

Calendar of Discovery and Invention.

March 27, 1827.—A hundred years ago, on Mar. 27, 1827, Darwin, then just eighteen years of age and a medical student at Edinburgh, contributed to the Edinburgh Plinian Society a paper on the larvæ of the Flustra or sea-mat, one of the Polyzoa.

March 27, 1895.—After making known the discovery of argon, Ramsay, through a suggestion of Sir Henry Miers, made experiments with the mineral cleveite, which it was thought would contain a compound of argon. From these experiments he was led to the isolation of helium, detected by Lockyer in the sun in 1868, but hitherto unknown on the earth. This discovery was made known on Mar. 27, 1895, at the annual meeting of the Chemical Society, the *Transactions* of which contain Ramsay's account of his investigations.

March 27, 1899.—The first wireless message across the English Channel was sent on Mar. 27, 1899. With an aerial erected on Dover Town Hall, signals were sent to Wimereux, near Boulogne, 32 miles distant, this being the record distance for wireless telegraphy up to that time.

March 29, 1810.—The modern printing machine can be traced back to Friedrich König, a printer of Leipzig. König visited England in 1806, and four years later, on Mar. 29, 1810, took out the first of four patents for printing machines in which he employed revolving cylinders. The *Times* was first printed by König's machines on Nov. 14, 1814, while the first book printed by machinery was Blumenbach's "Physiology."

March 31, 1795.—The hydraulic press so extensively used to-day was described by Bramah in his patent of Mar. 31, 1795, and his demonstration apparatus is preserved in working condition at the Science Museum, South Kensington. Pascal, 150 years previously, had, however, stated the principle of the machine. If a vessel, he said, had two openings, one a hundred times as large as the other, and if each be supplied with a piston which fit it exactly, then a man pushing the small piston will equilibrate that of 100 men pushing the larger piston.

March 31, 1889.—Commenced on Jan. 28, 1887, the Eiffel Tower in Paris, the highest structure in the world, was completed on Mar. 31, 1889. Its height is 300 metres and its weight 6875 tons.

April 1, 1823.—On April 1, 1823, the Treasury requested the opinion of the Royal Society on the merits and utility of a plan submitted by Babbage for applying machinery to the purpose of calculating and printing mathematical tables. This referred to the "difference engine" invented by Babbage in 1812. Its construction was authorised in 1823, suspended in 1833, and abandoned in 1842, after the Government had provided about £17,000 and Babbage had expended some £6000 of his own. This and many other calculating machines are now to be seen in the mathematical collections at the Science Museum, South Kensington.

April 2, 1799.—For more than seven centuries the home of Benedictine monks, the Priory of Saint Martin-des-Champs, Paris, in 1790 was appropriated by the French nation, and on April 2, 1799, became the home of the Conservatoire des Arts et Métiers, instituted by law on Oct. 10, 1794.

April 2, 1845.—The photographic study of the sun may be said to have been begun in 1858 with De la Rue's 'photo-heliograph,' but thirteen years before that, on April 2, 1845, Foucault and Fizeau obtained a daguerreotype of the sun which was reproduced in his "Popular Astronomy" by Arago, at whose suggestion the experiment was made.

E. C. S.

Societies and Academies.

LONDON.

Royal Society, Mar. 17.—W. L. Bragg and J. West: The structure of certain silicates. In a number of compounds the oxygen atoms are arranged in one of the forms of closest packing, the atoms of metal or silicon being inserted into this oxygen assemblage and causing only a slight distortion of its ideal arrangement. Typical examples are the compounds Al_2O_3 , BeAl_2O_4 , MgAl_2O_4 , Mg_2SiO_4 , MgCaSiO_4 , $(\text{MgOH})_2\text{Mg}_3(\text{SiO}_4)_2$, Al_2SiO_5 (kyanite). In the diffraction of X-rays by these crystals, which are often characterised by low symmetry and large unit cell, the simple pattern produced by the oxygen arrangement is evident, superimposed upon the pattern produced by the crystal as a whole. Other silicates are based upon more complicated arrangements of oxygen atoms, but these atoms appear in all cases to play a highly important part in determining the structure.

