

Contemporary Birthdays.

- April 1, 1874. The Rt. Rev. E. W. Barnes, F.R.S., Bishop of Birmingham.
 April 2, 1853. Prof. P. Phillips Bedson.
 April 3, 1846. Dr. B. Daydon Jackson.
 April 4, 1852. Prof. Arthur P. Coleman, F.R.S.
 April 5, 1849. Prof. George Forbes, F.R.S.
 April 5, 1865. Sir John Bretland Farmer, F.R.S.
 April 6, 1864. Sir William Bate Hardy, F.R.S.
 April 8, 1859. Mr. George William Lamplugh, F.R.S.
 April 8, 1861. Prof. J. R. Ainsworth-Davis.

Dr. BARNES, Bishop of Birmingham, was educated at King Edward's Grammar School, Birmingham, and Trinity College, Cambridge. Wrangler and second Smith's prizeman, he was ordained in 1902, becoming in the same year an assistant tutor at Trinity in mathematics; afterwards (1908-15) he was tutor. From 1915 until 1919 Dr. Barnes was Master of the Temple.

Dr. BEDSON, emeritus professor of chemistry in Durham College of Science, was educated at Fairfield School, Manchester, at the Grammar School there, and at Owens College. He also studied at the University of Bonn.

Dr. DAYDON JACKSON is a Londoner. General Secretary of the Linnean Society since 1902, he is perhaps best known to botanists through his close association with the preparation and issue of the *Index Kewensis*. He is responsible for many useful works for botanical students, notably "A Guide to the Literature of Botany" (1881); and "A Glossary of Botanic Terms" (1916).

Dr. COLEMAN, emeritus professor of geology in the University of Toronto, was educated at the Victoria University, Cobourg, Canada, and at the University of Breslau. At the former he was (1881-90) professor of geology and natural history. He was geologist to the Bureau of Mines of Ontario, 1893-1909, accomplishing highly important work. Murchison medallist of the Geological Society of London, he has added largely to knowledge of the history of the stratified systems and of the igneous rocks of Canada. Dr. Coleman was president of Section C (Geology) of the British Association at the Sheffield meeting (1910).

Prof. GEORGE FORBES was educated at the Universities of St. Andrews and Cambridge. He is a Chevalier of the Legion of Honour of France. Some-time professor of natural philosophy in Anderson's College, Glasgow, he afterwards devoted himself to electrical projects. Prof. Forbes was electrical engineer for the first series of installations at Niagara Falls, 1891-95.

Sir JOHN FARMER, professor of botany in the Imperial College of Science and Technology, graduated at Magdalen College, Oxford. He is a member of the Advisory Council of the Department of Scientific and Industrial Research. In 1919 he received a Royal medal from the Royal Society for his researches in the cytology and anatomy of plants.

Sir WILLIAM HARDY was born at Erdington. He received his education at Framlingham College and Gonville and Caius College, Cambridge. After some years' service, he retired last year from office as one of the secretaries of the Royal Society.

Mr. LAMPLUGH was born at Driffeld, East Yorkshire. He joined the Geological Survey of Great Britain in 1901, becoming Assistant Director, 1914-20. He is a past president of the Geological Society.

Societies and Academies.

LONDON.

