

Biblioteka Główna i OINT  
Politechniki Wrocławskiej



100100161467

A 610 II  
~~mm~~



NATURE, FEBRUARY 2, 1935

# Nature

A WEEKLY

## JOURNAL OF SCIENCE

VOLUME CXXXIV

JULY, 1934, to DECEMBER, 1934

*"To the solid ground  
Of nature trusts the Mind that builds for aye."*—WORDSWORTH.



1934.293.  
London

MACMILLAN AND CO., LIMITED  
NEW YORK: THE MACMILLAN COMPANY



JOURNAL OF SCIENCE

VOLUME CXXIX

DECEMBER 1931



MACMILLAN AND CO. LIMITED  
NEW YORK THE MACMILLAN COMPANY

## INDEX

## NAME INDEX

- Abderhalden (Prof.), and Heyns, Structure of Proteins, 296  
 Abe (S.), [G. Yamaha and], Iso-Electric points of Bacterial Suspensions, 328  
 Abetti (G.), Height of the Chromosphere in 1933 and Course of the Solar Cycle, 391; Variability of the Period of Rotation of the Sun, 823  
 Achard (C.), A. Boutaric and J. Bouchard, Action of Sera on the Fluorescent Power of Solutions of Uranine, 946  
 Acqua (C.), I Grandi Problemi della Biologia Generale (Review), 236  
 Adair (Dr. M. E.), elected a John Lucas Walker student in Cambridge University, 1018  
 Adamczewski (I.), Mobility of the Ions in Dielectric Liquids, 299  
 Adams (Dr. F. D.), Origin and Nature of Ore Deposits: an Historical Study (Review), 988  
 Adams (Dr. G. S.), Map Projections, 68  
 Adams (Sir John), [death], 524  
 Adams (Prof. L. A.), An Introduction to the Vertebrates (Review), 614  
 Addison (Prof. H.), A Text Book of Applied Hydraulics (Review), 441  
 Adel (Dr. A.), and Dr. V. M. Slipher, The Atmospheres of the Giant Planets, 148  
 Adrian (Prof. E. D.), awarded a Royal Medal of the Royal Society, 727; presented with a Royal Medal of the Royal Society; work of, 906; and B. H. C. Matthews, Electrical Changes in the Cerebral Cortex, 901  
 Adzhemjan (Z.), [K. M. Gorbunova and], Electrocrystallisation of Metals (4), 191  
 Agamennone (G.), Hourly Frequency of Italian Earthquakes, 711  
 Agello (Warrant-Officer F.), Air-Speed Record, 660  
 Agostini (L.), [M. Pauthenier and], Law of Charge of a Spherical Particle in an Ionised Field, 787  
 Agrell (S. O.), awarded the Wiltshire prize of Cambridge University, 37  
 Agruss (M. S.), [Dr. A. V. Grosse and], Fermi's Element, 93, 773  
 Aitken (Dr. R. S.), appointed reader in Medicine in the British Postgraduate Medical School, 745  
 Aiyar (Prof. R. Gopala), Development of *Salmacis bicolor*, Agassiz, 899  
 Albert (Prof. A. L.), Electrical Communication (Review), 619  
 Albrecht (Dr. S.), Accurate Wave-lengths in Stellar Spectra, 704  
 Aldrich (Prof. J. M.), [death], 171  
 Alexander (J.), Andrew Crosse: Electrical Pioneer, 105  
 Algar (J.), and K. J. Hanway, Synthesis of Diflavones, 262  
 Alichanian (A. J.), [A. J. Alichanow, B. S. Dželepov and], Limits of the Energy Spectra of Positrons and Electrons from Artificial Radio-elements, 254  
 Alichanow (A. J.), A. J. Alichanow and B. S. Dželepov, Limits of the Energy Spectra of Positrons and Electrons from Artificial Radio-elements, 254  
 Allan (W.), [A. P. G. Michelmores and], Phases of the Red-winged Locust, 30  
 Allard (G.), A General Method of Statistics applicable to Indiscernible Particles, 470  
 Allard (Mme. Simonne), Magnetic Properties of a Free Radical, Xanthyl- $\alpha$ -Naphthylmethyl, 982  
 Allen (Dr. B. M.), Sir Robert Morant, a Great Public Servant (Review), 954  
 Allen (C. E.), A Diploid Female Gametophyte of *Sphaerocarpos*, 263  
 Allen (E. T.), Neglected Factors in the Development of Thermal Springs, 547  
 Allen (H. A.), [obituary article], 562  
 Allibone (Dr. T. E.), and Dr. B. F. J. Schonland, Development of the Spark Discharge, 736  
 Allison (Dr. F. E.), Importance of Carbohydrate Supply in Legume Symbiosis, 144  
 Allmand (Prof. A. J.), Photochemical Reactions (Bedson Lecture), 693  
 Alsberg (Dr. P.), Man or Ape?, 702  
 Amal, Ltd., New Modified Bunsen Burner, 844  
 Amiel (J.), Preparation and Explosion Temperature of some Complex Compounds of Copper Nitrate, Perchlorate and Chlorate with Ethylenediamine, 390  
 Amiot (R.), Adsorption by Carbon of Binary Mixtures in Aqueous Solution, 710  
 Anderson (B. W.), and C. J. Payne, Specific Gravity of Lapis Lazuli, 627  
 Anderson (Sir G.), Education in India in 1927-32, 297  
 Anderson (J. C.), appointed a lecturer in Applied Anatomy and demonstrator in Anatomy in Sheffield University, 1018  
 Andersson (Dr. J. Gunnar), translated by Dr. E. Classen, Children of the Yellow Earth: Studies in Prehistoric China (Review), 121  
 Andrade (Prof. E. N. da C.), A Theory of the Viscosity of Liquids, 32; The New Elementary Particles, 345; and Prof. J. Huxley, Simple Science (Review), 896; and J. G. Martindale, Crystallisation of Metals from Sparse Assemblages, 321  
 Angell (Sir Norman), and others, edited by L. Woolf, The Intelligent Man's Way to Prevent War (Review), 683  
 Angus (W. R.), and A. H. Leckie, Raman Spectrum of Nitrosylsulphuric Acid, 572  
 Antoniani (C.), New Method of Preparing Xylose from Maize Cobs, 507  
 Appanna (M.), [C. Dover and], Insects and Spike-Disease of Sandal, 424  
 Appleton (Dr. A. B.), appointed professor of Anatomy at St. Thomas's Hospital Medical School, 113  
 Appleton (Prof. E. V.), elected president of the Union Radio Scientifique Internationale, 502; and F. W. Chapman, The Lightning Flash as Source of an Atmospheric, 968, 974  
 Appleyard (E. T. S.), N. Thompson and S. E. Williams, Situation of the  $A(2\Sigma)$  Level in the Nitrogen Molecule, 322  
 Aravamuthan (T. G.), [M. D. Raghavan and], Iron Age Site, Kilpauk, Madras, 939  
 Archibald (Prof. R. C.), Outline of the History of Mathematics. Second edition, 902  
 Arkadiew (W.), Diffraction of Electric Waves Chemically Recorded, 863

