Contemporary Birthdays.

July 25, 1848. The Earl of Balfour, K.G., O.M., F.R.S.

July 26, 1872. Prof. Joseph Barcroft, C.B.E., F.R.S.

July 27, 1857. Sir E. Wallis Budge, D.Litt. (Oxon.).

July 27, 1857. Dr. John William Evans, F.R.S.

July 28, 1843. Sir W. T. Thiselton-Dyer, K.C.M.G.

July 28, 1844. Sir Howard Grubb, F.R.S.

The EARL OF BALFOUR, Chancellor of the University of Cambridge, and also of the University of Edinburgh, was born in Scotland. He was educated at Eton and Trinity College, Cambridge. Always deeply interested in the advancement of science, he is a past-president of the British Association, and has, at two separate periods, served on the council of the Royal Society.

Prof. JOSEPH BARCROFT was educated at Bootham School, York, and King's College, Cambridge. He succeeded the late Prof. J. N. Langley as professor of physiology in the University of Cambridge, and is also Fullerian professor of physiology in the Royal Institution. His researches on the respiratory function of the blood and its relation to the activity of the tissues form but one department of many physiological inquiries. He has explored the conditions of life at high altitudes with persistency and acumen, undertaking the leadership of two expeditions for that purpose, one to Monte Rosa, and another to the High Andes. Prof. Barcroft was awarded a Royal medal by the Royal Society in 1922.

Sir WALLIS BUDGE, Oriental scholar, formerly keeper of Egyptian and Assyrian antiquities in the British Museum, is a graduate of Christ's College, Cambridge. He has conducted excavations at Assuan, Nineveh, in the Sudan, and elsewhere.

Dr. JOHN W. EVANS, lately president of the Geological Society of London, was educated at University College School. He has rendered much service to geological science by initiating, extending, and guiding the conduct of geological investigations in the colonies and dependencies of the British Empire. In western and southern India and in South America he has led official exploring expeditions. The Geological Society recognised the high value of his work by awarding him, in 1922, its Murchison medal. Dr. Evans is the author of a useful pamphlet of 20 pp. issued by the Colonial Office in 1914, on " Directions for the Collection of Geological Specimens."

Sir W. T. THISELTON-DYER, who was born at Westminster, attended King's College School, graduating afterwards at Christ Church, Oxford. In 1875 he became assistant director of the Royal Botanic Gardens, Kew, and he was director from 1885 until 1905. The "Flora Capensis," recently completed, and the "Flora of Tropical Africa," which will run to eleven or twelve volumes, will always be associated with his many years at Kew, where he also started the *Kew Bulletin*. He has contributed notably to the economic and systematic botany of the British Empire.

Sir HOWARD GRUBB, to whom our hearty congratulations are extended on the occasion of his eighty-second birthday, was educated privately and at Trinity College, Dublin. The practical outcome of his skill and labours in the production of objectives and instruments of precision is known wherever there are observatories. Early this year Sir Howard was the recipient of a congratulatory address signed by the leading astronomers and astrophysicists of Great Britain, referring to his resourcefulness and ingenuity in the development of the instrumental equipment of astronomers through more than sixty years.

Societies and Academies.

LONDON.

