

## Contemporary Birthdays.

December 12, 1838.	Prof. W. C. Unwin, F.R.S.
December 12, 1866.	Prof. E. W. MacBride, F.R.S.
December 12, 1855.	Mr. Arthur William Clayden.
December 13, 1861.	Prof. A. G. Perkin, F.R.S.
December 15, 1869.	Sir John F. C. Snell, G.B.E.
December 16, 1884.	Prof. John W. Bews.
December 16, 1859.	Prof. Douglas H. Campbell.
December 16, 1854.	Prof. John T. Cash, F.R.S.

Prof. UNWIN celebrates his eighty-eighth birthday on Sunday, and very hearty congratulations are accorded to this distinguished veteran of the engineering world. Educated at the City of London School, he began his technical career as a pupil in the firm of William Fairbairn, Manchester. For twenty years he taught the principles of engineering at the Central Technical College, City and Guilds of London Institute. Prof. Unwin is a past president of the Institutions of Civil Engineers and Mechanical Engineers.

Prof. MACBRIDE, the distinguished zoologist, who occupies the chair of zoology in the Imperial College of Science and Technology, South Kensington, was born at Belfast and educated there at Queen's College, and at St. John's College, Cambridge. From 1897 until 1909 he was Strathcona professor of zoology in McGill University, Montreal. A teacher of distinction, Prof. MacBride has made noteworthy contributions to invertebrate embryology. In 1924 he published his "Introduction to the Study of Heredity."

Mr. CLAYDEN was born at Boston, Lincolnshire, and educated at University College School, from whence he graduated at Christ's College, Cambridge. From 1894 until 1920 he was principal of University College, Exeter. Mr. Clayden has contributed much of sterling value to meteorological photography.

Prof. A. G. PERKIN, who, it will be recalled, retired recently from the chair of colour chemistry and dyeing in the University of Leeds, was born at Sudbury. He was educated at the City of London School and Royal College of Science. In 1924 the Royal Society awarded him its Davy medal for researches on the structure of natural colouring matters.

Sir JOHN SNELL was born at Saltash, Cornwall, and educated at Plymouth Grammar School and King's College, London. A past president of the Institution of Electrical Engineers, he is a member of the Advisory Council, Department of Scientific and Industrial Research, and the General Board, National Physical Laboratory. Sir John's advice and guidance are sought frequently in parliamentary projects concerning the technical industries.

Prof. BEWS, born at Kirkwall, Orkney, graduated at the University of Edinburgh. Assistant professor of botany there (1908-10), he left to take up the chair of botany in University College, Natal. In 1924 he published "Plant Forms and their Evolution in South Africa."

Prof. D. H. CAMPBELL, botanist, was born at Detroit, U.S.A. After graduation at the University of Michigan, he studied at Bonn, Tübingen, and Berlin. Professor of botany at Indiana University from 1888 until 1891, he was then elected to a similar chair at Stanford University, California. Prof. Campbell is a foreign member of the Linnean Society of London and a fellow of the Royal Society of Edinburgh. He is the author of "Plant Life and Evolution" (1911) and of many papers on systematic botany.

Prof. CASH, a graduate of the University of Edinburgh, is Emeritus Regius professor of materia medica in the University of Aberdeen.

## Societies and Academies.

LONDON.

**Royal Society**, December 2.—T. M. Lowry and W. R. C. Coode-Adams: Optical rotatory dispersion (Pt. 3). The rotatory dispersion of quartz in the infra-red, visible, and ultra-violet regions. Measurements of optical rotatory power of quartz were begun in 1908 with the view of testing, in the most drastic way possible, methods that were being developed for studying rotatory dispersion in organic compounds. Data are now given for the rotatory power at 20° C. of a column of quartz, 496.4735 mm. in length, over a range of wave-lengths from 25,170 Å.U. to 2263 Å.U. Observed rotations range from 450° to 101,332°, and rotations per mm. from 0.906° to 202.328°/mm. The latter can be expressed, over the entire range of wave-lengths, by the formula—

$$a = \frac{9.5639}{\lambda^2 - 0.0127943} - \frac{2.3113}{\lambda^2 - 0.000974} - 0.1905.$$

This formula postulates the existence of bands of selective absorption at 1130 Å.U. and 310 Å.U. The influence of infra-red bands is covered by the small constant -0.1905.

