

Calendar of Industrial Pioneers.

April 7, 1898. **Otto Baensch died.**—For nearly fifty years Baensch was in the State service of Germany and did important work in connection with the navigation of the Elbe, the Upper Rhine, and the famous Kaiser-Wilhelm or Kiel Ship Canal.

April 8, 1893. **Vice-Admiral E. Paris died.**—Joining the French Navy in 1822, Paris was one of the first naval officers in France to study steam navigation. He wrote manuals on mechanics and a treatise on screw propulsion, and contributed papers to the Institution of Naval Architects, of which he was elected an honorary associate.

April 9, 1870. **Thomas Joseph Ditchburn died.**—A pioneer builder of iron ships, Ditchburn received his training in Chatham Dockyard and assisted Sir Robert Seppings in some of his experiments. He afterwards was manager for Fletcher and Fearnall, and then with Mare established the first iron ship-building yard on the Thames. In 1846 he built the only iron sailing man-of-war ever in H.M. Navy, H.M.S. *Recruit*. Ditchburn later on founded the famous Thames Iron Works at Blackwall, where during ten years he constructed some 400 vessels.

April 9, 1877. **William Gossage died.**—A great industrial chemist and inventor, Gossage began life as a druggist's assistant. In 1830 he assisted to found an alkali works at Stoke Prior, Worcestershire, and six years later he patented his well-known condensing tower which prevents the escape of hydrochloric acid gas; an invention "which saved from extinction a trade, the growth of which has contributed to the nation's prosperity." Gossage engaged in copper smelting and other enterprises and also became the largest manufacturer of soap in the world.

April 10, 1903. **Horace Bell died.**—Entering the public works department of India in 1862, Bell rose to be Engineer-in-chief of the Survey of the Great Western Railway of India and consulting engineer for the State railways.

April 11, 1822. **Ralph Dodd died.**—The projector of a tunnel beneath the Thames between Tilbury and Gravesend, Dodd was a civil engineer and was known for his writings on canals and on the water supply and docks of London; he was also a promoter of steam navigation. He died just a hundred years ago from injuries sustained by a boiler exploding.

April 11, 1847. **Charles Holtzapffel died.**—The son of a German toolmaker who settled in London in 1787, Holtzapffel became an expert mechanic, and in 1843 published a valuable work entitled "Turning and Mechanical Manipulation." He was a member of the Council of the Institute of Civil Engineers.

April 12, 1840. **Franz Anton von Gerstner died.**—Like his father a mathematician and engineer, Gerstner from 1818 to 1825 was professor of practical geometry in the polytechnic in Vienna, and was one of the earliest continental railway engineers. He constructed the railway from Budweis to Linz, and in 1834 built the first Russian line, that from St. Petersburg to Czarskoeselo. He died in Philadelphia, whither he had gone to study the railways of America.

April 12, 1898. **Aimé Claude Alfred Girard died.**—A distinguished French chemist, and a member of the Institute, Girard in 1871 succeeded Payen in the chair of industrial chemistry in the Conservatoire des Arts et Metiers. E. C. S.

Societies and Academies.

