Calendar of Industrial Pioneers.

February 23, 1860. Joseph Miller died.—Trained as a mechanical engineer at Boulton and Watt's, Miller in 1822 with Barnes established one of the most successful marine engineering works on the Thames. He was a promoter of screw propulsion, and for H.M.S. *Amphion* built the first set of direct-acting screw engines placed below the water-line.

February 24, 1815. Robert Fulton died.—Famous as the pioneer of steam navigation in the New World, Fulton was born in 1765, and in early life attained success as an artist. Afterwards in England and France he turned to mechanical pursuits; in 1800 he constructed a submarine, and in 1803 experimented with a steamboat on the Seine. He returned to America in 1806, and the following year built the *Clermont*, which, driven by an engine constructed by Boulton and Watt, ran successfully between New York and Albany. Among other vessels built by him was the *Demologos*, the first steam man-o'-war.

February 24, 1875. Marc Seguin died.—A nephew of the aeronaut Montgolfier, Seguin was the first to construct an iron-wire suspension bridge and one of the earliest of French railway engineers. In 1827 he invented the tubular boiler, and the same year applied it to a locomotive for the railway from St. Etienne to Lyons. He also made scientific investigations and endeavoured to develop the mechanical theory of heat.

February 26, 1834. Alois Senefelder died.—The inventor about 1798 of the art of lithography, Senefelder, who in his youth was connected with the stage, was led to his discovery through seeking for a cheap method of reproducing his comedies. He established a lithographic establishment at Munich, and afterwards was Director of the Bavarian Royal Lithographic Office.

February 27, 1794. Jean Rudolphe Perronet died.—Perronet has been called the Telford of France. From the office of the City Architect of Paris he entered the Government service, and in 1747 became the first director of the Ecole des Ponts et Chaussées founded by Trudaine. He was the first to introduce bridges with level roadways, and among his most notable works was the bridge across the Seine at Neuilly.

February 27, 1913. Sir William Henry White died. From an apprentice at Devonport Dockyard White rose to be Chief Constructor of the Navy, a post he held from 1885 to 1902. During this period he was responsible for the construction of 245 vessels costing about 100,000,000*l*. A great master of his profession, he added much to the literature of naval architecture, held the presidencies of various technical societies, and was instrumental in forming the Royal Corps of Naval Constructors.

February 28, 1875. Sir Goldsworthy Gurney died.—One of the pioneers of the steam road carriage, Gurney practised as a surgeon at Wadebridge and then in London. He was the inventor of the Drummond light, the steam blast, and a water-tube boiler, and in 1829 went from London to Bath in a steam-driven carriage at 15 miles an hour.

March 1, 1911. Robert McAlpine died.—McAlpine is regarded as the father of wood-pulp paper. Emigrating from Scotland to Massachusetts at the age of sixteen, he mastered the business of paper-making, and in 1867 produced the first sheet of paper made from ground wood-pulp, the initial step in the production of abundant supplies of cheap paper.

E. C. S.

Societies and Academies.

LONDON.

Royal Society, February 16.—Sir Charles Sherrington, president, in the chair.—L. **Hill**, D. H. **Ash**, and J. A. **Campbell**: The heating and cooling of the body by local application of heat and cold. When the hands are heated or cooled by water the amount of heating or cooling is large, but not constant for a given range of temperature. The degree of heating or cooling is obtained from the temperature of the skin over the median vein at the elbow, the thermometer used being coiled and insulated from the air. Loss of 20 to 25 kilo-calories of heat from the hands in thirty minutes, *i.e.* a loss almost equal to the basal metabolism, does not appreciably affect the body metabolism.—J. B. **Cohen**, C. H. **Browning**, R. **Gaunt**, and R. **Gulbransen**: Relationships between antiseptic action and chemical constitution, with special reference to compounds of the pyridine, quinoline, acridine, and phenazine series. Certain acridine derivatives, salts of diamino-acridine and the methochloride of this base, are extremely potent antiseptics. Pyridine and quinoline derivatives ("fragments" of the acridine molecule), a number of acridine derivatives, and some phenazine compounds were also investigated, but none approximate to diamino-acridine in antiseptic properties. Dealing with the acridine group, the presence of amino-groups increases antiseptic power, and effectiveness in serum is a characteristic of compounds with unsubstituted amino-groups, and especially of their methochlorides. Other radicals replacing the methyl group in the methochloride do not alter the antiseptic action, but substitution of alkyls in the amino-group tends to diminish antiseptic action, while acetylation or replacement of the amino-group destroys it. Antiseptic action on organisms of different types shows marked irregular variation.—D. T. **Harris**: Active hyperæmia. The lingual nerve contains true vaso-dilator and the sympathetic vaso-constrictor fibres; both are equally independent of the intervention of metabolites. Experiments show that increased blood-supply during muscular activity is due entirely to the products of metabolism, and of the metabolites estimated carbon dioxide and α-hydroxy organic acids were increased. Vaso-dilator nerves are concerned with the control of body temperature; active hyperæmia in the dog's tongue may be induced by reflex excitation of the vaso-dilator nerves through the stimulation of heat receptors in the skin.—B. B. **Sarkar**: The depressor nerve of the rabbit. The depressor nerve of the rabbit is connected in part with a special collection of ganglion-cells in the vagus, distinct from the ganglion of the trunk, which may extend into the superior laryngeal or the vagus trunk. These cells probably give rise to the afferent fibres of the depressor. The nerve is usually formed by two branches, one from the superior laryngeal and one from the vagus, and is connected with the inferior cervical ganglion, the root of the aorta, and the base of the heart. The left nerve of the pair is generally larger and contains more fibres than the right. The depressor contains medium-sized and very fine myelinated fibres, and others which are non-myelinated. Probably it is not wholly formed of afferent fibres, for these fine myelinated and non-myelinated fibres presumably belong to the autonomic nervous system and are efferent.—A. **Lipschütz**, B. **Ottow**, C. **Wagner**, and F. **Bormann**: The hypertrophy of the interstitial cells in the testicle of the guinea-pig under different experimental conditions. Partial castration often causes enormous hypertrophy of the interstitial tissue. This hypertrophy is not compensatory, for the tendency to