- Arkell (W. J.), [Dr. K. S. Sandford and], Paleolithic Man and the Nile Valley in Nubia and Upper Egypt, 165
- Armellini (G.), Horizontal Diameter of the Sun in 1931, 1932, and 1933, 299
- Armstrong (Prof. H. E.), Infant Self-Help, 291; The Agony of Knowledge (*Review*), 195; Beginnings of Finsbury and the Central, 807
- Armstrong (L.), Palaeolithic Caves in Derbyshire, 464
- Årnäck-Christie-Linde (Augusta), Northern and Arctic Tunicata, 903
- Asahina and Ishidate, Inversion of *d*-Camphor, 745
- Ashbaugh (Prof.), Citizenship as an Objective of University Education, 429
- Ashbridge (N.), appointed a fellow of King's College, London, 1018; Droitwich Broadcasting Station, 412
- Ashmore (S. E.), Splashing of Rain, 38
- Asinger (F.), Migration of Bromine during the Side-chain Chlorination of Bromotoluenes, 155
- Asratjan (E.), Effect of a Simultaneous Cutting of both Jugular Sympathetic Nerves upon Food Conditioned Reflexes in Dogs, 192
- Astapowitsch (I. S.), Air Waves caused by the Fall of the Meteorite on June 30, 1908, in Central Siberia, 38
- Aston (Dr. F. W.), Constitution of Carbon, Nickel and Cadmium, 178; Elements and Isotopes, 731
- Atkins (Dr. W. R. G.), [Dr. H. H. Poole and], Measurement of the Current Generated by a Rectifier Photoelectric Cell, 810
- van Aubel (R.), [C. S. Hitchen and], Composition and Age of Crystalline Uraninite from Katanga, 982
- Auclair (J.), [L. Binet, M. Laudat and], Lowering of the Alkaline Reserve and the Movement of the Chlorine in the Blood in the course of Hyperthermia produced by Short Waves, 506
- Audrieth (L. F.), and M. T. Schmidt, Fused 'onium' salts as Acids (1), 335
- Audus (L. J.), appointed Frank Smart university student in Botany in Cambridge University, 672
- Augener (H.), Annelids from the Dutch East Indies, 816
- Austin (Sir Herbert), Research in the Automobile Industry, 657
- Austin (P.), Liverpool and the Atlantic Ferry, 20
- Austin and Humoller, Synthesis of the Aldohexoses, 32
- Ayyar (Prof. P. Ramaswami), Steric Hindrance and Geometrical Isomerism, 535
- Baade (W.), and F. Zwicky, Super-novæ; Cosmic Rays from Super-novæ, 472
- Babcock (E. B.), Genetic Evolutionary Processes, 911
- Babkin (Prof. B. P.), Modes of Stimulation of the Gastric Secretion, 1005, 1011
- Bacharach (A. L.), Progressive Biochemistry (*Review*), 162
- Bachofen (A.), Occurrence of *Megaceros* in Historical Time, 547
- Badger (R. M.), and R. C. Barton, Ultra-violet Absorption Spectrum of Carbon Suboxide Gas, 263
- Bagchi (Dr. S. C.), Asymptotic Developments of Periodic Functions related to Periodical Physical Phenomena, 216; Difficulty of Long-Wave Transmission in Summer, 701
- Bailey (C. H.), Mechanisation in Industry, 999
- Bailey (G. L.), [R. Genders and], The Casting of Brass Ingots (*Review*), 556
- Bailey (J. L.), Prof. R. Pearl, and C. P. Winsor, Variation in American Fresh-water Gastropods, 67
- Baillaud (B.), [death], 91; [obituary article], 279
- Baily (Prof. F. G.), Pit-Head Generation of Electric Power, 776; Sources of Cheap Electric Power, 369; 445; 558
- Baird and Tatlock (London), Ltd., "New Empire" Analytical Balance, 376
- Baker (E. C. Stuart), The Nidification of Birds of the Indian Empire. Vol. 3 (*Review*), 684
- Baker (Prof. H. F.), Principles of Geometry. Vol. 6: Introduction to the Theory of Algebraic Surfaces and Higher Loci (*Review*), 437
- Baker (Dr. J. R.), Cytological Technique (*Review*), 477; Measurement of Ultra-violet Light, 139
- Baldwin (Prof. J. M.), [death of], 802; [obituary article], 840