Royal Society, March 25.—E. B. Verney: The secretion of pituitrin in mammals, as shown by perfusion of the isolated kidney of the dog. When the head and neck of a dog are switched into perfusion-parallel with the isolated kidney, the blood picks up during its passage through the head and neck a substance or substances which inhibit the polyuria of the isolated kidney, augment the urinary chloride output perceptually, or sometimes absolutely, and diminish the renal blood flow. This result is still obtained after previous exposure of the pituitary body. It does not occur as the result of perfusing the pelvis and lower limbs in parallel with the kidney. Previous removal of the pituitary body abolishes the reaction. An antidiuretic, chloride-augmenting, and vasoconstrictor principle or principles are contributed by the pituitary body to blood during its passage through the head of a dog.—H. W. Florey and H. M. Carleton: Rouget cells and their function. Capillaries in cat's mesentery have been studied by a method which enables blood-vessels to be selectively stained by intra-arterial injection of fixative and stain. Morphologically definable Rouget cells cannot be identified. *In vivo*, capillaries reacted to mechanical stimuli and particularly to the action of histamine and pituitrin. While capillaries are capable of actively expanding and contracting, their motor activities reside, not in Rouget cells, but in the endothelial elements.—R. M. Sargent: The relation between oxygen requirement and speed in running. A modification is described of the usual method of determining energy expenditure during running. The subject does not wear a mouth-piece, or carry a Douglas bag, and the exercise can take place under natural conditions. The results show actual energy expenditure and that involved in 'start' and in 'pull-up.' For the subject of these experiments to run 120 yards in 13 seconds necessitated an energy expenditure equivalent to an oxygen requirement of 29 litres per minute, or to 13.7 horse-power. There is extreme energy cost for rapid and vigorous exercise of short duration. An approximate means of allowing for energy utilised in 'start' and in 'pull-up' is adopted. Then the general relation between speed in running and oxygen requirement is: Oxygen requirement per 120 yards increases about as the 2.8th power of speed. Oxygen requirement per minute increases approximately as the 3.8th power of speed. The calculated optimum performances agree well with those actually recorded (or estimated) by the subject, over the range 300 yards to 2 miles.—Seana King: Oogenesis in *Oniscus Asellus*.—J. L. Synge: On the geometry of dynamics. The representation of configurations by points of multi-dimensional Riemannian space has been used hitherto to discuss certain aspects only of classical dynamical theory. In the present paper, tensor notation is used throughout, and to the advantages of this notation the novel results are due. Parallel discussions are given corresponding to two line-elements—the 'kinematical' line-element, $ds^2 = 2Tdt^2 + a_{mn}dq^m dq^n$, and the 'action' line-element, $ds^2 = 2(h - V)Tdt^2 + (h - V)a_{mn}dq^m dq^n$. The laws of motion are discussed, leading to a generalisation of Bonnet's theorem on particle orbits and a geometrical elucidation of the Principle of Least Curvature. A completely determinate form of the Lagrangian equations for non-holonomic systems is developed. Necessary and sufficient conditions are obtained for the admissibility of $(N-1)$ ignorable co-ordinates in a system with N degrees of freedom. From an invariant geometrical definition of stability

three special types of particular dynamical importance are selected. A new definition of steady motion is given. The system of normals to a curve, originally defined by Blaschke, plays a fundamental part.—P. E. Shaw and C. S. Jex: Tribo-electricity and friction.—H. G. de Laszlo: The absorption-spectra of some naphthalene derivatives in vapour and solution. The ultra-violet absorption spectra of mono-derivatives of naphthalene containing the groups CH_3 , Cl, Br, OH, COOH , CN, and NH_2 , were measured in vapour and in hexane solution. The β -isomer spectra are more like that of naphthalene than the α spectra. All were shifted towards the red when compared with naphthalene by an amount which is of the same order in the case of naphthalene and benzene derivatives containing the same group. The solution spectra are always shifted towards the red when compared with the vapour. This shift varies with the group, suggesting a modified "Stark effect" when the dipolar molecules are in the strong electric field of the solvent. The bands of most of the bodies examined have been ranged in simple series. These periodicities, representing the atomic oscillations, are all smaller than that of the parent body and appear again in the infra-red.—O. Maass and W. H. Barnes: Some thermal constants of solid and liquid carbon dioxide.—R. H. Fowler and D. R. Hartree: An interpretation of the spectrum of ionised oxygen (O II). The terms of the O II spectrum deduced from the observed lines by A. Fowler are correlated with theoretical terms expected on the theory of complex spectra developed by Heisenberg and Hund. The general agreement is satisfactory. No lines involving the deepest-lying terms have yet been identified, but from consideration of the O I spectrum it appears likely that the normal term of the O II spectrum is a quartet S term.—G. C. Simpson: On lightning. The conducting channel of a lightning flash originates in the region of maximum electric field and develops only in the direction of the seat of negative electricity. A negatively charged cloud can only be discharged by a discharge originating in a positively charged cloud, or in the induced positive charge on the earth's surface. A positively charged cloud may be discharged by discharges starting in the cloud and terminating either in the surrounding air or on the earth's surface. If a lightning flash is branched, the branches are always directed towards the seat of negative electricity. The application of these conclusions to 442 photographs of lightning discharges reveals the fact that the majority of lower clouds from which discharges proceed are positively charged.