hypertrophy of interstitial cells is more marked in fragments with improved blood-supply. Hypertrophy appears to be independent of the internal secretory function of the testicle in its relation to the organism as a whole, and is a response to local conditions.

Linnean Society, February 2.—Dr. A. Smith Woodward, president, in the chair.—F. **Johansen**: The Canadian Arctic Expedition of 1913–18. The expedition started from Vancouver in the *Karluk* for Nome, in Alaska, where the equipment was procured. One party, under Mr. Stefansson, on the *Karluk* was caught in the ice in September, 1913, and carried westward until the vessel sank, in about 73° N. lat. and 160°–165° W. long. The party camped on an ice-floe, and the survivors reached Siberia in March, 1914, and Nome in May. Stefansson later organised a new search-party to proceed by sledge across Banks Land; he explored Parry Islands, discovering coal in Melville Island. Coasts hitherto unmapped were surveyed, and much geological and biological material was gathered, as well as many implements used by Esquimaux.—J. C. **Willis** and G. U. **Yule**: Some statistics of evolution and geographical distribution in plants and animals and their significance. The general result seems to show that evolution and geographical distribution have proceeded in a chiefly mechanical way, the effects of the various "other" factors that intervene—climatic, ecological, geological, etc.—being only to bring about deviations this way and that from the dominant plan. Every family and every genus, and in every country, behaves in the same way. Strong evidence is thus given for de Vries's theory of mutation and for Guppy's theory of differentiation (see NATURE, February 9, p. 177).—Mrs. E. M. **Reid**: Note on the hollow curve as shown by Pliocene floras. The material was that published from Tegelen, Castle Eden, etc. Fossil floras take their appropriate place alongside living floras, bringing direct evidence from the host to show the universality of the law of hollow-curve distribution.

Aristotelian Society, February 6.—Prof. Wildon Carr in the chair.—A. H. **Hannay**: Standards and principles in art. The problem of standards and objectivity in art is usually debated on the basis of standards and objectivity or no standards and subjectivity. Each new and individual work of art carries with it its own individual and original awareness. This view does not necessitate a lapse into subjectivism if it is realised that the awareness or taste is itself a striving for objectivity and rightness. The search for standards is the outcome of this incessant quest for right taste. Beauty is not entirely unique and indefinable. It is a process, a constructing, and can be differentiated from other processes such as history, science, and philosophy. Actually, modern criticism is full of psychological analyses which definitely involve reflective principles, but they are distinct from the old standards, for they do not pretend to anticipate the individual content of works of art. But do they precede, accompany, or follow upon æsthetic creation and appreciation? It is accepted that they are a later product, and this view has been stated very lucidly by Benedetto Croce. Yet history does not confirm it, and it does not explain the fact that criticism clarifies taste. It is suggested that the process imagination-principle is not a passage from one independent activity to another, but a development which requires both activities and in which a modification in one means a modification in the other. The critic emphasised the universal element, while the artist emphasised the individual element.