- Baldwin-Wiseman (W. R.), Cartographic Study of Drought, 38; Rainfall Records and Drought Periodicity, 656
- Ball (S. C.), Hybrid Ducks, 902
- Bally (Dr. W.), Coffee in 1931 and 1932: Economic and Technical Aspects, 1013
- Baly (Prof. E. C. C.), Kinetics of Photosynthesis, 933, 938
- Bancroft (Dr. Helen), Classification of British Elms, 501
- Bancroft (W. D.), and J. E. Rutzler, Jr., Reversible Coagulation in Living Tissue (12), 911
- Bandel (Dr. R.), Alcoholism and Male Mortality, 352
- Banks (Dr. T. E.), [A. Brasch, F. Lange, A. Waly, T. A. Chalmers, Dr. L. Szilard, Prof. F. L. Hopwood and], Liberation of Neutrons from Beryllium by X-Rays: Radioactivity induced by means of Electron Tubes, 880, 901
- Bannerman (D. A.), The Birds of Tropical West Africa: with Special Reference to those of the Gambia, Sierra Leone, the Gold Coast and Nigeria. Vol. 3 (*Review*), 9
- Bannister (F. A.), Crystal Structure and Optical Properties of Matlockite (PbFCl), 114; Crystal-Structure of Bismuth Oxyhalides, 856; [A. C. Skerl and], Lusakite, a Cobalt-bearing Silicate from Northern Rhodesia, 114
- Barbier (D.), Reality of the Correlation Observed between the Eccentricities and Periods of Double Stars, 946
- Barcroft (Prof. J.), elected president of the Cambridge Philosophical Society, 808; Experiments on Man (Stephen Paget memorial lecture), 456; Features in the Architecture of Physiological Function (*Review*), 340
- Bardhan (Dr. J. C.), Synthesis in the Estrin Group, 217
- Barfield (R. H.), Spaced-Aerial Direction-Finders, 1014
- Bargeton (D.), [L. Binet and], Action of the Lung on Aminoacids, 1019
- Barnard (E.), appointed director of Food Investigation in the Department of Scientific and Industrial Research, 97
- Barnard (K. H.), Second Occurrence of the Whale-Shark (*Rhineodon typus*), in South Africa, 66; The Lobster *Enoplometopus occidentalis*, Randall, in South Africa, 665
- Barnard (Prof. W. N.), Prof. F. O. Ellenwood, and Dr. C. Hirshfeld, Elements of Heat-Power Engineering. Parts 2 and 3 (*Review*), 620
- Barnes (T. C.), Alleged Stimulation of Moulds by Paraffin in Heavy Water, 573
- Baron (S.), Nest Mortality of Birds, 384
- Baroni (A.), Alloys of Lithium and Cadmium, 471
- Barrell [Sears and], The Imperial Standard Yard, 147
- Barrer (R. M.), elected a Denman Baynes student in Chemistry at Clare College, Cambridge, 152
- Bartlett (R. J.), Sleep and Hypnosis, 980
- Barton (Dr. A. W.), A Text Book on Heat (*Review*), 8
- Barton (R. C.), [R. M. Badger and], Ultra-violet Absorption Spectrum of Carbon Suboxide Gas, 263
- Bartram (E. B.), Polynesian Mosses, 329
- Basset (J.), Influence of Pressure on the Electrical Resistance of a Rod of Impure Zirconium Oxide in Air, 298; Preparation of Crystallised Carbon under very High Pressure, 334; Synthesis of Ammonia under very High Pressures, above 1,000 kgm./cm.<sup>2</sup>, 390; and M. Dodé, Direct Oxidation of Iodine and Iodides at Ultra-pressures, 747
- Bast (T. H.), and others. Edited by C. G. Hartman and W. L. Straus, Jr., The Anatomy of the Rhesus Monkey (*Macaca mulatta*) (*Review*), 47
- Bastings (L.), Central Core of the Earth, 257; Shear Waves through the Earth's Core, 216
- Bate (Dorothea M. A.), Discovery of a Fossil Elephant in Palestine, 219
- Bateman (J. H.), Highway Engineering: a Text Book for Students of Civil Engineering. Second edition (*Review*), 754
- Bates (Dr. L. F.), Gyromagnetic Measurements and their Significance, 50
- Batson (S.), [G. H. Henderson, L. G. Turnbull and], Quantitative Study of Pleochroic Haloes, 576