O. W. Richardson: Structure in the secondary hydrogen spectrum ( $\nu$ ). Fulcher's red bands as extended by various authors form a sequence of bands with the respective vibration transitions  $0 \rightarrow 0$ ,  $1 \rightarrow 1$ ,  $2 \rightarrow 2$ ,  $3 \rightarrow 3$ ,  $4 \rightarrow 4$ , and  $5 \rightarrow 5$ . The green bands belong to the same group and have the vibration transitions  $1 \rightarrow 0$ ,  $2 \rightarrow 1$ ,  $3 \rightarrow 2$ ,  $4 \rightarrow 3$ , and  $5 \rightarrow 4$ . Associated with these are five bands in the infra-red with transitions  $0 \rightarrow 1$ ,  $1 \rightarrow 2$ ,  $2 \rightarrow 3$ ,  $3 \rightarrow 4$ , and  $4 \rightarrow 5$ , and four in the blue-green with transitions  $2 \rightarrow 0$ ,  $3 \rightarrow 1$ ,  $4 \rightarrow 2$ , and  $5 \rightarrow 3$ . The blue bands arranged by Dieke form a sequence in another group and have the transitions  $0 \rightarrow 0$ ,  $1 \rightarrow 1$ ,  $2 \rightarrow 2$ ,  $3 \rightarrow 3$ , and  $4 \rightarrow 4$ . Belonging to this group are three other sequences with transitions 1 up, 1 down, and 2 down respectively. There are also at least three less well-developed groups in the violet side of these. The Q (1) lines of the bands with  $0 \rightarrow 0$  vibration transitions are given by the Rydberg-Ritz formula

$$\nu = A - \frac{R}{(m - 0.056704 - 0.06080/m^2)^2}$$

where  $A = 29330.305$ ,  $R = 109678.3$ , and  $m = 3, 4, 5, 6, 7, 8$ . The value of  $A$  is close to that of the second member when  $m = 2$ . It follows that the various groups of bands are associated with electron transitions  $3 \rightarrow 2$ ,  $4 \rightarrow 2$ ,  $5 \rightarrow 2$ , etc. The lines of the Q branches are connected together by a combination rule which extends not only within each group but also from each group to the others.

R. H. Fowler: General forms of statistical mechanics, with special reference to the new quantum mechanics. This paper discusses a very general form of statistical mechanics which includes as special cases the classical form, the form of Bose and Einstein, and of Fermi and Dirac. It is shown generally that assemblies of many independent systems are always thermodynamic systems. The correct form for material particles obeying the laws of quantum mechanics is then discussed, and the arguments in favour of the form of Fermi and Dirac summarised. The applications of this form are then greatly extended. Previously it had been applied only to structureless mass-points; it is here shown how to treat assemblies as general as any handled in the classical form. Problems of distribution in space according to the new mechanics are also briefly treated.

R. H. Fowler and E. K. Rideal: On the rate of maximum activation by collision for the complex

molecules, with applications to velocities of gas particles. New formulæ are used to compute the maximum rate of activation by collision and applied to the dissociation of nitrogen pentoxide. The maximum possible rate of activation by collision is 100 times greater than the observed rate of dissociation at the lowest pressures hitherto investigated. The maximum possible rate of dissociation of bromine molecules by collision and the rate of formation of hydrobromic acid are of the same order. The rate of dissociation need not be  $10^3$ - $10^6$  times smaller, as claimed by Polanyi.

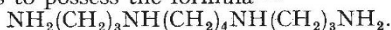
**H. Dingle:** The spectrum of fluorine (F<sub>1</sub>). The spectrum of neutral fluorine (F<sub>1</sub>) has been examined by means of discharges through silicon tetrafluoride, and lists of established and doubtful lines have been tabulated. It contains doublet and quartet systems of terms. The suggested arrangement is consistent with Carragan's observations of the Zeeman effect for fluorine. Relative term values have been deduced for each system, and an ionisation potential of about 17 volts suggested. The discussion suggests that lines of F<sub>1</sub> should appear with maximum intensity at or near A<sub>0</sub> in the Harvard sequence.