Geological Society, February 19.—J. W. Evans: Regions of compression (Anniversary address). The characteristic structures of regions of compression—folding, thrust-faulting and slaty cleavage—are, as a rule, the result of horizontal forces ultimately to be attributed to the contraction of the earth's interior as it cools. It has been doubted whether, with the energy released by radioactive elements, the earth cools at all. The whole of that energy, however, is not converted into heat; much must be employed in effecting physical, chemical, or atomic changes in the surrounding rock. Jeffreys shows that the contraction on cooling of the crystallised rocks is more than enough to account for the folding of existing mountains. But there are many folds of ancient mountains, now worn down, which would require still more contraction. This may have occurred in the following ways: (1) the contraction of uncrystallised magma retaining the volatile constituents is greater than that of crystallised rocks; (2) the contraction on crystallisation is equal to that on a big fall of temperature; (3) contraction

may take place on changes of crystal-structure, chemical composition, or even atomic nature; (4) it will result from the loss of volatile constituents; and (5) it must follow on the increase of pressure in the earth's interior due to the slowing down of its rotation. On the other hand, the extent of the crust may be locally increased in periods of tension by (1) infilling of rifts by igneous intrusions, and (2) slip-faulting; and also by hydration of rocks. Compression and folding may also result (1) from change in the earth's form on diminished rotation; (2) from change in the position of the crust relatively to (a) the poles and equator, (b) the maximum of gravitational force. In illustration of the process of folding, two examples are described: (1) the 'Hercynian,' or 'Armorican,' folding of the south-western peninsula of England and south Wales; and (2) the Wealden folding between the Thames Valley and the 'Massif Central' of France.

Physical Society, February 26.—J. E. Calthrop: The effects of torsion upon the thermal and electrical conductivities of aluminium, with special reference to single crystals. An attempt has been made to find the changes produced by torsion in the conductivities of single aluminium crystals, and of the annealed and hard aluminium wires from which the crystals are prepared. The hard wire gave a decrease of a few parts in a thousand in the thermal conductivity, but no change greater than one part in 1000 has been found in crystal wires. The decreases in the electrical conductivities, of the order of a few parts in 10,000, appear to be almost the same for all specimens.—T. H. Harrison: A study of the concurrent variations in the thermionic and photo-electric emission from platinum and tungsten with the state of the surfaces of these metals. The thermionic and photo-electric work functions for the same specimens of tungsten and platinum depend greatly on the previous heat treatment of the material. For platinum the curves showing the dependence of photo-electric sensibility on the wave-length of the irradiation are of four different types, while as regards thermionic properties the specimens can take up either a 'large-emission' or a 'small-emission' state, according to their treatment. The photo-electric work function of platinum appears to be greater than the thermionic, but no definite results were obtained for tungsten. The photo-electric curves obtained for both metals extended asymptotically towards zero emission in the direction of increasing wave-length. The irregularities in behaviour are attributed to the state of the surface of the specimens.

Royal Statistical Society, March 16.—Major P. G. Edge: The growth of mortality due to motor vehicles in England and Wales, 1904-23. In 1904 171 deaths caused by motor traffic were recorded in England and Wales; by 1923 this figure had grown to 2414. During the period 1904-23, while the mortality rate due to all causes had diminished by more than 11 per cent., the mortality caused by motor traffic had increased by approximately 1000 per cent. In London the figures for 1904 and 1925 were 24 and 595 respectively. The general mortality rate in London was 30 per cent. lower in 1923 than in 1904, while motor fatalities increased by more than 2000 per cent. Motor-vans are responsible for more than their share of fatal accidents. Driving licences should only be issued after a serious test of proficiency, and vehicles should be compulsorily insured. Lack of road sense and responsibility are more frequent factors of accidents among commercial vehicles than among owner-drivers.