W. A. Wooster: The analysis of beams of moving charged particles by a magnetic field. The intensity distribution in the line produced by a magnetic field acting on a beam of homogeneous particles is determined (a) for a source of particles which is infinitely narrow, and (b) for sources of various finite widths. The conditions under which the analysis of moving charged particles is most favourably carried out are derived from this structure of the lines. The method can be applied to the determination of the velocity distribution of particles passing through thin sheets of matter.

J. F. Spencer and E. M. John: The magnetic susceptibility of some binary alloys. The magnetic susceptibility of the pure metals gold, silver, lead, tin, bismuth, aluminium, and cadmium, and a complete series of binary alloys of lead with gold, silver, and tin; tin with aluminium, bismuth, gold, and cadmium; and gold with cadmium have been measured by means of a Curie balance. The susceptibility-composition curves indicate the existence of some intermetallic compounds which have not previously been recognised, for example, Al_4Sn_3 , Ag_9Pb_2 , and Sn_4Bi_3 ; they confirm the existence of some other compounds, for example, Pb_3Au_2 , AuSn_2 , AuCd_3 . The curves and measurements show that the alloy of lead and silver containing 29 per cent. of lead is comparatively strongly paramagnetic, that of lead and gold containing 94 per cent. lead is strongly diamagnetic, and the aluminium-tin alloy containing 75 per cent. of tin is also strongly diamagnetic. The susceptibilities of the lead-tin alloys, where compounds are not formed, may be calculated by the mixture rule.

H. T. Flint and J. W. Fisher: A contribution to modern ideas on the quantum theory. An account is given of the four-dimensional aspect of de Broglie's phase wave, followed by a suggestion for the inclusion of quantum phenomena into the general theory of relativity by the introduction of a four-vector, to complete the current four-vector of electrodynamics, of which the divergence does not vanish. This leads by a simple assumption to a generalised form of Schrödinger's wave equation.

Royal Meteorological Society, Feb. 16.—J. Glasspoole: The variability of average monthly rainfall throughout the year. The variability of the monthly averages for the thirty-five years, 1881–1915, has been circulated for some 550 stations in two ways. In (1) the range has been used, *i.e.* the difference between the largest and smallest monthly averages. It varies from 1 inch at stations along the east coast and in central England, to 9.8 inches at both Glenquich, in the western Highlands of Scotland, and

Seathwaite, in the English Lake District. The equation $R = -0.14 + 19M + 41M^2$ represents fairly closely the variation of the range (R) with the mean rainfall per day (M) in all parts of the British Isles. In (2) the monthly averages have been expressed as 'mean rainfalls per day.' The mean deviation of these amounts, as a percentage departure from the mean for the twelve monthly values, varies from 11 per cent. in central England to more than 25 per cent. in Dartmoor, the Lake District, parts of Wales, and the western Highlands of Scotland. The distribution in this case presents features unlike that of the map of the average annual rainfall.—L. F. Richardson and Denis Proctor: Diffusion over distances ranging from 3 km. to 86 km. This paper describes the way in which air is scattered and mixed by the eddies in the wind. In order that the wandering of a piece of air may be observed, the air must have some mark carried with it; small free balloons have been used and also volcano ash. The statistics of the observed scatter may be of interest in connexion with factory smoke and town planning. The rate of diffusion has been observed by various authors for air masses ranging in size from a few metres to 1000 kilometres, and comparison of their results shows that Fick's law does not describe atmospheric diffusion.

CAMBRIDGE.

Philosophical Society, Feb. 28.—G. C. Steward: On Herschel's condition and the optical cosine law. Sir John Herschel investigated the condition which would ensure the vanishing of spherical aberration for the region, upon the axis of an optical system, in the neighbourhood of two conjugate axial points, themselves free from aberration; but Herschel's condition applies only to first order, or primary, aberration, *i.e.* to aberration depending upon the cube of the inclination of the ray to the axis of symmetry. Abbe, later, gave a more general condition which is shown to imply the stationariness of spherical aberrations of all orders. A geometrical proof is given of a very general theorem recently published by T. Smith under the name of the optical cosine law. This law is valid in the presence of any combination of the geometrical aberrations, as well for a symmetrical as for an unsymmetrical optical system.