Zoological Society, February 7.—Dr. A. Smith Woodward, vice-president, in the chair.—C. W. **Hobley**: The fauna of East Africa and its future. Special attention was directed to the need for immediate action to preserve the herds of big game from total extinction.—Miss L. E. **Cheesman**: The position and function of the siphon in the amphibious mollusc *Ampullaria vermiformis*.—J. **Stephenson**: Contribution to the morphology, classification, and zoogeography of Indian Oligochæta. IV.: The diffuse production of sexual cells in a species of Chætogaster (fam. Naididæ). V.: *Drawida japonica*, Michlsn., a contribution to the anatomy of the Moniligastridæ. VI.: The relationships of the genera of Moniligastridæ, with some considerations on the origin of terrestrial Oligochæta.

Physical Society, February 10.—Dr. A. Russell, president, in the chair.—E. A. **Owen** and Bertha **Naylor**: The measurement of the radium content of sealed metal tubes. Tables have been compiled giving the corrections to be applied to the observed radium content of sealed platinum and silver tubes to obtain their true radium content. Two cases have been considered: (*a*) that in which the active deposit is uniformly distributed throughout the volume of the tube, and (*b*) that in which the active deposit is uniformly distributed over the inner wall of the tube. With constant wall-thickness the correction increases with the external diameter of the tube, and for the same increase of external diameter the increase of correction is more pronounced for the "empty" than for the full tube.—Sir William **Bragg**: The crystal structure of ice. The methods of X-ray analysis have been applied to ice by Ancel St. John and by D. M. Dennison. The former refers the structure to a lattice composed of right triangular prisms of side 4·74 Å.U. and height 6·65 Å.U.; the latter to a similar lattice of dimensions 4·52 Å.U. and 7·32 Å.U. respectively. The arrangement of the atoms was not found. On certain suppositions the arrangement can be found independently of direct X-ray analysis. Assume that each positive ion is surrounded symmetrically by negative ions, and *vice versa*; and, in view of the low density of ice, let the number of neighbours be in each case as small as possible. The crystal is to be hexagonal and to have the right density. Then each oxygen atom is at the centre of gravity of four neighbouring oxygens, from each of which it is separated by a hydrogen atom. The dimensions of the structure agree with Dennison's figures, and the calculated intensities of reflection agree well with the observed intensities recorded by Dennison.—Kerr **Grant**: A method of exciting vibrations in plates, membranes, etc., based on the Bernoulli principle. A plate placed close to a flanged orifice from which a stream of air or liquid is issuing is attracted towards the orifice. If the plate be mounted as a diaphragm it can be excited to strong vibration by a suitable blast, and a loud sound is produced with high efficiency.

Faraday Society, February 13.—Prof. A. W. Porter, president, in the chair.—J. R. **Partington**: The energy of gaseous molecules. The translational and rotational energies of gases are, at ordinary temperatures, approximately represented by the theory of equipartition, and any excess of C_v over 6 may be put down to internal motions. This excess is parallel to the activities of the gases. The translational energy may be represented on the quantum theory with a frequency equal to the collision frequency. The value of n in the equation $n=n_0(T/_{273})^n$, representing the effect of temperature on the viscosity, is related to the critical pressure (p_c in atm.) by the empirical equation $n=0{\cdot}642+0{\cdot}00116\,p_c+0{\cdot}0000399\,p_c^2$. The molecular heat of hydrogen may be represented empirically

by Debye's formula with a frequency $\nu=6541/\sqrt{T}$. The molecular heat of nitrogen is very approximately given by a molecule based on Bohr's theory, with a frequency given by the gyrostatic formula.—U. R. **Evans**: Passivity and overpotential. (1) Where a metal is corroded by a liquid yielding an insoluble corrosion product, the latter may either cling to the metal, forming a thin protective covering (often invisible), or it may become dispersed in the solution; in the latter case it will not seriously interfere with corrosion. It is probably the relative values of the interfacial tension between the metal, corrosion-product, and solution that determines which will occur. (2) The activation of passive metals by chlorides is related to the known peptising action of metallic hydroxides by chlorides; the passivication by means of chromates is connected in part with the flocculating action of chromates. (3) The fact that metals with basic oxides are rendered active by acids and passive by alkalis, whilst those with acidic oxides tend to become passive in acids and active in alkalis, shows that the invisible protective layer is "of the nature of an oxide-film." But it seems wrong to identify it with any oxide known in the massive state; probably we have to deal with a layer of oxygen atoms connecting the metal on one side to the solution on the other. (4) Likewise, at a cathodically polarised electrode we probably have to deal with a layer of hydrogen nuclei connecting the metal to the liquid. The hydrogen is probably in a state intermediate between the elementary and the ionic, and by forming a link between metal and solution it serves to decrease the energy of the interface. Overpotential may be due to the energy needed to desorb the hydrogen.—A. W. **Porter**: Note on the vapour-pressure of ternary mixtures. The equation proposed for ternary mixtures in a previous paper is here applied to the case of mixtures of toluene, carbon tetrachloride, and ethylene bromide, and is found to be satisfactory.