LONDON

Royal Society, March 23.—Sir Charles Sherrington, president, in the chair.—Sir Richard Glazebrook: Specific heats of air, steam, and carbon dioxide. The values for the specific heats of these gases below 1000° C. given recently by Womersley are higher by 5-10 per cent. than those which follow from the results given by Holborn and Henning.—A. E. H. Tutton: (1) Monoclinic double selenates of the manganese group. The manganese group of double selenates of the isomorphous series $R_2Mn(SeO_4)_2 \cdot 6H_2O$ includes only three salts, those in which R is rubidium, caesium, and ammonium. Optically these salts are precisely in line with those for analogous salts of other groups, so that if the potassium salt could be obtained, it would be the first member of a progressive series, and the general law of progression of the crystallographic properties with the atomic number of the alkali metal would be obeyed rigidly. The volume and edge-dimensions of the space-lattice cells of the crystal structures of ammonium manganous selenate hexahydrate and rubidium manganous selenate are nearly identical. Similar facts obtain for all analogous ammonium and rubidium salts throughout the whole isomorphous series, as well as for the rhombic simple sulphates themselves. (2) Monoclinic double selenates of the cadmium group. Crystals of the ammonium salt, $(NH_4)_2Cd(SeO_4)_2 \cdot 6H_2O$, which were sufficiently transparent in parts for optical use were obtained on very keen frosty nights. The potassium salt appears to be incapable of existence, its limit being probably below 0° C. Crystals of the rubidium or caesium salt were obtained during the coldest nights of January, but they were quite opaque, so that only goniometrical measurements were possible. The results are in complete accord with those from other, complete groups.—F. A. Freeth: The system: $Na_2O-CO_2-NaCl-H_2O$. The system is arbitrarily considered as composed of two four-component systems, namely:— $Na_2CO_3-NaHCO_3-NaCl-H_2O$, and $Na_2CO_3-NaOH-NaCl-H_2O$. Determinations have been made at 0°, 15°, 20°, 25°, 30°, 35°, 45°, and 60° C. A general treatment is given showing how the composition and quantities of the stable phases from any mixtures of the components may be deduced.—M. A. Catalán: Series and other regularities in the spectrum of manganese. Flame-arc, arc and spark spectra of manganese have been observed and new series lines traced. Series belonging to the spectrum of the neutral atom are (a) a system of triplet series; (b) a system consisting of narrow triplets; and (c) a system of narrower triplet series running parallel to the preceding system. Intercombination lines between the two first systems appear as two lines very prominent at low temperatures. The calculated ionisation and resonance potentials of manganese are 7.4 volts and 2.3 volts. Diffuse triplets in the spectrum of the ionised atom are composed of nine lines. At different temperatures, groups of lines of the same character and related by very exact numerical separations ("multiplets") have been identified. The neutral atom of manganese probably has two electrons in the outermost ring, and when it loses one electron and becomes ionised, another electron comes out to the ring. Thus, the spectra of neutral and ionised atoms would be similarly constituted in accordance with observations.—D. W. Dye: Calculation of a standard of mutual inductance and comparison of it with the similar laboratory standard. The windings of the primary helices and the secondary overwound coil of a Campbell type of mutual inductance standard were measured in terms

of the length standards of the N.P.L. and the value in absolute millihenries has been calculated. Comparisons with the similar laboratory standard at a frequency of ten cycles per second showed that the ratio of the calculated values of the two standards was in agreement with the ratio of the experimentally compared values to an accuracy of 5 in 10^6 .—P. E. Shaw and N. Davy: The effect of temperature on gravitative attraction. Results with a torsion balance of the Boys-Cavendish type indicated a temperature effect of gravitation of about 1×10^{-5} per 1° C. With similar apparatus modified to eliminate small mechanical movements caused possibly by the raising of the large gravitative masses to a high temperature, the effect was shown to be due to such movements reversible with temperature. The temperature effect, if any, must be less than 2×10^{-6} per 1° C. The mean effect observed is a very small diminution in attraction as temperature rises.

Zoological Society, March 7.—Sir Sidney F. Harmer, vice-president, in the chair.—N. S. Lucas: Report on the deaths which occurred in the Society's Gardens during 1921.—R. Broom: On the temporal arches of the Reptilia.—F. V. Urich, H. Scott, and J. Waterston: The bat-parasite *Cyclopodia greiffi*, and a new species of hymenopterous (Chalcid) parasite bred from it.—S. V. Montgomery: Direct development in a Dromiid Crab.—F. Balfour-Brown: The life-history of the water-beetle, *Pelobius tardus*, Herbst.

March 21.—Dr. A. Smith Woodward, vice-president, in the chair.—P. Chalmers Mitchell: Monkeys and the fear of snakes.—G. Blaine: Notes on the zebras and some antelopes of Angola.—R. I. Pocock: On the external characters of some Histicomorph Rodents.—H. R. Hogg: Some spiders from South Annam.