Optical Society, June 24.—M. von **Rohr**: Joseph Fraunhofer and the development of optical instruments. The position of high-grade optical work at the beginning of the nineteenth century was discussed. The chief cause of the transference from England to Germany of supremacy in telescope construction at that time was the appreciation in the latter country of the importance of fundamental research to the industry. The developments which took place in Munich and later at Benediktbeurn due to Fraunhofer's activities were detailed and some of the more important instruments produced under his direction were described.—T. **Smith**: (1) Reflection as a special case of refraction. Some difficulties which arise in applying the formulæ for refraction to reflection, and particularly the sign conventions which should be adopted for reflection, were discussed. (2) On the light transmitted and reflected by a pile of plates. The properties of a series of media or of a pile of plates which absorb and scatter light, and the interfaces of which may also absorb and scatter as well as transmit and reflect light, were investigated. In general, the ratio of the transmissive factors of a pile of plates in the two directions is independent of all reflective properties of the surfaces, and the factors are equal if the individual transmissive and absorptive factors are the same for the two beams. The ratios of the light transmitted without reflection to the total light transmitted are equal in both directions. The reflective properties of the pile depend upon all the factors of the system, and the ratio of the two reflective factors is not independent of the order in which the plates are placed. In non-absorbing systems, the sum of the intensities of the reflected and transmitted beams is equal to the intensity of the incident beam, and the ratio of the intensity of the reflected to that of the transmitted beam is equal to the sum of the corresponding ratios for the component plates or surfaces of the pile. Such a pile forms an exception to the rule that the reflective coefficients depend on the order in which the plates are arranged.—D. S. **Perfect**: Note on the immutability of transmissive factors with reversal of light. Direct experimental evidence has been obtained that the transmissive factor of the surface separating two media is unaltered if the direction in which the light travels is reversed.

DUBLIN.

Royal Dublin Society, June 22.—P. A. **Murphy**: The downy mildew of onions (*Peronospora Schleideni*), with particular reference to the hibernation of the parasite.—W. R. G. **Atkins** and H. H. **Poole**: Photoelectric measurements of illumination in relation to plant distribution (Part 1). Measurements of the illumination in shaded and open sites have been made by means of two photo-electric photometers and an apparatus already described, the readings being nearly simultaneous. The ratio of the illumination at a shaded site to the illumination due to diffused light in the open forms a useful index for comparing different sites. This ratio is conveniently expressed as a percentage which is called the daylight factor. It is usually found with both the photometers horizontal (so as to measure the vertical illumination), but a useful value near the edge of a wood is that found by tilting the photometer so as to receive the maximum illumination. There is a marked correlation between the flora and the daylight factors of the sites examined.—J. **Reilly** and G. T. **Pyne**: Studies in peat (Part 1). The thermal decomposition of peat under reduced pressure. Distillations of dried peat

were carried out under atmospheric and reduced pressures, and at both low and moderately high temperatures. The vacuum distillations gave larger yields of tar, of the heavier acidic substances, and of paraffin, while those at atmospheric pressure gave larger yields of simpler products such as ammonia, methyl alcohol, acetic acid, and gases. This points to a type of decomposition under low pressure favouring the formation of the more complex intermediate products.—J. **Reilly** and Miss H. E. **Bastible** : The velocity of formation of 3 - 5 - dimethylpyrazole - 4 - diazonium chloride. The rate of reaction between nitrous acid and the amine was retarded by working in $N/$100,000 solutions. Owing to the great stability of 3 - 5 - dimethylpyrazole-diazonium salts, measurements were possible up to comparatively high temperatures. The reaction is bimolecular, and at 0° C., K = 0·022, the value increasing regularly with rise of temperature. At 72° C., K = 5·8, more than 90 per cent. of the nitrous acid being destroyed in two minutes. In a control experiment without the base, less than 1 per cent. of the acid was destroyed in two minutes at 100° C.

PARIS.