Royal Meteorological Society, February 15.—Dr. C. Chree, president, in the chair.—C. E. P. **Brooks** and J. **Glasspoole**: The drought of 1921. The general rainfall in England and Wales was the least in 1921, so far as can be ascertained, since 1788. Individual long records indicated that over a considerable part of the south-east of England 1921 was the driest year for at least a century and a half. The months of 1921 were not individually so remarkable as was shown by a comparison with the driest months known to have occurred in the British Isles generally. As shown by a map of standard deviation of annual rainfall, 1881–1915, for the British Isles, the least fluctuations of annual rainfall occurred along the coast in the north-west, increasing to a maximum in the south-east and centre of the land masses. Constructing charts showing the distribution of barometric pressure over the globe during and preceding each of the great droughts, beginning with 1864, it is found that the conditions which commonly prevail during dry spells are high pressure over the British Isles, the greatest deviation from normal being usually over south-east England; low pressure over the Arctic regions, especially near Spitsbergen; and, generally, low pressure over the tropics. The first factor is related to the eleven-year sun-spot cycle, occurring most frequently two years after sun-spot minimum and three or four years after sun-spot maximum, so that it tends to recur every five or six years. Low pressure over the Arctic is related to ice conditions, and tends to recur every four or five years. Great droughts occur only when both these factors are favourable. With pressure low over the Arctic, two or three months' warning of a drought would be given by the development of high pressure over northern Russia.—T. **Kobayasi**: A cyclone which crossed the Korean Peninsula and the variations of its polar front The cyclone passed over a mountain range in Korea on March 25, 1918. It induced a secondary on the farther side of the range along the steering line, which extended upward until it joined with the primary; the secondary gradually grew stronger, and the original centre disappeared. The existence of the polar front was very distinctly marked, but complicated in character. There were two or more squall lines for one steering line.

EDINBURGH.

Royal Society, February 6.—Prof. F. O. Bower, president, in the chair.—J. M'Lean **Thompson**: The floral structure of *Napoleona imperialis*, Beauv. The flower structure of this curious African plant of the Myrtle family has remained a puzzle since the discovery of the plant in 1786. The flowers possess inside the corolla a series of petal-like growths, which it was held were produced during descent by transformation and replacement of cycles of stamens of a myrtle type of flower. These petaloid growths and the persisting cycle of stamens, which themselves are now partly sterile, are associated with a massy fleshy disc which surrounds the base of the style. The disc, stamens, and petaloid growths in question have now been shown from developmental study to have a common origin from a ring-like outgrowth which normally in the Myrtle family bears numerous groups of stamens, and were held to be the results of replacement of stamens during descent.—G. W. **Tyrrell**: The pre-Devonian basement complex of Central Spitsbergen. The rocks described constitute the basement which underlies the flat-lying Devonian and Carboniferous sediments in the region about the head of Klaas Billen Bay. They form the southern continuation of the extensive Wijde Bay region of Urgebirge, where these ancient rocks begin to be covered unconformably by a sedimentary mantle. Lithologically, they fall into a western zone of "Archæan" facies, consisting of quartz-schists, garnetiferous mica-schists, hornblende-schists and gneisses, lit-par-lit-gneisses, and augen-gneisses, with crystalline limestones; and an eastern zone consisting of slates, quartzites, and limestones similar to those of the Hecla Hoek system, the type-locality of which (Hecla Hoek, in Treurenberg Bay) lies exactly on the northern continuation of the line of strike of these rocks. Hence this group is believed to be of Hecla Hoek (probably Ordovician) age. The western schists and gneisses, while showing great similarities to rocks involved with the Hecla Hoek of the north-western mountains, may be much older, possibly even Archæan.

MANCHESTER.

Literary and Philosophical Society, November 1, 1921.—Mr. T. A. Coward, president, in the chair.—S. J. **Hickson**: Some early autographs of John Dalton. Variations in Dalton's handwriting were examined and attention was directed to certain family records.—R. W. **James**: The distribution of the electrons in atoms. When X-rays fall on an atom each electron of the atom probably becomes a source of scattered X-radiation; the waves scattered by the electrons in the direction of the incident light will be in phase, and the total amplitude scattered in this direction will be proportional to the number of scattering electrons. If the electrons in the atom lie at distances from the nucleus comparable with the wave-length of the X-rays, the waves scattered from the different

electrons in any direction making an angle with that of the incident radiation will not be in phase. Measurement of the intensity of the radiation scattered in different directions gives the diffraction pattern for the atom. The K_α doublet of rhodium falling on a crystal shows that each electron in the atom scatters independently. On the average, three or four electrons lie in the region near the edge of the atom, and the main concentration is much closer to the nucleus.

