

### Calendar of Industrial Pioneers.

**June 10, 1850. James Smith died.**—Educated at Glasgow University, Smith was placed in charge of his uncle's cotton-works at Deanston, Perthshire, where he introduced many improvements in manufacture and agriculture. He invented a reaping machine, improved the self-acting mule, built bridges and waterwheels, in 1813 lighted his factory by gas and introduced the sub-soil plough and the deep draining of soils.

**June 11, 1843. Alexander Forsyth died.**—The inventor of the percussion lock, Forsyth was born in 1769, graduated at King's College, Aberdeen, and from 1791 till his death was minister of his native place of Belhelvie. Devoting his spare time to chemistry and mechanics, in 1805 he brought out the percussion lock, which, though experimented with in the Tower of London, was not taken up by the Government. Forsyth refused an offer of 20,000*l.* from Napoleon for the secret.

**June 13, 1847. David Mushet died.**—A pioneer among modern metallurgists, Mushet began experimenting in the manufacture of iron and steel in 1793 while employed at the Clyde Iron Works. Dismissed through jealousy, he erected the Calder Iron Works, and while so engaged, in 1800 patented a process of making steel direct from iron in bars, and in 1801 made the discovery of the value of the black-band ironstone, which previously had been regarded as worthless.

**June 14, 1768. James Short died.**—In his day without a rival as a constructor of reflecting telescopes, Short was the first to give specula a true parabolic form. Born and educated at Edinburgh, where he learned mathematics from Maclaurin, he was summoned to London to give mathematical lessons to one of the royal family. He afterwards set up as an instrument maker in London.

**June 14, 1874. Sir Charles Fox died.**—Articled first to a doctor, Fox abandoned medicine for engineering, worked for Ericsson and Robert Stephenson, and became a partner in the firm of Fox, Henderson and Co., the first firm systematically to manufacture railway plant. Fox designed the buildings for the Great Exhibition of 1851, made the first narrow-gauge line in India, built the Berlin waterworks, and was connected with many railway enterprises.

**June 15, 1905. James Mansergh died.**—One of the greatest water-supply and sewerage engineers, Mansergh was responsible for works in some 60 or 70 towns at home and abroad. Among his most notable works were the Elan and Claerwen reservoirs in Wales, constructed for the Birmingham Corporation and opened by King Edward VII., July 21, 1904. In 1900 he served as President of the Institution of Civil Engineers.

**June 15, 1915. Sir Nathaniel Barnaby died.**—Barnaby came of a family of shipwrights, and was born at Chatham in 1829, the year the first British steam war-vessel was built. He was trained in the Royal Dockyard, and in 1870 succeeded Reed as Chief Constructor of the Navy, a post he held till 1885, when he was succeeded by White. To him were due many advances in the design and construction of warships; he introduced the use of steel, and during his regime sixty-six sea-going fighting ships of more than 2000 tons were built. The torpedo and torpedo boat came into use during his period of office, but he opposed the idea prevalent then, and periodically urged that the torpedo rendered the battleship obsolete.  
E. C. S.

### Societies and Academies

LONDON.