PARIS.

Academy of Sciences, Feb. 14.—Maurice Hamy: A particular case of diffraction of solar images.—P. Villard: The chemical actions of radiations. A description of experiments in which two halves of the same plate are exposed to ordinary light and to X-rays, with a discussion of the meaning of the results obtained. Contrary to the view generally admitted, the properties of a latent image vary with the frequency of the radiation to which the plate has been submitted.—de Sparre: Remarks on a recent note published by H. Sugot. A re-assertion of priority.—Prof. John Townsend was elected a *correspondant* for the section of physics in succession to Pierre Weiss, elected non-resident member.—Bertrand Gambier: Surfaces having a ds^2 of Liouville and their closed geodesics.—P. Noaillon: An isolated non-critical singular point of a harmonic function.—R. Gasse: A special class of equations of the form $s = f(x, y, z, p, q)$.—Octave Onicescu: Adjusting an aggregate of values, and its applications to the representation of functions by series of functions and to integral equations.—Hasso Härlén: The logical paradox in the theory of ensembles.—P. Dupont: Calculation of the frictional forces on the profiles of wings.—Pierre Dive: The impossibility of an ellipsoidal stratification of a heterogeneous fluid in

rotation.—R. Wavre: Figures of equilibrium, the stratification of the planets and the equation of the first species.—Gaston Dupouy: A direct reading apparatus for the measurement of magnetic fields. A gaussmeter. A crystal of siderose (iron carbonate) is mounted so that the geometrical axis of rotation of the apparatus is perpendicular to the plane containing the ternary axis of the crystal and the direction of the lines of force. The couple produced by the magnetic field is balanced by the torsion of a wire or spiral spring. The apparatus is graduated by direct comparison with a flux meter of the usual type. Measurements can be made very quickly, but with the drawback that there is a correction for temperature.—A. Cotton: Remarks on the preceding communication.—Pierre Chevenard: The anomaly of the internal friction of reversible ferronickels.—A. P. Bigot: Some anhydrous silicas containing clay. The composition of ochres.—Paul Gaubert: The dehydration and hydration of some platinocyanides.—J. Thoulet: Densimetry in the Tyrrhenian Sea.—Besson: Comparative observations of the light radiation at the sea coast and in the interior.—Jean des Cilleuls: The phytoplankton of the Thouet, a tributary of the Loire.—A. Maige: Observations on the various modes of digestion of starch grains in plant cells. The two modes of digestion of starch grains, peripheral or internal, are related to the presence or absence of a plastial crust, possessing an adhesive property for the amylase.—Volmar and Samdahl: Kirondrine, the bitter and toxic principle of Kirondro seeds (*Perriera madagascariensis*). A crystalline substance has been isolated from Kirondro seeds (0.75 per cent. of seed). It does not appear to be an alkaloid, neither does it give the reactions of a glucoside. Its chemical composition is being investigated.—A. Gruvel: Raising *Salmo Pallaryi* in Morocco.—Mlle. F. Coupin: The index of cerebral value in infancy in the anthropoids.—M. and Mme. Lopicque: Concentration of the cellular juices in the higher fungi.—L. Bounoure: Has ovular supermaturation an influence on the origin of the primary gonocytes in *Rana temporaria*?—Edouard Fischer: The upper limit of distribution of various organisms in very calm water.—A. Blanchetière: The composition of the peptones. Description of a method for separating and determining peptides and diacipiperazines, and determinations of the proportions of the latter in various specimens of commercial peptones.—E. Aurel, L. Genevois, and R. Wurmser: The apparent potential of solutions of reducing sugars.—Paul Hauduroy: Diphtheric toxins giving rise to a diphtherimorph bacillus. A specimen of diphtheric toxin, preserved in the dark for two years, contained filtrable bacilli from which, by a series of plate cultures, visible organisms were obtained possessing the morphological characters of the diphtheria bacillus; but *without pathogenic action* (guinea-pig).—R. Sazerac, Hiroshi Nakamura, and Mme. M. Kitchevatz: The action of bismuth on hæmorrhagic icterus. Bismuth, as sodium tartarobismuthate, possesses a remarkable preventive action towards infection by *Spirochaeta icterohæmorrhagicæ* in the guinea-pig, and also has marked curative action on the evolution of the disease caused by this organism.