November 15.—Mr. R. L. Taylor, vice-president, in the chair.—S. **Chapman**: Certain integrals occurring in the kinetic theory of gases. In the kinetic theory of gases, if molecules are regarded as point-centres of force, the calculation of the intensity of the force from experimental determinations of gaseous viscosity depends upon numerical factors which have not hitherto been evaluated except in one case. The factors concerned have now been calculated in other cases.—J. E. **Jones**: The dynamics of collision of diatomic molecules. By the application of Maxwell's kinetic theory, a simple relation between the velocity with which the points of contact approach each other and the velocity with which they separate has been found; a simple relation between the impulse acting on each body at collision and the velocity of approach of the points of contact has been deduced and the impulse on collision calculated. The velocities after collision are then deduced from the ordinary dynamical equations of momentum.

PARIS.

Academy of Sciences, February 6.—M. Emile Bertin in the chair.—L. **Lecornu**: Some remarks on relativity.—M. **Hamy**: The determination by interference of the diameters of stars the superficial brightness of which is not uniform.—C. **Richet**, E. **Bachrach**, and H. **Cardot**: The tolerance of the lactic ferment to poisons. It has been shown that the lactic acid organism gradually grows accustomed to poisons present in the culture media. It is now proved that this is specific, in the sense that a ferment grown tolerant to the presence of one poison still remains sensitive to another. The lactic ferment may be made to tolerate the presence of two different poisons simultaneously.—F. **Widal**, P. **Abrami**, and J. **Hutinel**: Researches on the proteopexic insufficiency of the liver in dysenteric hepatitis. The test previously described by the authors (enumeration of the white blood corpuscles after drinking a glass of milk, fasting) proves whether the liver is completely arresting incompletely disintegrated proteids, and this has proved to be a most sensitive test of the proper functioning of the liver. In dysentery the liver may be extensively attacked without affecting the proteopexic function.—M. **d'Ocagne**: The comparative examination of various nomographic methods.—A. **de Gramont** and G. A. **Hemsalech**: The evolution of the spectrum of magnesium under the influence of increasing electrical actions. Applications to astrophysics. From a detailed study of the effects of temperature and of the strength of the electric field on the lines of the magnesium spectrum various conclusions of interest in astrophysics are drawn. It is dangerous to conclude that a star possesses a high temperature because the spark-lines predominate in its spectrum. It is important to study the character of each line.—C. **Guichard**: Networks which are several times Ω_{00}.—J. **Timmermans**, Mlle. H. **Van der Horst**, and H. Kamerlingh **Onnes**: The melting points of pure organic liquids as thermometric standards for temperatures below 0° C. The temperatures were determined by a platinum resistance thermometer, standardised against the helium thermometer, of nine carefully purified liquids. The range covered is between −159·6° C. (isopentane) and −22·9° C. (carbon tetrachloride), with an error of less than 0·1° C. Specimens of these standard liquids will be distributed to other institutions later on.—M. **Gevrey**: Remarks on quasi-analytical functions.—G. **Julia**: Series of rational fractions and integration.—T. **Carleman**: A theorem of M. Denjoy.—G. **Sagnac**: The projection of the light of periodic double stars and the oscillations of the spectral lines.—D. **Coster**: The L series of the X-ray spectrum. The X-ray spectra of a large number of elements (from Ta to Rb) have been remeasured. In general, the new results confirm earlier work, and also give support to the theory of structure of the Bohr atom. Details are given in cases where the new measurements are not in agreement with the earlier observers.—M. **Bedeau**: Measurement of the dielectric constant of gases and vapours by means of circuits with sustained waves.—C. E. **Guye** and R. **Rüdy**: A new mode of determination of the molecular diameters by the electromagnetic rotation of the discharge in the gases. Earlier work had shown that whilst the molecular diameters obtained by this formula were of the same order of magnitude as those obtained by the viscosity method, the results were greatly influenced by the presence of traces of impurities. In the present work great care was taken in the purification of the gases, and comparative figures for the molecular diameters obtained by the electromagnetic rotation and the viscosity methods are tabulated for oxygen, nitrogen, carbon dioxide, hydrogen, nitrous oxide, methane, and carbon monoxide. The two sets are in fair agreement.—L. **Guillet** and J. **Cournot**: The variations of the mechanical properties of metals and alloys at low temperatures. Results are given for the resilience and Brinell test at 20° C., −20° C., −80° C., and −190° C. of electrolytic iron, steels, and alloys.—P. **Jolibois** and R. **Bossuet**: The relations between the different oxides of uranium. At 500° C. in a vacuum the oxide UO_3 loses oxygen, giving rise to U_3O_8, and the reaction is irreversible. The same oxide is formed by heating UO_2 in oxygen.—P. **Lebeau**: The oxides of uranium. The only oxides of uranium which have a certain existence are UO_3, U_3O_8, and UO_2. The green oxides prepared at temperatures below 800° C. contain variable quantities of uranic anhydride, and change in composition in contact with moist air.—H. **Pélabon**: The action of selenium on gold. Gold is slightly attacked by selenium; the metal fixes a little selenium, and the selenium itself takes up a little gold.—E. **Grandmougin**: Some new derivatives of sulphobenzide.—G. **Dupont**: The composition of Aleppo essence of turpentine. This turpentine contains 95 per cent. of pinene, 1·14 per cent. of inactive bornyl acetate, and 3·8 per cent. of sesquiterpene.—G. **Mouret**: The eastern limit of the granitic massif of Millevaches.—P. **Glangeaud**: The Saint-Flour Oligocene basin. The Miocene Truyère flowing into the Allier.—P. **Négris**: Glacial phases in Greece.—R. **Bourret**: The strata in the north-east of Tonkin.—L. **Dussault**: The geology of western Tonkin.—E. **Saillard**: Composition of the wild beetroots.—R. **Stumper**: New observations on the poison of ants. The concentration of the formic acid in *Formica rufa* was found to vary between 21 and 73 per cent. of pure acid. Formic acid is always present in the Camponotinæ, but absent in Myrmicinæ and Dolichoderinæ.—M. **Doyon**: The incoagulability of the circulating blood provoked in the frog by injections of nucleic acids. Duration of the phase. Comparison with various anti-coagulants.—A. A. **Mendes-Corrêa**: The asymmetry of the skeleton of the upper