**Royal Society, May 25.**—Sir Charles Sherrington, president, in the chair.—C. H. Lees: The thermal stresses in solid and in hollow circular cylinders concentrically heated. The method of calculation is similar to that used in dealing with spheres. Two cases of practical importance are worked out—that of a furnace with the temperature throughout the wall steady, and that of a pillar supporting the floor above a room in which a fire occurs. Curves are given for the thermal stresses produced.—B. F. J. Schonland: On the scattering of  $\beta$ -particles.—N. K. Adam: The properties and molecular structure of thin films. Pt. II. Condensed films. Pt. III. Expanded films. Saturated and unsaturated fatty acids of the long straight chain series, and their derivatives, including esters, substituted ureas, an alcohol, amide, and nitrite have been studied. Below a certain temperature determined by the conditions, the molecules appeared to be closely packed or "condensed." Above this temperature greater areas on the surface were occupied, such films being called "expanded films." Two general types of condensed film were found: one in which the hydrocarbon chains are close packed, while in the other probably only the polar groups touch. In the temperature interval (about 25° C.) between fully condensed and fully expanded states, pressure-area curves resemble isothermals of a vapour near critical temperature. Probably expanded films resemble vapours in two dimensions. Increase in length of hydrocarbon chains raises the temperature of expansion regularly. The lateral attraction which tends to keep the molecules close packed therefore depends on the length of these chains. Probably the greater attraction between longer chains diminishes the area of the expanded films. The area actually filled by molecules both of saturated and unsaturated acids is probably nearly the same in expanded and in condensed films; therefore it is unlikely that the unsaturated linkage in oleic acid approaches the water closely, as was previously thought.—E. Wilson: On the susceptibility of feebly magnetic bodies as affected by compression. Rock specimens were examined and the compressive stress was necessarily limited to about 1200 kgm. per sq. cm. Some feebly magnetic alloys have also been tested. All the specimens are in the form of short bars about 4 cm. in length, with a cross-section either 1 cm. square or 1 cm. in diameter, and the compressive stress has been applied in the direction of the length of the bar. The susceptibility has been measured (a) in the direction of the stress and (b) at right-angles to it.—S. F. Grace: Free motion of a sphere in a rotating liquid parallel to the axis of rotation. The motion is a small disturbance from one of uniform rotation, like a rigid body due to a projection, parallel to the axis of rotation, of a sphere of density equal to that of the liquid and originally at rest relative to it. The path of the centre of the sphere is a straight line, and the motion is symmetrical about it. The sphere oscillates about a point with amplitudes which diminish rapidly, being less than 0.02 of the velocity of projection, after one revolution of the liquid. The velocity of the liquid in this line is oscillatory. The disturbance over the plane through the centre of the sphere perpendicular to the axis is oscillatory, and confined to the immediate neighbourhood of the sphere. The components of vorticity contain terms proportional to the time, so that the assumptions of small motion are ultimately violated.

**Society of Glass Technology**, May 17.—Prof. W. E. S. Turner, president, in the chair.—J. Currie: Columnar structure in sandstone blocks. A glass tank furnace sprang a leak in the bottom and the metal drained through rapidly. A full heat of 1300° C. was maintained to facilitate the removal of the metal, but finally part of the crown of the furnace collapsed and the gas was cut off. After the tank was dismantled it was observed that the sandstones readily disintegrated into long prismatic columns, many of which were straight, but most of them showing a decided curvature. They were roughly pentagonal in section, and varied in thickness from 0.5-1.5 inches; some were trigonal, others tetragonal in form. The columns were intersected at more or less regular intervals by cross joints, so that the sandstone tended to break up into short columns five or six inches long, some of which were regularly prismatic, others tapering off to a point. The effect is probably due to the rapid expansion caused by the sudden increase of temperature from 800° C. to 1300° C. resulting from the break in the furnace, followed by sudden cooling when the gas was turned off. The formation probably started at the point of contact with the glass, and as has already been claimed for similar formations in Nature, columnar jointing is related to the planes of cooling.—F. W. Adams: Some practical notes on the manufacture of white glass in a tank furnace. It is necessary to have complete analyses of all batch materials used, especially the selenium decoloriser. The total iron content in the finished glass must be kept constant, and careful weighing and efficient mixing of the batch ingredients is essential. Melting temperatures should be kept constant by the use of pyrometers. Lehr temperatures should be correct for a given type of glass and kept constant. Two pyrometer stations in the Lehr are advisable, and articles differing greatly in weight should not be put together in the same Lehr. Selenium offers many advantages over other decolorising media, and will undoubtedly be as generally used in this country for making colourless glass as in the United States when the conditions for its application are more fully understood by manufacturers.