Eighteen papers were read in title only.

#### MANCHESTER.

**Literary and Philosophical Society, November 2.**—**H. B. Dixon and W. F. Higgins:** The burning of gases in nitrous oxide. A small jet of hydrogen burning in air is almost invisible and its light is inappreciable: if nitrous oxide, instead of air, is made to feed the flame, the increase in the size and luminosity of the flames is remarkable. The jet of issuing gas is surrounded by a luminous apricot-coloured zone, and outside this is a thick sheath of greenish-grey colour. The luminous zone appears to give a continuous spectrum, and this is confirmed by a spectrogram taken with a 24 hours' exposure. Hydrocarbon gases burning in nitrous oxide show an intensely bright centre surrounded by a luminous apricot zone, and round all a wide-stretching green-grey envelope. The propylene and acetylene flames deposit a sheath of carbon round their luminous cores. All the gases tested in the 'concentric-tube' apparatus have ignition-points in nitrous oxide lower than those in oxygen or air. They all exhibit a lowering of nitrous-point above and below the *crucial pressure*, just as in oxygen or in air.—**R. W. James:** The intensity of reflexion of X-ray from crystals at low temperatures. The temperature coefficient of X-ray reflexion from crystals of rock-salt over a range of temperatures from 290° Abs. to 85° Abs. has been measured. The crystal is suspended just above the surface of liquid air contained in a Dewar flask having specially thin walls made of boro-silicate glass. With molybdenum *K $\alpha$*  the absorption in the glass is only about 30 per cent. The ratios of the intensities of reflexion at 85° Abs. to that at 290° Abs. are 1.22, 1.61, 2.36, 3.39, for the 2nd, 3rd, 4th, and 5th order reflexions respectively, from the cube face of the crystal. This is in accord with Debye's theory. At higher temperatures the intensity decreases too rapidly. According to recent work by Waller the value of the exponent should be double that calculated by Debye. At low temperatures the present experiments point to the substantial correctness of Waller's formula.

November 16.—**R. Robinson:** Some recent advances in organic chemistry. In the aliphatic group, special interest attaches to the work of Dudley, Rosenheim, and Starling on the tetra-acid base, spermine, which has been isolated and proved by synthesis to possess the formula—



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In the alicyclic group, Ruzicka, after doing much to clear up the chemistry of the sesquiterpenes, has made the astonishing discovery of the stability of large rings of carbon atoms. The clue was furnished by the study of the ketone, civetone, from certain glands of the civet cat. This substance was proved to be cycloheptadecanone. In the aromatic groups Harington has studied the active constituent of the thyroid gland and shown it to be the tetra-iodo derivative of a compound termed deiodothyroxin. The latter contains a diphenyl ether group, is related to tyrosine and has been synthesised. Turning to the heterocyclic groups, H. Fischer's recent announcement of the transformation of cryptopyrrole into aetioporphyryr marks a great advance in our knowledge of chlorophyll and of the blood pigment. For the first time the synthetic method affords evidence of the arrangement of the four pyrrole nuclei in the molecule. The most striking feature of recent organic chemical theory is the increasing use which is made of conceptions based on the electronic theory of valency. Thus, it can be shown theoretically that electrophile groups, those which attract electrons and, for example, actually positively charged centres, have a *m*-directive tendency. On the other hand, groups which are less electrophile than hydrogen is, have an *o*-*p*-directive tendency.