ROME.

Royal Academy of the Lincei, Jan. 2.—V. Volterra: Biological fluctuations.—C. Somigliana: The relations existing between the geodetic constants and the values of gravity. Development of Pizzetti's expression for gravity on the surface of the ellipsoid of rotation leads to the conclusion that there exists a homogeneous linear relationship between any three

values of gravity on such a surface. The same expression gives rise to a biquadratic equation which determines the eccentricity as a function of any three values of gravity and of their corresponding latitudes.—U. Cisotti: A noteworthy exception to the Kutta-Joukowski theorem.—F. Millosevich: The corundum rocks of Val Sessera.—L. Petri: The method of applying Wood's light in investigations on vegetable pathology. Attention is directed to the existence of a peculiar luminogenous substance, which appears to be present in all living vegetable tissues, even in potato tubers, although the photograms of the green tissues are by far the more luminescent. The crude alcoholic extract of chlorophyll gives a photogram with a wine-red fluorescence, whereas the photogram of chlorophyll-free leaf tissue is only moderately fluorescent. Dilute sulphuric acid does not modify the luminogenic properties, and the substance in question diffuses rapidly by capillarity into filter paper.—S. Baglioni, L. Bracaloni, and A. Galamini: Physiological action of alcohol. Variations in glucohaemia and alcoholaemia resulting from ingestion of alcoholic liquors and of saccharose (ii). The results of experiments on human beings reveal a connexion between glucohaemic and alcoholaemic variations which appears to support, in part at least, the hypothesis advanced by Ford and recently maintained by Serono, that sugar ultimately undergoes alcoholic scission in the organism.—F. De Carli: Anhydrous borates of silver, barium, and zinc. The results of measurements of the temperature of devitrification of systems composed of boric anhydride and silver oxide, barium oxide, and zinc oxide respectively indicate the existence of anhydrous borates having the formulae: $Ag_2O, 4B_2O_3$; BaO, B_2O_3 ; $BaO, 2B_2O_3$; $BaO, 3B_2O_3$; $BaO, 4B_2O_3$; $2ZnO, B_2O_3$, and ZnO, B_2O_3 .—C. Jucci: Heredity of the metabolic type in silkworms. Larval development in reciprocal crosses between two races of *Bombyx mori*.—E. Benedetti: The telencephalon of the triton. Contribution to the comparative study of the central nervous system of amphibia.

Official Publications Received.

BRITISH.