**Royal Meteorological Society**, May 17.—Dr. C. Chree, president, in the chair.—A. E. M. Geddes: Weather and the crop-yield in the north-east counties of Scotland. The methods of correlation have been applied to find the relation between the yield of the crops in the three north-east counties of Scotland and the "weather," including in this term temperature and rainfall. There is not sufficient uniformity in all the conditions over the area from Nairn to Fife to permit of useful deductions being drawn. The final investigation was confined to the counties of Aberdeen, Banff, and Kincardine for the period 1885 to 1919. The conclusions are as follows: cereals do better in a comparatively warm summer with rainfall somewhat in excess; root crops show less connection with the weather than cereals, but are better with rainfall below the normal; hay is influenced almost as much by the weather of the year previous as by that of the actual year of harvest. Comparing the latest values for eastern England for the same period, it appears that the most important sections of the year, so far as weather is concerned, vary from district to district. It is important not to make the district too wide in such investigations.—H. P. Waran: A new form of direct-reading barometer. The instrument is a modified syphon barometer that compensates automatically for the change of level. This is accomplished by reading axially through the inclined upper reservoir,

the reflection on the mercury surface of the divisions of a short length of vertically suspended scale, which has once been set to read the actual pressure, on the cross-wire.

## PARIS.

**Academy of Sciences**, May 15.—M. Albin Haller in the chair.—L. Maquenne and R. Cerighelli: The influence of lime on the yield of seeds during the germinative period. Traces of lime in the culture fluid (10 parts of calcium sulphate per million) favour the growth of the organs, and this is shown not only by increased length, as compared with control seeds grown in distilled water, but also by increase in weight.—Georges Charpy and Louis Grenet: Study of the penetration of tempering in steel. A method is described permitting the study of the variation in hardness (Brinell) along a bar, after tempering at different temperatures, with or without reheating, and not necessitating test pieces being cut out of the specimen.—Gustave Guillaumin: The equations of the limit of equilibrium of adherent bodies.—Jean Chazy: The movement of a planet in a resisting medium.—F. Michaud: The rigidity of jellies. A new method of measuring the rigidity of a jelly is described, based on the use of a horizontal tube filled with the jelly and carrying some solid particles in suspension, the movement of which, when the ends of the rod of jelly are submitted to different pressures, can be measured in a microscope. The apparatus has been applied to the measurement of the rigidity of 15 solutions of gelose of concentrations varying from 0.4 to 6 per 1000. The experimental figures can be expressed by the empirical formula  $\mu = 6.32 (c - 0.39)^{3.3}$ , where  $\mu$  is the modulus of rigidity in C.G.S. units, and  $c$  is the number of grams of gelose per 1000 grams of the mixture.—Henri Abraham and René Planiol: A new method of emission doubling the capacity of wireless telegraphy stations.—A. Grebel: A comburimeter and a controller for gas, Grebel-Velter system. In the "comburimètre," the coal gas is burnt in air, the ratio of gas to air being capable of variation and measurement. A mirror surface of fused lead serves as the indicator for oxygen in excess, and the exact quantity of air required for the complete combustion of a given volume of gas is thus continuously indicated.—Mme. Ramart and M. G. Albesco: Study of the two  $\alpha\alpha$ .  $\beta\beta$ -substituted propiophenones and their reaction with sodium amide.—Marcel Delépine: The auto-oxidation of organic sulphur compounds. A detailed account of some phenomena observed when air and certain sulphur compounds (such as  $\text{SC}(\text{OCH}_3)(\text{S} \cdot \text{CH}_3)$ ;  $\text{CH}_3 \cdot \text{CS} \cdot (\text{OCH}_3)$ ) interact. The observations cannot be fully explained.—Henri Piéron: The law of the velocity of establishment of the fundamental chromatic processes as a function of the intensity of the luminous stimulation.—Alphonse Labbé: The activation of the spermatozoid in heterogeneous fecundations.—Armand Dehorne: The formation of myolytic spindles and their phagocytosis in the coelom of *Lipobranchus intermedius*. These organisms are extracted from old oyster shells by placing the latter in a crystallising basin filled with sea-water. The *Lipobranchus* can be seen swimming or attached to the sides of the basin. They are fixed living, and on microscopical analysis show marked phenomena of histolysis. It is remarkable that it is the muscles which show peculiar sensibility to this degeneration. The changes in the muscle fibres are described in detail.—C. Gessard: Varieties of pyocyanoid bacilli. The term "pyocyanoid" is applied to degenerate pyocyanic bacilli, which although retaining most of