Physical Society, March 10.—Dr. Russell, president, in the chair.—R. L. Smith-Rose: On the electromagnetic screening of a triode oscillator. The most complete method of screening a valve set is to enclose it in a hermetically sealed box made of metal of suitable thickness for the frequency used. The smallest crack allows a detectable amount of the high-frequency energy to escape. Iron is far more effective than copper of the same thickness in preventing direct penetration of radio-frequency magnetic fields through the metal.—H. P. Waran: A new form of high vacuum automatic mercury pump. The pump, based on a modified Sprengel action, works automatically, the mercury being removed from the lower to the upper reservoir mixed with a current of dry air which is sucked through a side tube by a filter pump. An intermediate reservoir in the middle of the fall tube, kept automatically exhausted by the Sprengel action in the lower fall, allows the upper half to exert a positive exhaustion for every pellet of mercury falling down. The absence of compression in the first fall makes it possible to use the maximum bore for the fall tube. Less than a pound of mercury is required to operate the pump.—W. N. Bond: Viscosity determination by means of orifices and short tubes. General expressions for the end-corrections obtained by the method of dimensions are employed in plotting the results of experiments on the flow of mixtures of glycerine and water through pairs of tubes of equal diameter, but of different lengths. The conditions that the flow at the ends may be purely viscous and equations for determining the viscosity are given.

Royal Meteorological Society, March 15.—Dr. C. Chree, president, in the chair.—E. M. Wedderburn: Seiches; and the effect of wind and atmospheric

pressure on inland lakes. "Seiche" is the name originally given in Switzerland to quasi-tidal movements of the level of inland lakes. In 1905 the late Prof. Chrystal investigated the seiches in Loch Earn for the Scottish Lake Survey, and found that microbaric disturbances were the most frequent cause of seiches. Other possible causes are heavy rainfall over part of the lake, rapid flooding and wind squalls. Earth tremors rarely cause considerable movements. The Scottish Lake Survey also discovered internal seiches of large amplitude. During autumn there is at the surface a layer in which there is little variation of temperature with depth. Below this is a narrow layer, the discontinuity layer, in which the fall of temperature is rapid, while below this again is the bottom water of the lake in which temperature variations are small. The effect of wind blowing along a lake is to accumulate the warm surface water at the lee end, so that the discontinuity layer is displaced from its normal horizontal position. When the wind moderates a standing oscillation commences at the discontinuity layer. The period of oscillation depends on the difference of density between these layers; the amplitude may be several feet, without causing measurable disturbance of the level of the free surface.

CAMBRIDGE.

British Mycological Society, March 18.—Mr. F. T. Brooks, president, in the chair.—Mrs. M. N. Kidd: Diseases of apples in storage. Moulds attacking apples in storage show a definite sequence and cause a different amount of loss. Physiological diseases are of considerable importance. Scald and probably others can be completely controlled by wrapping the fruit in specially prepared paper.—J. Line: Parasitism of *Nectria cinnabarina*. This fungus is associated with a characteristic wilting of apparently healthy branches, the wood of which is brown to green and occluded with fungal hyphæ. Pure cultures of the fungus were incapable of establishing the hyphæ in living wood or cortex but succeeded on artificially killed plants, and finally were able to pass into healthy wood.—K. C. Mehta: Observations on the occurrence of wheat rusts near Cambridge. *Puccinia graminis* does not overwinter by uredospores nor by mycelium inside the host plant; its recurrence is explained only through fresh infection by aecidiospores produced on Barberry. In *P. triticea* and *P. glumarum* viable uredospores can be found during the greater part of winter, and there is conclusive experimental evidence that these rusts can overwinter by means of mycelium inside the host plants.—F. T. Brooks and C. G. Hansford: Mould growths on cold store meat. Meat from the southern hemisphere showing mould growths was investigated. Some of these fungi, particularly *Cladosporium herbarum* ("black spot"), can develop at -6° C.; other moulds grow readily at temperatures about freezing-point. At several degrees above this, bacterial growth is so active as to suppress the moulds. The fungi are only superficial and, unless accompanied by putrefactive bacteria, do not render the meat unfit for food.

DUBLIN.

Royal Dublin Society, March 28.—Dr. J. A. Scott in the chair.—J. J. Nolan and J. Enright: Experiments on the electrification produced by breaking up water, with special application to Simpson's theory of the electricity of thunderstorms. Different samples of water were tested. The purer water gives higher charges, the difference being very great for small degrees of breaking-up. With more complete pulverisation the charge produced tends to be

independent of the purity. It is found that the purer water can be broken into finer drops. Charges are obtained about ten times as great as any reported previously. The probable charge produced by the natural breaking up of a rain-drop of 4 mm. diameter is 0.2 e.s. unit per c.c.

