6*d.* net.

The International Forestry Bibliography, including Allied Subjects. By Dr. A. H. Unwin. Pp. 48. (Critchmere, Haslemere: Forest Lover's Library.) 2*s.* 6*d.* net.

Wightman's Secondary Schools Mathematical Tables. Edited by F. Sandon. Pp. 96. (London: Wightman and Co., Ltd.) 6*d.*

The Depths of the Soul: Psycho-Analytical Studies. By Dr. William Stekel. Authorised translation by Dr. S. A. Tannenbaum. Pp. v+216. (London: Kegan Paul and Co., Ltd.) 6*s.* 6*d.* net.

An Introduction to Biophysics. By Dr. D. Burns. Pp. xiii+435. (London: J. and A. Churchill.) 21*s.* net.

Handbuch der Gesamten Augenheilkunde. Begründet von A. Graefe und Th. Saemisch. Fortgeführt von C. Hess. Herausgegeben von Th. Axenfeld und A. Elschnig. Dritte, neubearbeitete auflage. Die Brille als Optisches Instrument. Von Prof. Dr. M. von Rohr. Dritte auflage. Pp. xiv+254. (Berlin: J. Springer.) In Germany, 66 marks; in England, 132 marks.

The Chemistry of Colloids and some Technical Applications. By Dr. W. W. Taylor. Second edition. Pp. viii+332. (London: E. Arnold and Co.) 10*s.* 6*d.* net.

An Introduction to Projective Geometry. By Prof. L. N. G. Filon. Third edition. Pp. viii+253. (London: E. Arnold and Co.) 7*s.* 6*d.*

Forensic Chemistry. By A. Lucas. Pp. viii+268. (London: E. Arnold and Co.) 15*s.* net.

Organic Evolution: Outstanding Difficulties and Possible Explanations. By Major Leonard Darwin. Pp. viii+47. (Cambridge: At the University Press). 4*s.* net.

On some Antiquities in the Neighbourhood of Dunecht House, Aberdeenshire. By the Right Rev. Dr. G. F. Browne. Pp. xiv+170+63 plates. (Cambridge: At the University Press.) 63*s.* net.

A First Book of General Science: An Introduction to the Scientific Study of Animal and Plant Life. By A. T. Simmons and A. J. V. Gale. (First Books of Science series.) Pp. viii+145. (London: Macmillan and Co., Ltd.) 2*s.* 6*d.*

The Institution of Mechanical Engineers. Eleventh Report to the Alloys Research Committee. On Some Alloys of Aluminium (Light Alloys). By Dr. W.