- Batey (J. T.), presidential address to the North-East Coast Institution of Engineers and Shipbuilders, 656
- Batten (H. M.), Our Garden Birds: their Food, Habits and Appearances (*Review*), 893
- Baughan (E. C.), Mechanism of the Liesegang Phenomenon, 778
- Beals (C. S.), Spectra of Wolf Rayet Stars and Novæ, 147
- Beams (Dr. H. W.), J. A. Mulyil, and Prof. J. B. Gatenby), Use of the Ultra-Centrifuge for Studying the Golgi Apparatus, 810
- Beans (H. T.), [A. Dingwall and], Occurrence of Chromium and Molybdenum in Carcinoma of the Human Breast, 711
- Beard (T. H.), 'Dry Ice' in the Machine Shop, 853
- Beaugé (L.), [E. le Danois and], Relief of the Edge of the Continental Plateau to the West of the Entrance to the English Channel, 638
- Beauverie (J.), Causes of the Individual Resistance of Cells of Micro-organisms of the same species Submitted to the Action of the Ultra-violet Rays, 863
- Beaven (Dr. E. S.), Culture of Barley for Brewing (Horace Brown memorial lecture), 292
- Beck (H. C.), Early Grass, 384
- Becker (Prof. R.), Neubearbeitung des Werkes von M. Abraham. Theorie der Elektrizität. Band 1 u. 2 (*Review*), 84
- Becker & Co. (F. E.), Catalogue of Chemical Apparatus, etc., 320
- Becquerel (J.), W. J. de Haas and J. van den Handel, Paramagnetic Rotatory Power of Siderose, 154
- Bedford (R. and W. R.), New Species of Archæocyathinae from the Lower Cambrian of Beltana, 107
- Bedson (Dr. S. P.), appointed Goldsmith's Company's professor of Bacteriology at London Hospital Medical School, 113
- Beebe (Dr. W.), Life-History of *Idiacanthus fasciola*, 815
- Beevers (C. A.), and H. Lipson, Crystal Structure of the Alums, 327
- Belgians (King of the), acceptance of nomination as an honorary member of the Iron and Steel Institute, 415
- Bell (V. A.), Function and Operation of Junior Instruction Centres, 72
- Belling (Tsai), [A. Cotton and], Magnetic Double Refraction of Oxygen and Nitrogen in the Gaseous State and of Aqueous Solutions of Chlorates, 115
- Belopolsky (Dr. A.), [death], 926
- Benedict (F. G.), and H. F. Root, Potentialities of Extreme Old Age, 548
- Benham (C. M.), and P. H. Spagnoletti, British Empire Broadcasting, 57
- Bennett (W. E.), elected to a Dominion and Colonial Exhibition at Trinity College, Cambridge, 224
- Benson (H. K.), and A. M. Partansky, Rate and Extent of Anaerobic Decomposition of Sulphite Waste Liquor by Bacteria of Sea-water Mud, 984
- Bentham (George), (1800-84), 351
- Berg (L. S.), *Culter recurviceps*, Rich. (Pisces, Cyprinidæ), 507
- Berg (Dr. W. F.), Mechanical Twinning in Bismuth Crystals, 143
- Bergius (Dr. F.), presented with the Melchett Medal of the Institute of Fuel, 770
- Bergstrom (E. M.), [A. S. Valentine and], Hydro-electric Development in Great Britain, 1016
- Berkeley (Dr. G. H.), and Miss Isabel Lauder-Thomson, Root Rots of Strawberry in Britain, 856
- Berkeley (G. S.), Traffic and Trunking Principles in Automatic Telephony (*Review*), 344
- Berlage, Jr. (H. P.), Origin of the Solar System, 668
- Berliner (Dr. A.), Suggested Use of Red Filters for Improving Vision, 1000
- Berlingozzi (S.), Method of Preparing Aromatic Nitroketones, 299
- Bernal (J. D.), and Miss D. Crowfoot, Use of the Centrifuge in Determining the Density of Small Crystals, 809
- Bernays (P.), and P. Hertz, Axioms of Archimedes and of Cantor, 674
- Berry (E. W.), Miocene Patagonia, 472