EDINBURGH.

Royal Society, March 20.—Prof. F. O. Bower, president, in the chair.—Address by Sir Charles Sherrington: Some points regarding present-day views of reflex action. More attention is being paid now than formerly to the intimate nature of the processes in the nervous centres during reflex action. The question has been raised as to whether the essential elements of reflex action as unfolded in the reflex centre itself contain any which are fundamentally different from the properties shown by simple peripheral nerve-muscle preparations. The resemblance between the neuro-muscular junction and the synapse suggests that the latter, like the former, is a junctional region exhibiting decremental conduction of the nervous impulse. Then much of the summation observable in the nervous centre could be accounted for by such timing in the sequence of centripetal impulses that the successive impulses fell in the conducting path at such frequency as to coincide with the period of supranormal phase in the conducting fibre. The larger impulses thus resulting would pass through the decremental block that suffices to extinguish smaller ones. A somewhat slow frequency of stimulus rhythm would thus succeed in making a stimulus effective which had been at the outset ineffective. Conversely a frequency of serial stimuli, each singly effective, but so timed as to follow one upon another at such interval as to fall within the period of relative refractory phase of the precedent impulse, would lead to impulses of subnormal extent. These on arriving at a region of decrement, a synapse, would fail to pass. A neurone occupied by such subnormal impulses would form a complete inhibitory block to any reflex arc of which it formed a link. Thus central inhibition could be established by successive impulses, the interval between which lay outside the period of absolute refractory phase but not so far outside as to escape that of relatively refractory phase. Lucas offers an explanation of reciprocal innervation by such rhythmic impulse adjustments as involve interference of impulses of this nature. By invoking changes in the degree of decrement in the decrementally conducting regions the reversal of reflex action can be explained. Thus A. Forbes accounts for the changing of reflex excitation into reflex inhibition by assuming that the intensity of decrement is increased by such agents as chloroform and ether. The similar reversal by fatigue lends itself to a similar explanation. Such properties, observable in the simple nerve-muscle preparation itself, can be made to explain the main essential features of action of the nerve-centres.

PARIS.

Academy of Sciences, March 6.—M. Emile Bertin in the chair.—The secretary announced the death of M. Max. Noether, correspondent for the section of geometry.—G. Julia: New applications of conformal representation with functional equations.—H. Villat: A new problem concerning analytical functions and conformal representation.—R. Lagrange: The application of varieties of order p in an x space of n order.—B. Gambier: Point correspondence deduced from the study of the three fundamental quadratic forms of two surfaces.—A. Planiol: Organic yield of internal combustion