Academy of Sciences, June 14.—E. **Goursat** : A problem of the theory of surfaces.—Marcel **Brillouin** : The centre of gravity and moments of inertia of the oceans. The mean action of the earth on the ocean.—Charles **Moureu**, Charles **Dufraisse**, and Paul Marshall **Dean** : A coloured hydrocarbon : rubrene. The substituted phenylacetylene, $(C_6H_5)_2CCl . C : C . C_6H_5$, has been proved to be very unstable, owing to the mobility of the atom of chlorine. If this compound is heated alone in a vacuum, hydrogen chloride is evolved, and from the residue a new hydrocarbon (rubrene) can be extracted, distinguished by its fine orange red colour, high melting point (331° C.), and sparing solubility in ordinary solvents. It combines with four atoms of bromine giving derivatives remarkable for their stability at high temperatures, one melting at 460° C. and another at 500° C., both without decomposition.—A. **Blondel** and A. **Dargenton** : Apparent brilliance of the face of exit of an optical system with any number of thick lenses.—Léon **Guillet** : The cementation of copper and its alloys by aluminium. As cementing agent an aluminium copper alloy (aluminium 20 per cent.) was used, the powdered alloy being mixed with 5 per cent. of ammonium chloride. Details of the results of experiments with various alloys are given, including the depth of penetration, hardness of the surface, and microscopic structure of the surface.—Charles **Nicolle** and Charles **Anderson** : Recurrent fever transmitted both by Ornithodorus and by lice. Sadi de Buen has recently announced the existence in Spain of a special type of recurrent fever, not transmitted by lice, but by *Ornithodorus marocanus*. These experiments were made on rats, but the author now proves that if monkeys are substituted for rats, the Spanish recurrent fever can be transmitted both by lice and by Ornithodorus.—N. E. **Nörlund** was elected corresponding member for the Section of Geometry in succession to the late Cl. Guichard.—Bertrand **Gambier** : Voss-Guichard surfaces.—Gaston **Julia** : Correction to the note on the polynomials of Tchebichef. Admitting priority to D. Jackson and G. Polya.—E. **Lainé** : Equations of the form $s = f(x, y, z, p, q)$ which are of the first class.—Jacques **Risler** : The formation of luminescent helium tubes. Details of the methods of purifying the helium and cleaning the tubes from foreign gases.—D. K. **Yovanovitch** and Mlle. A. **Dorabialska** : A new method for measuring the absorption of the β- and γ-radiation of radioactive bodies. The usual method consists in measuring the ionisation produced by the

energy remaining in the rays after traversing several layers of material : the method now proposed is to measure calorimetrically the energy retained by the material itself in the form of heat.—**Frilley** : Absorption of the penetrating radiation of actinium in equilibrium with its derivatives.—René **Dubrisay** : Researches on surface actions. Solutions of various dyes (methylene blue, congo red, methyl orange, etc.) were shaken with absorbent materials (sand, kieselguhr, asbestos, cotton) and the quantity of dye adsorbed measured colorimetrically. The addition of an electrolyte, sodium chloride, increased the amount adsorbed in every case.—P. **Mondain-Monval** : The thermal properties of the various varieties of selenium. The heat of transformation of vitreous selenium into metallic selenium at 130° C. was found to be 13·5 cal. per gm., and that of red crystallised selenium at 150° C. into metallic selenium, 2·2 cal. per gm.—A. **Kirrmann** and H. **Volkringer** : The absorption in the ultra-violet of two isomers. The substances compared were the two bromoheptenes, $C_5H_{11} - CH = CHBr$ and $C_5H_{11} - CBr = CH_2$.—L. **Barthe** and E. **Dufilho** : The estimation of sodium : applications. A modification of the method of Blanchetière suitable for material containing organic matter or phosphates. The sodium is precipitated as the triple acetate of uranium, magnesium, and sodium.—B. **Bogitch** : The removal of iron from copper and nickel matte.—Charles **Prévost** : The two stereoisomeric α-ethylene-γ-glycols.—P. **Russo** : The presence of three transported beds in the southern Rif.—Pierre **Termier** : Remarks on the preceding communication.—**Pouget** and **Chouchak** : The radioactivity and chemical composition of the mineral waters of Hammam des Ouled Ali.—Ignace **Puig** : The large electromagnetic disturbances of the four first months of 1926 according to the records of the Observatory of Ebro, Tortosa, Spain.—André **Dauphiné** : New experiments on the vascular relations between the leaf and the root.—B. P. G. **Hochreutiner** : A new genus, intermediate between the Malvaceæ, the Bombacaceæ and the Sterculiaceæ.—L. **Blaringhem** : The production of double flowers as a result of complex crossings between divergent species of Geums (Rosaceæ).—G. **Mouriquand**, M. **Bernheim**, and Mlle. **Theobalt** : The antirachitic power of Wood's light. The radiations corresponding to Wood's light possess a protective action against the development of experimental rickets.—R. **Legendre** : The presence of two sea birds in the stomach of *Lophius piscatorius*.—R. **Courrier** : The quantitative action of the follicular hormone.—Em. **Perrot** and Al. **Rouhier** : *Yocco*, a new drug containing caffeine. The bark of the stem of a plant known as Yocco grown in Colombia, especially in the Putumayo and Caqueta regions, is used as a stimulant by the natives. The bark contains about 2·7 per cent. of a crystalline substance presenting all the characters and reactions of caffeine.