#### PARIS.

**Academy of Sciences, November 8.**—**Ch. Lallemand:** A world-wide scheme for measurements of longitude. The scheme starts with the determination of the differences of longitude between three fundamental points, nearly on the same parallel, and about 120° apart. For these points three permanent observatories were chosen (Algiers, Shanghai, San Diego), and these are to be connected by secondary polygons. Full use is made of radio telegraphy, associated with the most perfect methods of astronomical observation available. Wherever possible, self-recording methods are utilised.—**H. Dauvillé:** Some observations on the Cretaceous strata to the south of Paris.—**R. Jarry Desloges:** The changes observed in the planet Mars during the apposition of 1926. A list of changes from the configurations seen in 1924.—**J. Schokalsky:** The expedition of the Russian Geographical Society in Mongolia (1924-1926).—**S. Drzewiecki:** A new representation of a gas. Application to the barometric pressure. Starting with a simple deduction from the kinetic theory of gases, a new formula for the variation of barometric pressure with altitude is deduced. This formula contains a series in ascending powers of *g*, and if all terms of this series except the first be neglected, it reduces to the ordinary Laplace formula.—**W. Arkadiew:** The oscillations and resonance of elementary magnets.—**H. Volkringer:** The continuous spectrum of mercury. The continuous spectrum of mercury vapour under oscillating discharge, studied in a tube without electrodes, was of maximum intensity at about 240° C. (vapour pressure 35 mm.). The distribution of energy in the spectrum was determined by comparison with the energy emitted by a black body at 1520° C. The curve given shows a maximum in the neighbourhood of  $\lambda = 0.512\mu$  and is nearly symmetrical about this point.—**René Dubrisay:** The action of heat on the superficial properties of kaolin. Kaolin was heated to 250° C., 550°-600° C., and 950°-1000° C. The unheated sample and the three heated samples were compared with respect to their adsorption of iodine and of methylene blue, the heat developed on moistening with water and ammonia solution, and apparent volume after shaking up with water and ammonia solution. The comparative results of these experiments are given in tabular form.

—Pierre Jolibois, Henri Lefebvre, and Pierre Montagne: Comparison between the effects of the electric spark and of thermal dissociation.—H. Forestier and G. Chaudron: The ferromagnetic characters of stable iron sesquioxide.—Jean Cournot and Jean Bary: Electrolytic plating of aluminium and light alloys, their adherence and resistance to corrosion by sea water. Aluminium and duralumin were used in these experiments. The deposited metals were cadmium, cobalt, and chromium (all on a copper film), also cadmium directly on duralumin. Detailed accounts of cleaning methods and depositing baths are given. As regards resistance to sea water, copper-chromium deposited on aluminium gave the best results.—A. Sanfourche: The cementation of iron by silicon chloride.—C. Marie and J. Bertheloot: Two causes of error in the electrolytic determination of nickel in the presence of iron. The precipitated oxide of iron retains some nickel and the deposited nickel contains some iron. These errors may sometimes compensate each other. The first error may be prevented by the addition of magnesium sulphate, the second by using a diaphragm of filter paper round the cathode.—Georges Dubois: Geological study of the Flemish coast in the neighbourhood of Gravelines.—P. Russo: The presence of a large volcanic region in the lower plain of Moulouya (Northern Morocco).—Const. A. Kténas: The evolution of the volcano of Kamenis (Santorin) in 1926.—Louis Besson: Relation between the temperatures of certain months in the year. Taking the mean monthly temperatures at Paris for 123 years, and plotting the figures for July and April against the date, it is seen that there is a remarkable similitude between the two curves; if one curve is displaced seven years the two curves are almost parallel.—J. Magrou: *Bacterium tumefaciens* in the tissues of plant cancers. The observations described, which agree with those of Robinson and Walkden and of Pinoy, suggest that the agent of cancer in plants acts at a distance, by a mechanism which remains to be explained, on the cells in which it is causing multiplication.—Stefan Jelinek: A biological sign marking the return of spontaneous respiration in cases of apparent death. The first sign of restoration of breathing is a swallowing movement of the larynx and lips.—Alphonse Labbé: Herouardia, a new genus of copepod, intermediate between the Harpacticidæ and the Cyclopida.—A. Dorier: The commensalism of the larva of *Dactylocladius brevipalpis*.—Auguste Lumière and Mme. Montoloy: The formation of abscesses of fixation.

### Official Publications Received.

#### BRITISH AND COLONIAL.

Ministry of Finance, Egypt: Survey of Egypt, Geological Survey. The Geography and Geology of the District between Gebel 'Atâqa and El-Galâla El-Bahariya (Gulf of Suez). By Dr. H. Sadek. (Survey of Egypt Paper No. 40.) Pp. viii+120+6 plates. (Cairo: Government Publications Office.) 10 P.T.

Proceedings of the Isle of Wight Natural History Society for 1925. Vol. 1, Part 6. Pp. cccxiii-cccxcviii+819-403. (Newport, I.W.: The County Press.) 3s.