- Berthier (Mlle. Paulette), Influence of the Surface Tension on the Velocity of Ascent of Aqueous Solutions through Porous Bodies, 1019
- Bertrand (G.), and R. C. Bhattacharjee, Combined Action of Zinc and Vitamins in the Nutrition of Animals, 75
- Berzelius (Jöns Jacob), Autobiographical Notes. Translated by Prof. O. Larsell (*Review*), 892
- Besson (L.), Influence of Temperature and Season on Mortality, 155
- Besterman (T.), and O. Gatty, Tests of the Medium Rudi Schneider, 965
- Bethe (Dr. H. A.), [Prof. A. H. Compton and], Composition of Cosmic Rays, 734
- Betts (D.), [R. Grierson and], Electrical Warming of Large Buildings, 908
- Beutel (E.), and A. Kutzelnigg, Keratin (1), the Lead Sulphide Reaction, 155
- Bezssonoff (N.), [P. Rohmer, Miss Ursula Sanders and], Synthesis of Vitamin C by the Infant, 142
- Bewley (Dr. W. F.), and others, Researches on Greenhouse Plants, 388
- Bhabha (H. J.), elected an Isaac Newton student of Cambridge University, 821; Passage of Very Fast Protons through Matter, 934
- Bhargava (P. N.), [Prof. N. R. Dhar and], Chemical Reactivity and Absorption of Light, 848, 854
- Bhaskaran (T. R.), and others, Effect of Cane Molasses on Swamp Soil, 976
- Bhattacharjee (R. C.), [G. Bertrand and], Combined Action of Zinc and Vitamins in the Nutrition of Animals, 75
- Bickersteth (Dr. M. E.), Bilingual Problem in Education, 779
- Bigelow (Prof. Harriet W.), [death], 171
- Bijvoet (Dr. J. M.), and Miss C. H. MacGillavry, The Crystal Structure of  $Hg(NH_3)_2Cl_2$ , 849
- Billy (M.), and M. A. Foex, Mineral Precipitation in Glasses, 299
- Binder (O.), Action of Aqueous Solutions of Copper Sulphate on Cupric Oxide, 227
- Binet (L.), and D. Bargeton, Action of the Lung on Aminoacids, 1019; M. Laudat, and J. Auclair, Lowering of the Alkaline Reserve and the Movement of the Chlorine in the Blood in the Course of Hyperthermia Produced by Short Waves, 506
- Bini (G.), Characteristic Nitrogen Groupings in the Muscular Tissue of *Mullus barbatus*, L., 40
- Birch (T. W.), and Dr. W. J. Dann, Glutathione and Vitamin C in the Crystalline Lens, 383
- Birge (Prof. R. T.), The Velocity of Light, 771
- Bispham (J. W.), Functions of the Technical School, 819
- Biswas (K.), Pollen carried by Dust Storms, 492
- Bittles (S. G.), awarded the Silvanus Thompson scholarship of the Institution of Electrical Engineers, 189
- Bjerge (T.), and C. H. Westcott, Radioactivity Induced by Bombardment with Neutrons of Different Energies, 177; 286
- Black (M.), elected a fellow of Trinity College, Cambridge, 637
- Black (T. C.), [C. W. A. Scott and], awarded the £10,000 prize in the England-Melbourne Air Race, and the British Silver Medal of the Royal Aeronautical Society, 728
- Blackburn (Dr. Kathleen B.), Wasting Disease of *Zostera marina*, 738
- Blackett (Prof. P. M. S.), Automatic Wilson Chamber for Cosmic Rays, 742
- Blacklock (Prof. D. B.), appointed professor of Tropical Hygiene in Liverpool University, 113; Sanitation of Rural Areas in the Tropics (Bradshaw lecture), 696
- Blackman (Dr. A. R.), appointed Brunner professor of Egyptology in Liverpool University, 113
- Blavi (A.), The Need for Social Research, 898
- Blakeslee (A. F.), [E. W. Sinnott, Helen Houghtaling and], Comparative Anatomy of Extra-Chromosomal Types in *Datura stramonium*, 708; and others, Genetics of *Datura*, 667
- Blaringham (L.), Temperature of Flowers, 582