ROME.

Royal Academy of the Lincei, May 16.—O. M. **Corbino** : Perot and Fabry fringes obtained with a half-silvered doubly refracting plate.—Federico **Sacco** : The tunnel at Drink (Valle d' Aosta). A representation is given of the stratigraphic metamorphic crystalline series traversed by the tunnel at Drink.—Angelo **Tonolo** : Equations for the conformable representability of a three-dimensional variety of Euclidean space.—Alessandro **Terracini** : The geometrical signification of the projective normal.—G. **Horn-D' Arturo** : The theory of flying shadows. The recent suggestions of Armellini and Ronchi with regard to the origin of flying shadows during solar eclipse are refuted, the author re-asserting his view that the light

intervals of these shadows represent real images of the solar crescent.—Giorgio **Abetti** : The structure of the *Hα* line of the chromosphere.—Filippo **Burzio** : Some new properties of ballistic precession.—E. **Persico** : Magnetic rotatory polarisation in an alternating field.—Ubaldo **Barbieri** : Astronomical determination of latitude and azimuth made at Cape Noli in 1911.—Ramiro **Fabiani** : First results of new investigations in the Permian outcrops in the Sosio basin (Palermo).—Enoch **Peserico** : The manner in which the electrical conductivity of the submaxillary gland is modified during its functional activity (ii.).—Giulio **Savastano** : Non-productivity of the pistachio in Sicily. Faulty fertilisation due to lack of pollen, rather than adverse climatic conditions or ovular abortion, is the principal cause of non-productivity.—P. **Pasquini** : Ineffective closing of the blastopore and subsequent development of the segmented ovum of *Rana esculenta* subjected to rapid centrifugation.—Constantino **Gorino** : The microflora of the Italian silo.

Washington, D.C.