Union of South Africa: Department of Agriculture. Science Bulletin No. 53: Yoking Oxen to the Plough; a new System. By Dr. W. S. H. Cleghorne. Pp. 14. (Pretoria: Government Printing and Stationery Office.) 3d.

#### CATALOGUES.

Catalogue of General and Industrial Laboratory Appliances. Eighth edition. Pp. 1214. (London: A. Gallenkamp and Co., Ltd.)

Medizin und Naturwissenschaften. Mit einem Vorwort von Prof. Dr. Henry E. Sigerist. Pp. xii+103. (Leipzig: Georg Thieme Verlag.)

Books on Art and the Decorative Crafts. Catalogue 488, November. Pp. 56. (London: Francis Edwards.)

A New Catalogue of Publishers' Reminders and other Purchases. No. 131. Pp. 24. (London: Henry W. Glover.)

Firth 'Stayrite': the New Acid-Resisting Steel. Pp. 20. (Sheffield: Thos. Firth and Sons, Ltd.)

Cambridge Unipivot Instruments for D.C. Measurements. List No. 160. Pp. 27. (London: Cambridge Instrument Co., Ltd.)

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### Diary of Societies.

SATURDAY, DECEMBER 11.

- INSTITUTION OF MUNICIPAL AND COUNTY ENGINEERS (South-Western District Meeting) (at Vestry Hall, Dawlish), at 2.15.—S. F. C. Church: Twenty Years in an Urban District.
- NORTH OF ENGLAND INSTITUTE OF MINING AND MECHANICAL ENGINEERS (Associates' and Students' Sections) (jointly with Graduate Sections of North-East Coast Institution of Engineers and Shipbuilders, and Institution of Electrical Engineers) (at Neville Hall, Newcastle-upon-Tyne), at 3.—Joint Discussion on The Production and Transport of Coal by Machinery.
- MINING INSTITUTE OF SCOTLAND (at Royal Technical College, Glasgow), at 3.—A. Kyle: Mineral Boring.—Discussions on the following—Coal-Cutting by Machinery and Conveyors in Scottish Mines, G. L. Kerr.—The Problem of In-bye Transport, D. C. Gemmill.—Miner's Nystagmus, Dr. F. Fergus.
- ROYAL INSTITUTION OF GREAT BRITAIN, at 3.—Dr. C. Rootham: Henry Purcell and his Contemporaries (1).
- PHYSIOLOGICAL SOCIETY (at London Hospital Medical College), at 3.30.—Demonstrations—A Simple Colorimeter Lamp, H. D. Kay.—An Easily-constructed Ultratriller, R. S. Aitken and H. D. Kay.—A Method of Collecting 'Alveolar Air' during Exercise, A. E. Clark-Kennedy and T. Owen.—The Fractional Analysis of an Expired Breath, R. S. Aitken and A. E. Clark-Kennedy.—Apparatus for Measuring the Osmotic Pressure of Proteins at Constant Hydrogen-Ion Concentration, J. R. Marrach.—Dr. W. A. M. Smart: Some Nonomograms of Physiological Interest.—Prof. H. E. Roaf: (a) Apparatus for Measuring the Influence of Intensity of Light on Discrimination of Wavelengths; (b) Effect of Exposure of the Eye to a Coloured Light on its Sensitivity to Various Regions of the Spectrum; (c) Apparatus for Measuring the After Effects of Exposure of the Eye to any Region of the Spectrum.—S. Wright: A Simple Respiratory Apparatus for Man or Animals.—D. T. Barry: Experimental Lesions of Mitral and Tricuspid Valves.—E. D. Adrian and R. Eckhard: The Time Relations and Frequency of Impulses in the Optic Nerve.—J. T. Cunningham: The Function of the Scrotum.—H. A. Harris: The Growth of the Long Bones in Health and Disease; its Relation to Vitamines and Tissue-Culture.—Dr. F. W. Etridge-Green: The White Equation and its Relation to the Theory of Colour Vision.—F. R. Curtis, A. A. Moncrieff, and S. Wright: On a Supposed Pressor Substance in the Blood of Patients with Hypertension.—I. de Burgh Daly: Effect of a Negative Pressure on the Heart-Lung Preparation.—K. Furusawa: A Muscle Twitch Lasting for Hours.—D. T. Barry and J. Freud: Toxemia from Liver Grafting.—Prof. H. S. Raper: Indole Derivatives from Tyrosine.—F. Campbell Smith: The Ultra-violet Absorption Spectra of Cerebrospinal Fluids (Preliminary Communication).
- BRITISH PSYCHOLOGICAL SOCIETY (Annual General Meeting) (at University College), at 3.30.—J. C. Flugel: Practice, Fatigue, and Oscillation.
- INSTITUTE OF BRITISH FOUNDRYMEN (Newcastle and District Branch) (at Neville Hall, Newcastle-upon-Tyne), at 6.15.—W. J. Molineux: The Manufacture of Iron Castings for Petrol Engines.
- INSTITUTE OF BRITISH FOUNDRYMEN (Birmingham, Coventry, and West Midlands Branch) (at Engineers' Club, Birmingham), at 6.30.—W. West: Oil, Sand, and Motor Castings.
- HULL ASSOCIATION OF ENGINEERS (at Hull Technical College), at 7.15.—Prof. F. C. Lea: Hydro-Electrical Developments.
- OIL AND COLOUR CHEMISTS' ASSOCIATION (Manchester Section) (at Manchester).—R. S. Horsfall: Modern Industrial Chemistry.