- Blau (Marietta), and Hertha Wambacher, Photographic Desensitisers and Oxygen, 538; Physical and Chemical Investigations on the Photographic Detection of H-Rays, 392
- Bledisloe (Lord), address at the Opening of the Waitaki Hydro-electric Power Station, 876; Agriculture in New Zealand, 455; Grassland: the Main Source of the Nation's True Wealth, 907; Industry in New Zealand, 694; New Zealand's Timber: a Great National Asset, 1015; Science and the World's Economic and Social Problems, 59; Some Reflections on the Economic Crisis, 92; The Proper Function and Scope of a National Art Gallery and Museum, 17
- Bleksley (A. E. H.), Relation between Temperature and Radius in the Cepheid variables, 661
- Bligh (N. M.), Studies in Heat (*Review*), 8
- Blondel (A.), Utilisation of Yellow Glasses in the Technique of Lighthouses or Aviation Beacons, 822
- Böck (F.), G. Lock, and K. Schmidt, Perkin's Synthesis of Cinnamic Acid, 392
- Bodansky (Prof. M.), Introduction to Physiological Chemistry. Third edition (*Review*), 647
- Boddam-Whetham (R. E.), A Garden in the Veld (*Review*), 309
- Bodroux (D.), and R. Rivault, Some Attempts to photograph the Television Emissions from London and a Local Station on Short Waves, 430
- Boestad (G.), [Prof. The Svedberg, Inga-Britta Eriksson-Quensel and], Possibility of Sedimentation Measurements in Intense Centrifugal Fields, 98
- Bogitch (B.), Some Properties of Silver Silicate, 116
- Bohn (Prof. G.), Leçons de zoologie et biologie générale (3): Les invertébrés (Coelentérés et vers), (*Review*), 721
- Bohr (Prof. N.), elected president of the International Union of Pure and Applied Physics, 560
- Bolliger (A.), Volumetric Micro-determination of Ortho-nitrophenols with Methylene Blue, 747; Volumetric Micro-determination of Perchlorates with Methylene Blue and Picric Acid, 76
- Bolton (Dr. H.), Fossil Insect from the British Coal Measures, 183
- Bolton (Dr. J. S.), appointed Lumleian lecturer of the Royal College of Physicians of London, 176
- Bolton (Mrs.), gift to Leeds University, 152
- Bond (C. J.), Inheritance of Habits, 28
- Bone (Prof. W. A.), Utilisation of Coal (Watt Anniversary lecture), 212
- Bonner (J.), Growth Hormone of Plants (5), 548
- Bonnet (R.), Neuro-muscular Action of Amides and Cyanic Derivatives, 75
- Booth (R. G.), and Dr. S. K. Kon, Effect of Light on the Reducing Substance (Vitamin C ?) in Milk, 536
- Bootsgezel (Eng.-Lieut. J. J.), A famous Dutch Pumping Engine, 766
- Boots Pure Drug Co., Ltd., Insulin-Boots, 249; Medical products of, 567
- Bordier, Measurement of the Lucimetric Index of a given place by a Helio-chronometer, 39
- Borinski (Dr. L.), elected a research student at Trinity College, Cambridge, 224
- Borodin (A. P.), centenary of the birth of, 727
- Borsook (H.), and G. Keighley, Protein Metabolism in Man, 263
- Bortolotti (E.), Vitali's Calculus and its Extensions (1), 711
- Borthwick (Prof. A. W.), Some Aspects of Forest Biology, 372
- Bosch (G. H.), [death], 691
- Bose (Prof. S. R.), Sexuality of *Polyporus ostreiformis* and *Polystictus hirsutus*, 146
- Bossuet (R.), Alkaline Metals in Natural Waters, 334
- Boswell (Prof. P. G. H.), on the Mineralogy of Sedimentary Rocks: A Series of Essays and a Bibliography (*Review*), 615
- Bottani (E.), [L. Lombardi and], Distribution of the Continuous Current in a Homogeneous Conductor Subjected to the Influence of a Permanent Magnetic Field (2), 823