limbs.—MM. **Alezais** and **Peyron**: The histogenesis and origin of the chordomes.—E. **Burnet**: A new method of diagnosis of Mediterranean fever. The test proposed is the intradermal reaction produced by a drop of a broth-culture of *Micrococcus melitensis*.—M. **Léger** and A. **Baury**: The shrew, *Crocidura Stampflii*, and the plague in Senegal. This animal has been proved to carry plague, and also fleas. Its destruction should be carried out systematically along with the rat.

Official Publications Received.

Agricultural Research Institute, Pusa. Bulletin No. 123, 1921: The Bundelkhand Cottons: Experiment in their Improvement by Pure Line Selection. By B. C. Burt and Nizamuddin Hyder. Pp. iv +15. (Calcutta: Government Printing Office, 1921.) 4 annas.

Memoirs of the Department of Agriculture in India. Entomological Series, Vol. 7, No. 6: Life-Histories of Indian Insects. Diptera: *Sphyracephala Hearseiana*, Westw. By S. K. Sen. Pp. ii +33-38+plates 4 and 5. (Pusa: Agricultural Research Institute.) 12 annas; 1*s*.

Annals of the Transvaal Museum. Vol. 8, Part 3: New South African Heterocera. By L. B. Prout and A. E. Prout. Pp. 149-186. (Cambridge: At the University Press.)

Canada. Department of Mines: Mines Branch. Annual Report on the Mineral Production of Canada during the Calendar Year 1920. Pp. 80. (Ottawa.)

Report of the Department of the Naval Service for the Fiscal Year ended March 31, 1921. (Sessional Paper No. 39: A. 1922.) Pp. 38. (Ottawa.)

The Journal of the Institute of Metals. Edited by G. Shaw Scott. Vol. 26. Pp. x+760+34 plates. (London: Institute of Metals.) 31*s*. 6*d*. net.

Abridged Edition of Tide Tables for Vancouver and Sand Heads, B.C., and Slack Water for First Narrows and Active Pass, with Tidal Differences for the Strait of Georgia. Pp. 45. (Ottawa: Tidal and Current Survey, Naval Service Department.)

Memoirs of the Department of Agriculture in India. Chemical Series, Vol. 6, No. 2: The Effect of Environmental Factors on the Alkaloidal Content and Yield of Latex from the Opium Poppy (*Papaver Somniferum*), and the Bearing of the Work on the Functions of Alkaloids in Plant Life. By Dr. H. E. Annett. Pp. ii+59-154. (Calcutta: Thacker, Spink and Co.; London: W. Thacker and Co.) 2 rupees; 2*s*. 9*d*.