their original properties have lost the essential characteristic of making pyocyanine. One variety gives no trace of the blue colouring matter in peptone water or peptone gelose, but the pyocyanine reappears if a small quantity of glycerol be added to the peptone gelose. In cultures with increasing quantities of glycerol, the power of producing the blue pigment is lost.—Albert Berthelot and Mme. St. Danysz-Michel: The presence of acetone-producing micro-organisms in the intestinal flora of diabetics. Cultures from faecal matter of 32 subjects, not diabetic, but suffering from various diseases, showed that no organism was present capable of producing acetone from starch. From similar cultures with faeces from diabetic patients, acetone-producing organisms were found in 17 cases out of 22. The view that diabetes is a disease of microbial origin is not in agreement with the present state of knowledge of this disease, but it is not altogether impossible that certain cases of diabetes may be caused, directly or indirectly, by the presence of certain micro-organisms in the intestine.—M. Breton and V. Grysez: The reactions of defence and immunity provoked by the intradermic injection of micro-organisms, either living or killed by heat. The skin of the rabbit possesses exceptional properties of defence against organisms inoculated there: immunity has been produced by a single injection.

### Official Publications Received.

- Annals of the Astronomical Observatory of Harvard College. Vol 86, Part 1: Observations and Investigations made at the Blue Hill Meteorological Observatory in the Year 1921 under the direction of Prof. A. McAuliffe. Pp. 61. (Cambridge, Mass.)
- Egyptian Government. Almanac for the Year 1922. Pp. viii + 242. (Cairo: Government Publications Office.) P.T. 10.
- Dominion of New Zealand: Board of Science and Art. Bulletin No. 2: History of the Portobello Marine Fish-Hatchery and Biological Station. By the Hon. Geo. M. Thomson and the late T. Anderton. Pp. 131. (Wellington, N.Z.)
- Annual Report of the Council of the Yorkshire Philosophical Society for the Year 1921, presented to the Annual Meeting, February 13th, 1922. Pp. 51. (York.)
- The Royal Society for the Protection of Birds. Thirty-first Annual Report, January 1st to December 31st, 1921, with Proceedings of Annual Meeting, 1922. Pp. 76. (London: 23 Queen Anne's Gate, S.W.1.)

### Diary of Societies.

#### FRIDAY, JUNE 9.

- ROYAL SOCIETY OF MEDICINE (Electro-therapeutics Section) AND BRITISH ASSOCIATION FOR THE ADVANCEMENT OF RADIOLOGY AND PHYSIOTHERAPY (at 1 Wimpole Street), at 10.30 A.M. and 2.30.—Congress of Radiology and Physiotherapy.
- PHYSICAL SOCIETY OF LONDON, at 3.30.—Visit to the National Physical Laboratory, Teddington.
- ROYAL SOCIETY OF ARTS (Dominions and Colonies Section), at 4.30.—Major Sir Humphrey Leggett: Tanganyika Territory (formerly German East Africa).
- ROYAL ASTRONOMICAL SOCIETY, at 5.
- MALACOLOGICAL SOCIETY OF LONDON (at Linnean Society).
- GEOLOGISTS' ASSOCIATION (at University College), at 7.30.—Dr. A. E. Trueman: The Liassic Rocks of Glamorgan.—C. C. Fagg: The Recession of the Chalk Escarpment and the Development of Valleys in the Chalk between the Mole and the Darent.
- ROYAL SOCIETY OF MEDICINE (Ophthalmology Section), at 8.30.—Annual General Meeting.
- ROYAL INSTITUTION OF GREAT BRITAIN, at 9.—J. Barcroft: Physiological Effects at High Altitudes in Peru.