- British Legion. Annual Report and Accounts, 1926, January 1st to September 30th. Pp. 87+4 plates. (London.)
- Leeds University. Report to the Worshipful Company of Clothworkers of the City of London of the Advisory Committee on the Departments of Textile Industries and Colour Chemistry and Dyeing, during the Session 1925-26. Pp. 11. (Leeds.)
- The National Institute of Industrial Psychology. Annual Report and Statement of Accounts for the Year ended December 31st, 1926. Pp. 20. (London.)
- Proceedings of the Royal Society of Edinburgh, Session 1926-1927. Vol. 47, Part 1, No. 1: Further Experiments with the Ewing Ball-and-Tube Flowmeter. By J. H. Awbery and Dr. Ezer Griffiths. Pp. 10. 1s. Vol. 47, Part 1, No. 2: The Theory of Persymmetric Determinants from 1894 to 1919. By Sir Thomas Muir. Pp. 11-23. 2s. Vol. 47, Part 1, No. 3: The Law of Blackening of the Photographic Plate at Low Densities (Second Paper). By E. A. Baker. Pp. 34-51. 1s. 6d. (Edinburgh: Robert Grant and Son; London: Williams and Norgate, Ltd.)
- Records of the Indian Museum. Vol. 28, Part 3: Zoological Results of a Tour in the Far East; The Tanaidacea and Isopoda of Talé Sap. By Dr. Chas. Chilton. Pp. 173-185. (Calcutta.)
- Philosophical Transactions of the Royal Society of London. Series B, Vol. 214 (B.417): The Development of the Calcareous Test of *Echinus miliaris*. By Dr. Isabella Gordon. Pp. 259-312. Series B, Vol. 215, (B.426): The Development of the Calcareous Test of *Echinocardium Cordatum*. By Dr. Isabella Gordon. Pp. 255-313. (London: Harrison and Sons, Ltd.)
- The Physical Society of London. List of Officers and Fellows. Pp. 27. (London: Imperial College of Science.)
- Ministry of Agriculture and Fisheries. Second Progress Report of the Foot-and-Mouth Disease Research Committee. Pp. 117. (London: H.M. Stationery Office.) 3s. net.
- The British Research Association for the Woollen and Worsted Industries. Publication No. 74: Exhibition of Scientific and Practical Research Work, Opened by the Earl of Balfour at the Science Museum, South Kensington, 1st March 1927. Pp. 21. (Headingley, Leeds.)
- Journal of the Royal Statistical Society. Vol. 90, Part 1, 1927. Pp. x+224. (London.) 7s. 6d.

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- Survey of India. General Report, 1925 to 1926, from 1st October 1925 to 30th September 1926. Pp. viii+51+iii+3 maps. 1 rupee; 1s. 9d. Map Publication and Office Work, 1925 to 1926, from 1st April 1925 to 31st March 1926. Pp. viii+23+5 maps. 1 rupee; 1s. 9d. (Calcutta.)
- Bothalia: a Record of Contributions from the National Herbarium, Union of South Africa, Pretoria. Vol. 2, Part 1A: A Preliminary Study of the South African Rust Fungi. By Ethel M. Doidge. Pp. 228+6 plates. (Pretoria: Government Printing and Stationery Office.) 7s. 6d.
- Botanical Survey of South Africa. Memoir No. 9: A Preliminary List of the known Poisonous Plants found in South Africa. By Dr. E. P. Phillips. Pp. 30+14 plates. (Pretoria: Government Printing and Stationery Office.) 2s. 6d.
- Union of South Africa: Department of Agriculture. Reprint No. 64, 1926: Diseases of Virginian Tobacco in South Africa. By Dr. E. S. Moore. Pp. 30. (Pretoria: Government Printing and Stationery Office.) 3d.
- Dominion of Canada. Report of the Department of Mines for the Fiscal Year ending March 31, 1926. (No. 2116.) Pp. v+77. (Ottawa: F. A. Acland.) 20 cents.
- Canada. Department of Mines: Geological Survey. Economic Geology Series, No. 2: Talc Deposits of Canada. By M. E. Wilson. (No. 2092.) Pp. v+149 (14 plates). 25 cents. Memoir 149, No. 130 Geological Series: Placer and Vein Gold Deposits of Barkerville, Cariboo District, British Columbia. By W. A. Johnston and W. L. Uglov. (No. 2095.) Pp. iii+246 (15 plates). 40 cents. Memoir 150, No. 131 Geological Series: Whitehorse District, Yukon. By W. E. Cockfield and A. H. Bell. (No. 2101.) Pp. ii+63 (8 plates). 20 cents. (Ottawa: F. A. Acland.)
- Canada. Department of Mines: Victoria Memorial Museum. Museum Bulletin No. 45, Biological Series No. 12: List of Quaternary and Tertiary Diatomaceae from Deposits of Southern Canada. By C. S. Boyer. (No. 2102.) Pp. 26. 10 cents. (Ottawa: F. A. Acland.)

FOREIGN.