Proceedings of the Rochester Academy of Science. Vol. 6, No. 2: Minerals in the Niagara Limestone of Western New York. By A. W. Giles. Pp. 57-72. Vol. 6, No. 3: The Fungi of our Common Nuts and Pits. By C. E. Fairman. Pp. 73-115+plates 15-20. (Rochester, N.Y.)

Uganda Protectorate: Annual Report of the Department of Agriculture for the Nine Months ended 31st December, 1920. Pp. 67. (Kampala: Department of Agriculture.)

Calendario della Basilica Pontificia del Santissimo Rosario in Valle di Pompei per l'Anno 1922. Pp. 240. (Valle di Pompei: Scuola Tip. Pontificia.)

Diary of Societies.

THURSDAY, FEBRUARY 23.

ROYAL INSTITUTION OF GREAT BRITAIN, at 3.—Prof. A. G. Perkin: Dyeing: Ancient and Modern (2).

INSTITUTION OF ELECTRICAL ENGINEERS, at 3.30 and 8.—Meeting in Commemoration of the First Meeting of the Society of Telegraph Engineers on February 28, 1872.

ROYAL SOCIETY, at 4.30.—C. D. Ellis: β-ray Spectra and their Meaning.—Prof. A. E. Conrady: A Study of the Balance.—Dr. J. S. Owens: Suspended Impurity in the Air.—R. V. Southwell: The Free Transverse Vibrations of a Uniform Circular Disc clamped at its Centre, and the Effects of Rotation.—A. E. Oxley: Magnetism and Atomic Structure. II. The Constitution of the Hydrogen-palladium System and other similar Systems.—T. Carleman and Prof. G. H. Hardy: Fourier's Series and Analytic Functions.—Prof. A. McAulay: Multenions and Differential Invariants. II. and III.

ROYAL SOCIETY OF MEDICINE (Balneology and Climatology Section), at 4.30.—Dr R. L. J. Llewellyn and others: Discussion on The Etiology of Gout.

CHILD-STUDY SOCIETY (at Royal Sanitary Institute, 90 Buckingham Palace Road, S.W.1), at 6.—A. E. Haves: Phonoscript.

INSTITUTION OF AERONAUTICAL ENGINEERS (at Royal Society of Arts), at 7.30.—Lt.-Col. Moore-Brabazon: The Early Days of Aviation (Presidential Address).

CONCRETE INSTITUTE, at 7.30.—H. K. Dyson: What is the Use of the Modular Ratio?

ROYAL SOCIETY OF MEDICINE (Urology Section), at 8.30.—Prof. P. J. Cammidge: The Source of the Amylolytic Ferment of the Urine.—Dr. G. A. Harrison: Glycosuria in Renal Disorders.

FRIDAY, FEBRUARY 24.

ASSOCIATION OF ECONOMIC BIOLOGISTS (in Botanical Lecture Theatre, Imperial College of Science and Technology), at 2.30.—Dr. J. Rennie: (*a*) The Present Position of Bee Disease Research; (*b*) Demonstration of Polyhedral Disease in Tipula Species.

ROYAL SOCIETY OF ARTS (Joint Meeting of the Dominions and Colonies and Indian Sections), at 4.30.—Prof. W. A. Bone: Brown Coals and Lignites: Their Importance to the Empire.

ROYAL SOCIETY OF MEDICINE (Study of Disease in Children Section), at 5.—Dr. C. P. Lapage and Dr. W. J. S. Bythell: Tonic and Atonic Hearts in Children (with Radiographic Illustrations).

PHYSICAL SOCIETY OF LONDON (at Imperial College of Science and Technology), at 5.—Dr. H. Levy: The Number of Radio-active Transformations as Determined by Analysis of the Observations.—Prof. C. H. Lees: A Graphical Method of Treating Fresnel's Formulæ for Reflection in Transparent Media.—Research Department of the General Electric Co., Hammersmith: Demonstrations of a Rapid Weighing Balance, and an Electrostatic Voltmeter.—F. C. Dyche-Teague: Demonstration of the Physical Properties of Cellactite.

ROYAL PHOTOGRAPHIC SOCIETY OF GREAT BRITAIN, at 7.—H. Main: A Pilgrimage to Provence.

INSTITUTION OF PRODUCTION ENGINEERS (at Institution of Mechanical Engineers), at 7.30.—G. W. Eastwood: Intensive Production of Automobile Bodies.

JUNIOR INSTITUTION OF ENGINEERS, at 8.—Prof. E. G. Coker: Curved Beams, Rings, and Chain Links.