#### SATURDAY, JUNE 10.

- ROYAL SOCIETY OF MEDICINE (Electro-therapeutics Section) AND THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF RADIOLOGY AND PHYSIOTHERAPY (at 1 Wimpole Street), at 10 A.M. and 2.30.—Congress of Radiology and Physiotherapy.
- ROYAL INSTITUTION OF GREAT BRITAIN, at 3.—Sir Hugh Allen: Early Keyboard Music (3).

#### MONDAY, JUNE 12.

- VICTORIA INSTITUTE (at Central Buildings, Westminster), at 4.30.—Miss A. M. Hodgkin: The Witness of Archaeology to the Bible.
- INSTITUTE OF ACTUARIES, at 5.—Annual General Meeting.
- ROYAL INSTITUTION OF GREAT BRITAIN, at 5.—General Meeting.
- SOCIETY OF ENGINEERS (at Geological Society of London), at 5.30.—Dr. H. Chatley; A. S. E. Ackermann: The Physical Properties of Clay.

- ROYAL INSTITUTE OF BRITISH ARCHITECTS, at 8.—Business Meeting.
- ARISTOTELIAN SOCIETY (at University of London Club, 21 Gower Street), at 8.—T. Greenwood: Geometry and Reality.
- ROYAL GEOGRAPHICAL SOCIETY (at Æolian Hall, 135 New Bond Street), at 8.30.
- ROYAL SOCIETY OF MEDICINE (Tropical Diseases and Parasitology Section), at 8.30.—Sir Leonard Rogers: Leprosy: its Etiology and Epidemiology.—D. Pincock: Quinine Necrosis of Muscles.—Dr. J. Bamforth: Cortical Necrosis of the Kidney in a Fatal Case of Malaria.

#### TUESDAY, JUNE 13.

- ROYAL COLLEGE OF PHYSICIANS OF LONDON, at 5.—Dr. G. Holmes: The Symptoms of Cerebellar Disease and their Interpretation (Croonian Lectures) (2).
- ZOOLOGICAL SOCIETY OF LONDON, at 5.30.—The Secretary: The Council's Scheme to establish an Aquarium in the Society's Gardens.—Miss Joan B. Proctor: A Study of the Tortoise *Testudo heraldi*, Blgr., and the Morphogeny of the Chelonian Carapace.—J. T. Carter: A Microscopical Examination of the Teeth of the Primates.—H. G. Jackson: A Revision of the Isopod Genus *Ligia* (Fabricus).—W. R. B. Oliver: A Review of the Cetacea of the New Zealand Seas.—Prof. Wood Jones: The Dental Characters of certain Australian Rats.
- ROYAL PHOTOGRAPHIC SOCIETY OF GREAT BRITAIN, at 7.—F. T. Usher: Matt Surface Plates.
- QUEKETT MICROSCOPICAL CLUB, at 7.30.—E. K. Maxwell: Some Tubular Rotifers.—F. H. Davidson: Demonstration of Microscope and Super-Microscope.
- ROYAL ANTHROPOLOGICAL INSTITUTE, at 8.15.—Prof. G. Elliot Smith and Prof. J. I. Hunter: A Reconstruction of the Pittdown Skull.
- RÖNTGEN SOCIETY (at Institution of Electrical Engineers), at 8.15.—Dr. F. L. Hopwood and Dr. E. A. Owen: German Apparatus for the Production and Measurement of X-rays for Deep Therapy.—Prof. S. Russ and L. H. Clark: A Balance Method of Measuring X-rays for Therapeutic Purposes.—Dr. F. L. Hopwood: The Ondoscope.—Dr. E. A. Owen: The Sphere Gap Voltmeter.
- SOCIOLOGICAL SOCIETY (at Royal Society), at 8.15.—G. K. Chesterton: The Return of the Guilds.