motors.—G. Camichel: Surfaces of discontinuity.—C. Nordmann and Le Morvan: Observation of a singular phenomenon presented by the star θ of the Great Bear. From its spectrum, this star should belong to the solar type, but the intensity distribution in its spectrum corresponds with an effective temperature near that of the very hot hydrogen stars.—G. Prévost: Determination of the coefficients in the development in Laplace polynomials of a function of two variables.—M. Labussière: The geometrical existence of a general invariant of pencils of rays refracted according to Descartes' law, and its applications to geometrical optics and to radiation.—E. Belin: The telegraphic transmission of photographs, drawings, or manuscripts. The original is converted into a relief photograph on bichromate gelatine paper, and a stylus connected with a microphone is moved over this relief. Special arrangements are described for ensuring the synchronism of the transmitting and receiving mechanism. The efficiency of the apparatus has been proved by trials in America and in France.—G. Claude: The elimination of the heat of reaction in the synthesis of ammonia at very high pressures.—G. Chaudron and G. Juge-Boirard: The estimation of sulphur in iron pyrites. In the method in current use (solution in aqua regia) some sulphur occasionally separates. It has been found that by allowing the reaction to proceed at the ordinary temperature for 12 hours this error can be avoided.—H. de Pommereau: The reduction of ethyl benzoate and of some other benzene compounds by sodium and absolute alcohol. With ethyl benzoate the chief product is tetrahydrobenzyl alcohol, with a small proportion of tetrahydrobenzyl alcohol as a secondary product.—M. Sommelet and J. Guioth: The formic hydrogenation of the quaternary salts of hexamethylenetetramine. Hexamethylenetetramine-chlorobenzylate boiled with formic acid gives a slow evolution of carbon dioxide. When gas ceases to be evolved, dimethylbenzylamine, $C_6H_5 \cdot CH_2 \cdot N(CH_3)_2$, can be isolated, in quantity corresponding with 60-70 per cent. of the theoretical yield.—A. Allix: Observations on relief sculpture by ice.—A. Guilliermond and G. Mangelot: The signification of the reticular apparatus of Golgi. It has been suggested that Golgi's apparatus has no real existence in the living plant and is caused by the preparation and staining of the section. With barley root as material, Golgi's experiments were repeated and confirmed, using not only Golgi's method, admittedly open to objection, but also the more certain technique of Cajal and Da Fano.—P. Georgévitch: The origin of the centrosome and the formation of the spindle in *Stypocaulon scoparium*.—Mme. A. Pruvot: A new and remarkable type of Gymnosome (Loginiopsis). A description of a new type of Gasteropod collected during the voyages of the Prince of Monaco in the region of the Azores. At the point where the mouth is usually situated this animal carries an appendix, in length about one-third that of the body. This is expanded near the summit into three fleshy lobes.—F. Maignon: The utilisation of the tissue diastases for the determination of the organ, the functional insufficiency of which is the cause of a pathological state. The application of this clinical method to the study of the physiological rôle of certain organs. Basedow's disease was proved to be caused not by the condition of the thyroid gland alone, since a mixture of diastases from the thyroid, ovary, and suprarenal glands was required to abate the symptoms. Eczema yielded to treatment with hepatic diastases, either alone, or mixed with diastase from other organs.—J. Benoit: The physiological conditions relating to the periodic nuptial adornment in birds. There is a close connection between the

state of the testicular interstitial gland and the state of the nuptial adornment (change in colour of plumage). There is no such connection between the nuptial adornment and the intratubular seminal gland.—C. Oberthür and C. Houbert: Convergence or parallel variation in the genus *Holmede*.—M. and Mme. G. Villedieu: Contribution to the study of anticryptogamic copper mixtures. The spores of *Phytophthora* (potato "disease") germinate freely in solutions of copper bicarbonate, but solutions of sodium sulphate (0.18 per cent.), potassium chloride (0.15 per cent.), sodium chloride (0.15 per cent.), or potassium nitrate (0.2 per cent.) arrest completely the germination of mildew. It would appear that the presence of copper in Bordeaux or Burgundy mixtures is of doubtful utility.—M. Aron: The determinism of secondary sexual characters in Tritons.—P. Nottin: The increased solubility and diastatic degradation of the nitrogenous materials of maize. Application to yeast manufacture.

ROYAL ANTHROPOLOGICAL INSTITUTE, at 8.15.—Capt. T. A. Joyce: The Paquecha of Ancient Peru.—Miss A. C. Breton: Notes on Some Peruvian Antiquities.
ROYAL SOCIETY OF MEDICINE (Psychiatry Section), at 8.30.—Dr. B. Pierce: Recovery.

WEDNESDAY, APRIL 12.

ROYAL ASTRONOMICAL SOCIETY, at 5.—Major W. J. S. Lockyer: The Relationship between the Solar Prominences and the Corona.
GEOLOGICAL SOCIETY OF LONDON, at 5.30.—Prof. A. C. Seward: A Collection of Carboniferous Plants from Peru.—F. W. Edwards: Oligocene Mosquitoes in the British Museum, with a Summary of our present Knowledge concerning Fossil Culicidae.—Miss M. E. J. Chandler: The Geological History of the Genus *Stratiotes*: an Account of the Evolutionary Changes which have occurred within the Genus during the Tertiary and Quaternary Eras.
INSTITUTION OF AUTOMOBILE ENGINEERS (at Institution of Mechanical Engineers), at 8.—A. F. Evans: Marine Engine Design as affected by Lifeboat Service Conditions.
ASSOCIATION OF ENGINEERS-IN-CHIEF (at St. Bride's Institute, Bride Lane, E.C.4), at 8.—W. H. Booth: The Artesian Wells and Geological Strata of London.