- Ministry of Finance, Egypt: Coastguards and Fisheries Service. Résumé of the Report on the Fisheries of Egypt for the Year 1925. By El Miralal Ahmed Bey Fouad. Translated from the Arabic. Pp. viii+84. (Cairo: Government Publications Office.) 5 P.T.
- Ministry of Public Works, Egypt: Physical Department. Interpretation of Correlation Coefficients. By S. Krichewsky. (Physical Department Paper No. 22.) Pp. 14. (Cairo: Government Publications Office.) 5 P.T.
- Ministry of Finance: Survey of Egypt. The Phosphate Deposits in Egypt. By Dr. W. F. Hume. (Survey of Egypt Paper No. 41.) Pp. iii+20+7 plates. (Cairo: Government Publications Office.) 10 P.T.
- R. Università degli Studi di Perugia. Annali della Facoltà di Medicina e Chirurgia. (Bollettino dell'Accademia Medico-Chirurgica di Perugia.) Vol. 29, Anno 1926, Serie 5, Vol. 4. Pp. 295+147. (Milano: Società Anonima Istituto Editoriale Scientifico.)
- Anales del Museo Nacional de Historia Natural Bernardino Rivadavia, Buenos Aires. Tomo 33. Pp. vii+359. (Buenos Aires.)
- Almanaque del Ministerio de Agricultura para el año 1927, preparado por la Sección Biblioteca con la cooperación de las Reparticiones del Ministerio. Año 3. Pp. 560. (Buenos Aires.) 1 peso.
- Koninklijk Nederlandsch Meteorologisch Instituut. No. 106A: Ergebnisse aerologischer Beobachtungen. 13, 1924. Pp. iv.+40. 2.50 fl. No. 108: Seismische Registrierungen in De Bilt. 11, 1923. Pp. x+59. 1 fl. (Utrecht: Kemink en Zoon.)
- Department of Commerce: Bureau of Standards. Scientific Papers of the Bureau of Standards, No. 534: Effect of Concentrated Loads on the Length of Measuring Tapes. By Lewis V. Judson. Pp. 385-393. 10 cents. Scientific Papers of the Bureau of Standards, No. 540: Measurement of Surface Tension. By N. Ernest Dorsey. Pp. 563-595. 15 cents. Scientific Papers of the Bureau of Standards, No. 542: Electric Field of a Charged Wire and a Slotted Cylindrical Conductor. By Chester Snow. Pp. 631-646. 10 cents. (Washington, D.C.: Government Printing Office.)

CATALOGUES.

- Canadiana: Catalogue of Books, Manuscripts, Engravings and Maps, relating to the Canadian Empire; also a Selection on Arctic Discovery, including Alaska, Yukon, Greenland, Spitzbergen, Kamtschatka and Northern Pacific Ocean. (No. 493.) Pp. 42. (London: Francis Edwards.)
- A Catalogue of Important and Rare Books on Zoology, Geology and Palaeontology; including a Fine Collection of Original Water-Colour Drawings. (No. 407.) Pp. 136. (London: Bernard Quaritch, Ltd.) 1s.
- Catalogue of Astronomical and Optical Instruments. Publication No. 4. Pp. 30. (Newcastle-on-Tyne: Sir Howard Grubb, Parsons and Co.)

Diary of Societies.

SATURDAY, MARCH 26.

- INSTITUTION OF MUNICIPAL AND COUNTY ENGINEERS (South-Eastern District Meeting) (at Guildhall, Rochester), at 11 A.M.
- INSTITUTION OF MUNICIPAL AND COUNTY ENGINEERS (South Midland District Meeting) (at Leighton Buzzard), at 11 A.M.—H. J. Barnes: Waterworks.—B. H. Robjant: Housing Schemes.
- INSTITUTION OF MUNICIPAL AND COUNTY ENGINEERS (North-Eastern District Meeting) (at Town Hall, South Shields), at 2.15.—J. Reid: Estimation of Storm Water Discharge.
- INSTITUTION OF MUNICIPAL AND COUNTY ENGINEERS (Yorkshire and North-Western Districts) (at Town Hall, Manchester), at 2.30.—R. Bruce and others: Discussion on Manchester and District Joint Town Planning Report.