ROYAL SOCIETY OF MEDICINE (Epidemiology and State Medicine Section), at 8.—Dr. Evelyn D. Brown: The Relation between Puerperal Septicæmia and other Infectious Diseases, with Reference to the Admission of Maternity Cases into Isolation Hospitals.

ROYAL INSTITUTION OF GREAT BRITAIN, at 9.—Prof. J. Joly: The Age of the Earth.

SATURDAY, FEBRUARY 25.

ROYAL INSTITUTION OF GREAT BRITAIN, at 3.—Prof. E. A. Gardner: Masterpieces of Greek Sculpture (2).

MONDAY, FEBRUARY 27.

INSTITUTE OF ACTUARIES, at 5.—C. H. Maltby: Results of an Investigation into the Effects of Different Valuation Bases upon Surplus.

INSTITUTION OF MECHANICAL ENGINEERS (Graduates' Association Meeting), at 7.—Sir Henry Fowler: Metallurgy in Relation to Mechanical Engineering.

ROYAL SOCIETY OF ARTS, at 8.—Prof. A. F. C. Pollard: The Mechanical Design of Scientific Instruments (Cantor Lecture) (2).

ROYAL SOCIETY OF MEDICINE (Odontology Section), at 8.—Clinical Evening.

MEDICAL SOCIETY OF LONDON (at 11 Chandos Street, W.1), at 8.30.—G. G. Turner, Sir Lenthal Cheatle, W. H. Clayton-Greene, W. James, and W. G. Howarth: Discussion on The Treatment of Tuberculous Glands.

TUESDAY, FEBRUARY 28.

ROYAL INSTITUTION OF GREAT BRITAIN, at 3.—Sir Arthur Keith: Anthropology of the British Empire: Series 1: Racial Problems in Asia and Australasia (2).

ROYAL SOCIETY OF MEDICINE (Medicine Section), at 5.30.—Dr. E. I. Spriggs and O. A. Marxer: A Review of Sixty-one Cases seeking Relief after Short-circuiting Operations.

ROYAL PHOTOGRAPHIC SOCIETY OF GREAT BRITAIN, at 7.—T. Bell: Present-day Portraiture.

ILLUMINATING ENGINEERING SOCIETY (at Royal Society of Arts), at 8.—L. Gaster and others: Discussion on Industrial Lighting: Ideal Requirements (legislative and otherwise) and Practical Solutions.

ROYAL ANTHROPOLOGICAL INSTITUTE, at 8.15.—Miss R. M. Fleming: Sex and Growth Features in Racial Analysis.

INSTITUTION OF AUTOMOBILE ENGINEERS (Informal Meeting) (at Institution of Mechanical Engineers), at 8.30.—Demonstration of, and Discussion on, Various Recording Instruments used on Motor Cars.

WEDNESDAY, MARCH 1.

NEWCOMEN SOCIETY (at Caxton Hall, Westminster), at 5.—R. Young: Timothy Hackworth and the Locomotive.

ROYAL SOCIETY OF MEDICINE (Surgery Section), at 5.30.—Informal Discussion on The Treatment of the Acute Obstruction resulting from Carcinoma of the Colon.

INSTITUTION OF ELECTRICAL ENGINEERS (Wireless Section), at 6.—E. B. Moullin and L. B. Turner: The Thermionic Triode as Rectifier.

ROYAL SOCIETY OF ARTS, at 8.—E. Moor: The Duplex-coupler Pianoforte.

SOCIETY OF PUBLIC ANALYSTS AND OTHER ANALYTICAL CHEMISTS (at Chemical Society), at 8.—R. V. Wadsworth: The Theobromine Content of Cacao Beans and Cocoa.—A. H. Bennett and F. K. Donovan: The Determination of Aldehydes and Ketones by Means of Hydroxylamine.—R. E. Esserv: The Value of Fish Scales as a Means of Identification of the Fish Used in Manufactured Products.—N. Evers and G. D. Elsdon: The Examination of B.P. Ointments.

THURSDAY, MARCH 2.

ROYAL INSTITUTION OF GREAT BRITAIN, at 3.—Prof. H. M. Lefroy: The Menace of the Insect Pest: The Balance of Life in Relation to Insect Pest Control (1).

ROYAL SOCIETY, at 4.30.—*Probable Papers*.—Prof. L. N. G. Filon and H. T. Jessop: The Stress-optical Effect in Transparent Solids strained beyond the Elastic Limit.—W. E. Curtis: The Structure of the Band Spectrum of Helium.—S. Datta: The Spectrum of Beryllium Fluoride.—W. G. Palmer: The Catalytic Activity of