THURSDAY, APRIL 13.

OPTICAL SOCIETY (at Imperial College of Science and Technology), at 7.30.

FRIDAY, APRIL 14.

MALACOLOGICAL SOCIETY OF LONDON (at Linnean Society).

Official Publications Received.

Department of the Interior: United States Geological Survey. Forty-second Annual Report of the United States Geological Survey to the Secretary of the Interior for the Fiscal Year ended June 30, 1921. Pp. 108. (Washington: Government Printing Office.)
Thirty-fifth Annual Report of the Bureau of American Ethnology to the Secretary of the Smithsonian Institution, 1913-1914. (In 2 parts.) Part II. Pp. viii+795-1481. (Washington: Government Printing Office.)
Annual Report of the Director, United States Coast and Geodetic Survey to the Secretary of Commerce for the Fiscal Year ended June 30, 1921. Pp. 147+36 charts. (Washington: Government Printing Office.)
Department of the Interior: Bureau of Education. Bulletin, 1921, No. 8: Foreign Criticism of American Education. By W. J. Osburn. Pp. 158. (Washington: Government Printing Office.)

Diary of Societies.

FRIDAY, APRIL 7.

DIESEL ENGINE USERS' ASSOCIATION (at Institution of Electrical Engineers), at 3.—H. Moore: Some Characteristics of Petroleum Oil used in Diesel Engines.
LONDON SOCIETY (at Royal Society of Arts), at 4.30.—Dr. C. W. Saleeby: More Light on London: or the Coal Smoke Curse and the Restoration of Daylight.
FOOD EDUCATION SOCIETY (at Caxton Hall, Westminster), at 5.30.—Miss A. D. Muncaster, and others: Discussion on Feeding in Institutions, with special reference to School Diet.
ROYAL AERONAUTICAL SOCIETY (Students' Section) (at 7 Albemarle Street), at 6.45.—Prof. L. Baird: Some Aeronautical Problems of the Early Future.
JUNIOR INSTITUTION OF ENGINEERS, at 8.—J. W. Maple: Engineering in Southern Persia.
ROYAL INSTITUTION OF GREAT BRITAIN, at 9.—Sir Ernest Rutherford: Evolution of the Elements.

SATURDAY, APRIL 8.

ROYAL INSTITUTION OF GREAT BRITAIN, at 3.—Sir Ernest Rutherford: Radioactivity (6).
INTERNATIONAL COLLEGE OF CHROMATICS (at Caxton Hall), at 3.15.—E. K. Robinson: Trees: their Colours and Coloration.

MONDAY, APRIL 10.

VICTORIA INSTITUTE (at Central Buildings, Westminster), at 4.30.—T. Roberts: Seven Decisive and Suggestive Scenes in the History of the Secular Contest between Conscience and Power.
ROYAL GEOGRAPHICAL SOCIETY (at Lowther Lodge, Kensington Gore), at 5.—C. S. Fox, and others: Discussion on Dr. Heron's Report on the Geology of the Mount Everest Region.
ARISTOTELIAN SOCIETY (at University of London Club, 21 Gower Street, W.C.1), at 8.—Dr. G. E. Moore, Prof. G. Dawes Hicks, and Miss L. S. Stebbing: Discussion on Dr. McTaggart's "Nature of Existence."
SURVEYORS' INSTITUTION, at 8.—R. Cobb: Agricultural Valuations.

TUESDAY, APRIL 11.

ROYAL SOCIETY OF MEDICINE (Therapeutics and Pharmacology Section), at 4.30.—Annual General Meeting.
ROYAL SOCIETY OF MEDICINE, at 5.—General Meeting.
INSTITUTION OF PETROLEUM TECHNOLOGISTS (at Royal Society of Arts), at 5.30.—A. Millar: Galicia and its Petroleum Industry.
ROYAL PHOTOGRAPHIC SOCIETY OF GREAT BRITAIN, at 7.—Dr. H. B. Goodwin: Photographic Portraiture, Pure and Simple.
QUEKETT MICROSCOPICAL CLUB, at 7.30.—J. Wilson: A Short Account of the Genus *Closterium*.—L. E. Brown: Imitative and Windowed Plants.

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