MONDAY, DECEMBER 13.

- ROYAL GEOGRAPHICAL SOCIETY (at Lowther Lodge), at 5.—Sir Henry Lyons: Ancient Survey Instruments.
- SOCIETY OF ENGINEERS (at Geological Society), at 5.45.—Prof. F. H. Hummel: The Economic Proportions, and the Stresses in a Solid Masonry Dam or Buttress, subjected to Water Pressure acting on an Inclined Face.
- INSTITUTION OF ELECTRICAL ENGINEERS (London Students' Section) (at Institution of Mechanical Engineers), at 7.—E. H. Lewis: Payment by Results.
- INSTITUTION OF ELECTRICAL ENGINEERS (Mersey and North Wales (Liverpool) Section) (at Liverpool University), at 7.—H. W. Edmundson and G. B. Robertson: The Making of a Radio Valve.
- INSTITUTION OF ELECTRICAL ENGINEERS (North-Eastern Circle) (at Armstrong College, Newcastle-upon-Tyne), at 7.—J. R. Beard and T. G. N. Haldane: The Design of City Distribution Systems, and the Problem of Standardisation.
- INSTITUTION OF MECHANICAL ENGINEERS (Graduates' Section, London) (jointly with Student Sections of the Institutions of Civil and Electrical Engineers), at 7.—E. H. Lewis: Payment by Results.
- INSTITUTE OF METALS (Scottish Local Section) (at 39 Elmbank Crescent, Glasgow), at 7.30.—Protection Coating of Metals.—C. H. Faris: Fescolising.—N. C. Marples: Colorising.—E. A. Ollard: Chromium Plating.
- RAILWAY CLUB, at 7.30.—W. H. R. Dawson: The Underground Railway.
- ROYAL INSTITUTE OF BRITISH ARCHITECTS, at 8.—G. Drysdale: The Work of Leonard Stokes.
- ARISTOTELIAN SOCIETY (at University of London Club), at 8.—J. Anderson: The Knower and the Known.
- INSTITUTE OF CHEMISTRY (Leeds Area Section).—F. Scholefield: Registration of Chemists.

TUESDAY, DECEMBER 14.

- ROYAL INSTITUTION OF GREAT BRITAIN, at 5.15.—Sir William Bragg: The Imperfect Crystallisation of Common Things (4).
- INSTITUTION OF PETROLEUM TECHNOLOGISTS (at Royal Society of Arts), at 5.30.—Dr. W. R. Ormandy, E. C. Craven, Prof. I. M. Heilbron, and H. J. Channon: A Contribution to the Study of the Origin of Petroleum. The Berginisation of Fish Liver Oils and Other Bodies.
- INSTITUTION OF CIVIL ENGINEERS, at 6.—G. E. Elson: The Remodelling of Charing Cross and Cannon Street Stations.
- INSTITUTE OF MARINE ENGINEERS, at 6.30.—Presidential Address.