#### WEDNESDAY, JUNE 14.

- GEOLOGICAL SOCIETY OF LONDON, at 5.30.—Prof. P. G. H. Boswell: The Petrography of the Cretaceous and Tertiary Outliers of the West of England.—Prof. W. N. Benson and Dr. S. Smith: Some Rugose Corals from the Burindi Series (Lower Carboniferous) of New South Wales.
- ROYAL MICROSCOPICAL SOCIETY, at 8.—J. Strachan: The Microscope in Paper Making.—A. Chaston Chapman: The Use of the Microscope in the Brewing Industry.

#### THURSDAY, JUNE 15.

- ROYAL SOCIETY, at 4.30.—*Probable Papers*.—Dr. H. M. Evans: The Defensive Spines of Fishes, Living and Fossil, and the Glandular Construction in connection therewith, and Observations on the Nature of Fish Venoms.—D. W. Cutler, L. M. Crump, and H. Sandon: A Quantitative Investigation of the Bacterial and Protozoan Population of the Soil: with an Account of the Protozoan Fauna.—D. W. Devanesen: The Development of the Calcareous Parts of the Lantern of Aristotle in *Echinus miliaris*.—Dr. A. Lipschütz, C. Wagner, R. Tamm, and F. Bormann: Further Experimental Investigations on the Hypertrophy of the Sexual Glands.
- LINNEAN SOCIETY OF LONDON, at 5.
- ROYAL COLLEGE OF PHYSICIANS OF LONDON, at 5.—Dr. G. Holmes: The Symptoms of Cerebellar Disease and their Interpretation (Croonian Lectures) (3).
- ROYAL AERONAUTICAL SOCIETY (at Royal Society of Arts), at 5.30.—Lieut.-Col. A. Ogilvie: Some Aspects of Aeronautical Research (Wilbur Wright Lecture).
- NATIONAL UNION OF SCIENTIFIC WORKERS (in Botanical Theatre, University College), at 5.30.—F. W. Sanderson: The Duty and Service of Science in the New Era.
- CHEMICAL SOCIETY, at 8.—C. K. Ingold and E. A. Perren: Ring-chain Tautomerism. Part III. The Occurrence of Tautomerism of the Three-carbon (Glutaconic) Type between a Homocyclic Compound and its Unsaturated Open-chain Isomeride.

#### PUBLIC LECTURES.

(A number in brackets indicates the number of a lecture in a series.)

#### FRIDAY, JUNE 9.

- UNIVERSITY COLLEGE, at 5.30.—Prof. E. Husserl: Phänomenologische Methode und Phänomenologische Philosophie (3). (In German.)

#### MONDAY, JUNE 12.

- ROYAL SOCIETY OF MEDICINE, at 5.—Dr. M. Jansen: Injurious Agents and Growth. (In English.)
- UNIVERSITY COLLEGE, at 5.30.—Prof. E. Husserl: Phänomenologische Methode und Phänomenologische Philosophie (4). (In German.)

#### TUESDAY, JUNE 13.

- FELLOWSHIP OF MEDICINE (at 1 Wimpole Street), at 5.—Sir William Hale White: The Clinical Symptoms of Coli Infection of the Urine.
- KING'S COLLEGE, at 5.30.—C. E. M. Joad: Vitalism Restated (2). Dualism and the Life Force.

#### THURSDAY, JUNE 15.

- ROYAL INSTITUTE OF BRITISH ARCHITECTS, at 5.—Prof. C. H. Reilly: Some London Streets and their Recent Buildings.
- ST. MARY'S HOSPITAL (Institute of Pathology and Research), at 5.—Sir Berkeley G. A. Moynihan: Diverticula of the Alimentary Tract.