- Bottomley (W. T.), E. W. Corlett, and F. Piercy, awarded the Engineering gold medal of the North-East Coast Institution of Engineers and Shipbuilders, 415
- Bouchard (J.), [C. Achard, A. Boutaric and], Action of Sera on the Fluorescent Power of Solutions of Uranine, 946
- Boulanger (Mlle. J.), [E. Chauvenet and], Combinations of Zirconyl Iodide and the Alkaline Iodides, 638
- Boulton (Prof. W. S.), Inland Water Survey, 777; Underground Water Supply, 652
- Bourne (G.), Unique Structure in the Adrenal of the Female Opossum, 664
- Boutaric (A.), [C. Achard, J. Bouchard and], Action of Sera on the Fluorescent Power of Solutions of Uranine, 946
- Bowden (Dr. F. P.), [A. J. P. Martin, T. Moore, Marion Schmidt and], Absorption Spectrum of Vitamin E, 214
- Bowden (Dr. R. C.), appointed Superintendent of the Royal Gunpowder Factory, Waltham Abbey, 60
- Bowman (I.), Geography in Relation to the Social Sciences (*Review*), 894
- Boys (Dr. C. V.), Collecting Spilled Mercury, 29
- Bracher (Dr. R.), Field Studies in Ecology (*Review*), 955
- Braddick (Dr. H. J. J.), [Prof. R. W. Ditchburn and], Absorption of Light in Gases, 935, 938
- Bradfield (Dr. A. E.), Velocity of Reactions in Solution, 421
- Bradford (Dr. S. C.), review of Catalogue of the Scientific and Technical Periodicals in the Libraries of Australia. Supplement 1928-1933, 400
- Bradshaw (E.), awarded the Swan Memorial Scholarship of the Institution of Electrical Engineers, 189
- Bradshaw (F.), Gulls destroy Grasshoppers, 566
- Bragg (Sir William), Structure of the Azide Group, 138; X-rays and the Coarse Structure of Materials (Mackenzie Davidson memorial lecture), 942
- Bragg (Prof. W. L.), Exploration of the Mineral World by X-Rays, 401; Structure of Alloys (Bakerian lecture), 38; The Crystalline State. Edited by Sir William Bragg and Prof. W. L. Bragg. Vol. I: A General Survey (*Review*), 303
- Brasch (A.), F. Lange and A. Waly; Dr. T. E. Banks, T. A. Chalmers, Dr. L. Szilard and Prof. F. L. Hopwood, Liberation of Neutrons from Beryllium by X-Rays: Radioactivity induced by means of Electron Tubes, 880, 901
- Braun (A. D.), Lipolysis as a Source of Mitogenetic Radiation, 536
- Breasted (Prof. J. H.), The Oriental Institute [Chicago University], 78
- Brech (F.), [F. Twyman and], X-Irradiation of Fused Silica, 180
- Breder, Jr. (C. M.), Atlantic Synentognathi, 779; Reproductive Habits and Life History of the Cichlid Fish, *Aequidens latifrons* (Steindachner), 939
- von Brehmer (Dr. W.), Causation of Cancer, 411
- Breton (J.), [P. Laffitte and], Detonation Limits of Some Gaseous Mixtures, 334
- Breuer (G.), [E. Jusa and], Influence of the position of the Mercapto or Methylmercapto Group on the colour of the Monosubstituted  $\alpha$ -Naphtholazo dyes, 156
- Breuil (Abbé, H.), awarded the Petrie medal of London University, 861; Rock Engravings in Central South Africa (*Review*), 679
- Brewer (A. K.), Effect of Oxygen on Photoelectric Emissivity of Silver, 857
- Brezina (E.), [W. Schmidt and], Action of Air-suction Arrangements in Works, 392
- Bricout (P.), and R. Salomon, Use of the Cathode Ray Oscillograph for the Study of the Magnetisation of Ferromagnetic Substances, 582
- Bridges (Dr. C. B.), Chromosomes in the Salivary Glands of Fruit-fly Larvæ, 839
- Bridgman (Prof. P. W.), The Thermodynamics of Electrical Phenomena in Metals (*Review*), 619
- Brightman (R.), Prevention of War (*Review*), 683; Science and Everyday Life (*Review*), 889; Some Problems of Industrial Recruitment and Leadership, 860