National Academy of Sciences (Proc. Vol. 12, No. 5, May).—L. H. **Adams** and R. E. **Gibson** : The compressibilities of dunite and of basalt glass and their bearing on the composition of the earth. Direct measurements were made of the cubic compressibilities in the pressure range 2000 to 12,000 megabars (1 megabar = 1·0197 kgm./cm.^{2} = 0·987 atmos.). Assuming change of compressibility with pressure is a function of the compressibility, the compressibilities of dunite are $0·84 \times 10^{-6}$ and $0·79 \times 10^{-6}$ reciprocal megabars at 2000 and 10,000 megabars pressure respectively. The velocities of longitudinal waves at these pressures would be 7·9 km./sec. and 8·2 km./sec. Seismological data indicate that the velocity for longitudinal waves at 60 km. depth increases suddenly from 5·9 km./sec. to about 8 km./sec. The average compressibility of basalt glass was $1·45 \times 10^{-6}$ for the above pressure range, giving a velocity for longitudinal waves of 6·4$_5$ km./sec. The results suggest the existence below 60 km. of ultra-basic rock.—Edwin B. **Frost**, Storrs B. **Barrett** and Otto **Struve**. Radial velocities of 368 helium stars. Of these stars, 158 are spectroscopic binaries the periods of revolution of which are mostly only a few days. Using 350 stars, those brighter than mag. 2 have an average residual velocity of 6 km./sec., while for those fainter than mag. 5·3 it is 12 km./sec. The remainder have intermediate velocities.—George E. **Hale** : Visual observations of the solar atmosphere. The spectrohelioscope is of value for detecting exceptional phenomena quickly, while observations can readily be made with light of different wave-lengths. The chromosphere, prominences, spots, and faculæ can be investigated, and the instrument affords a means of searching for solar magnetic and electric phenomena. In the laboratory it should prove of service in the study of arcs, sparks, and other light sources with lines of various types.—William C. **Bray** and Hal D. **Draper** : Capillary condensation and adsorption. Sorption isotherms have been found for water vapour on partially hydrated oxides of copper and manganese, and mixtures of them in the form of porous granules. There is a rapid increase of sorption at higher pressures due to condensation of liquid in the capillaries. This occurs only when the surface, covered with a monomolecular layer by adsorption, is sufficiently curved.—Cecil D. **Murray** : The physiological principle of minimum work. (ii.) Oxygen exchange in the capillaries. The principle of minimum work can be applied to the circulation in the arterial system and in the capillaries. The general conclusion is that a minimum principle holds in physiology ; the internal environ-ment is in a state of mobile equilibrium, its components settling down to a new equilibrium with new con-straints.—Cesar **Uribe** : Nuclear division in the trophozoites of *Endamœba histolytica*. Stained preparations were made of the intestine of a cat experimentally infected. A consecutive series of stages of nuclear division in trophozoites is described. Cloudy material forming two polar masses and an " axial band " in which the spindle is embedded appear to arise from the karyosome. The polar masses are surmounted by two clear cones with a centriole at the apex of each. The number of daughter chromosomes is estimated as six.—D. L. **Hopkins** : The effect of hydrogen-ion concentration on locomotion and other life-processes in *Amœba proteus*. Optimum conditions for growth and reproduction of Amœbæ from both acid and alkaline solutions occur at about *p*H 6·7 and *p*H 7·6. Locomotion, measured by sketching a pseudopodium with a camera lucida at minute intervals, shows similar optimum points. A neutral solution seems to cause a marked change in permeability, leading to decreased movement and vitality.—A. F. **Blakeslee** and J. L. **Cartledge** : Pollen abortion in chromosomal types of Datura. The size and condition of the pollen is an indication of the chromosomal group to which a plant belongs.—Edward **Condon** : Remarks on penetrating radiation. (*a*) Assuming that an electron is a sphere of negative electricity of uniform density and that a proton is a point charge, it is calculated that the ' neutron ' can execute simple harmonic motion with a frequency of the same order as that of Millikan's penetrating radiation. (*b*) Using a corrected absorption law to accord with the geometrical conditions of Millikan's experiment, the results suggest that the radiation observed is truly homogeneous. There are difficulties in accepting the ' neutron ' postulated.—Edwin H. **Hall** : New evidence in favour of a dual theory of metallic conduction. This theory gives an explanation of the Peltier development of heat observed by Bridgman, where an electric current changes direction within a metal crystal.—R. de L. **Kronig** : (1) The magnetic moment of the electron. (See Nature, April 17, p. 550.) (2) A theorem of space quantisation.—E. O. **Salant** : On the heat capacity of non-polar solid compounds. Taking Born's theory of the heat capacities of crystalline solids and assuming a mean vibration in all directions for the molecule, terms are obtained expressing the contributions to heat capacity by (*a*) molecular vibrations, (*b*) bond frequencies (determined by characteristic bond frequencies in the infra-red), and (*c*) vibrations of the atoms across their bonds.—Robert S. **Mulliken** : Systematic relations between electronic structure and band-spectrum structure in diatomic molecules (iii.). Molecule formation and molecular structure.—Richard C. **Tolman** and Sinclair **Smith** : On the nature of light. G. N. Lewis has suggested that an atom never emits a quantum of radiation except to another atom, the possibility of transmission being determined by the laws of interference. His crucial experiment of arranging a mirror on a pivot in order to detect the effect of reflexion of quanta from one half only, those from the other half being forbidden by interference laws, is considered inadequate. The suggestion is made that a radiation field contains both waves and light quanta, the latter carrying energy and the former providing a signalling system. When and where both wave and quantum theory permit, the action of light occurs.—Einar **Hille** : On Laguerre's series (iii.).—Tracy Yerkes **Thomas** : On conformal geometry.—R. L. **Moore** : Concerning indecomposable continua and continua which contain no subsets that separate the plane.