- Briggs (Prof. H.), Evolution of Coal and Oil, 385; Graphical Classification of Carbonaceous Minerals: the Mineral Oils; Products of the Natural Development of Coal and Oil, 115
- Brimble (L. J. F.), Everyday Botany (*Review*), 918
- Brindley (G. W.), and F. W. Spiers, Effect of Dispersion and of Lattice Distortion on the Atomic Scattering Factor of Copper for X-Rays, 850, 854
- Brinkman (H.), [L. S. Ornstein and], Arc Discharge, 501
- British Drug Houses, Ltd., B.D.H. Injections for Perieral Medication, 530; Radiostol, Radiostoleum and Radio-Malt, 137
- Brittain (W. H.), and Dorothy E. Newton, Pollen Constancy of Bees, 31
- Britton (Dr. N. L.), [death], 60; [obituary article], 131
- Britton (S. C.), Ancient Indian Iron, 238; 277
- Brockway (L. O.), [L. Pauling and], Structure of the Carboxyl Group (1), 547
- Brodie (J. A.), [death], 998
- de Broglie (Prof. L.), L'Électron magnétique (théorie de Dirac) (*Review*), 757
- Bromley (N. V.), [V. N. Orechovitch and], Histolytic Properties of the Regenerating Blasteme, 507
- Brown (A. S.), [T. Shedlovsky and], Electrolytic Conductivity of Alkaline Earth Chlorides, 69
- Brown (Dr. B.), Dinosaur discovery in Wyoming, 492
- Brown (C. W.), and F. M. Henry, Central Nervous Mechanism for Emotional Responses (2), 472
- Brown (F.), J. M. A. de Bruyne, and P. Gross, Dipole Moments of Substituted Mesitylenes, 185
- Brown (H. H.), A Tectibranch Gasteropod Mollusc, *Philine aperta*, L., 226
- Brown (J. B.), and C. C. Sheldon, Unsaturated Acids in Animal Oils and Fats, 817
- Brown (Dr. N. E.), [obituary article], 961
- Brown (Dr. W.), Psychology and Psychotherapy. Third edition (*Review*), 269; Sleep and Hypnosis, 980
- Brown (Prof. W.), Mechanism of Disease Resistance in Plants, 903
- Browne (S. G.), awarded the Murchison scholarship of the Royal College of Physicians of London, 176
- Browning (Dr. H. Mary), and Dr. F. J. W. Whipple, Air Waves of Unknown Origin, 532
- Brumberg (E.), and S. Vavilov, Accuracy of the Photometric Method of Extinction, 1020
- Bruni (G.), and G. Natta, Structure of Guttapercha Studied by Electron Rays, 228; Structure of Unstretched Rubber Studied by Means of Electron Rays, 507; and M. Strada, New Methods for Separating Heavy Water H<sub>2</sub>O from Ordinary Water H<sub>2</sub>O, 471
- de Bruyne (J. M. A.), [F. Brown, P. Gross and], Dipole Moments of Substituted Mesitylenes, 185
- Bryant (W. L.), Fish Fauna of Beartooth Butte, Wyoming, 256
- Bryce (R. B.), awarded the Wrenbury scholarship of Cambridge University, 152
- Buchanan (Sir George), International Co-operation in Public Health (Milroy lectures), 491
- Buchanan-Wollaston (H. J.), Inshore Trawl Fisheries of Dorset and Devon, 296
- Buck (Dr. P.), (Te Rangi Hiroa), Social Grades in Mangaia, 779
- Budge (Sir E. A. Wallis), [death], 841
- Buffle (J.), [L. W. Collet and], Transportation of Alluvial Matter in Suspension in the Waters of the River Arve at Geneva, in 1933, 582
- Builder (G.), [A. L. Green and], Polarisation of Long Radio Waves, 257
- Bukasov (S. M.), Potatoes of South America, and their Breeding Possibilities, 540
- Buller (Prof. A. H. R.), Physiological Studies of Fungi, 291; Researches on Fungi. Vol. 5 (*Review*), 80
- Bulloch (Prof. W.), conferment upon, of the title of Emeritus Professor, 113
- Burchell (J. P. T.), [J. Reid Moir and], Classification of Stone Age Cultures, 526; Palæolithic Pottery, 766
- Burnham (T. H.), Special Steels. Second edition (*Review*), 513
- Burroughs Wellcome & Co., Commercial Insulin, 733
- Burrows (G. J.), Some Hydroxy Salts of Secondary and Tertiary Arsines, 983; and R. H. Parker, Some Tetra-covalent Platinum Compounds derived from Tertiary Arsines, 583
- Burrows (Dr. H.), Action of Oestrin on the Coagulating Glands and on Certain Vestigial Structures in the Mouse (*Mus musculus*), 570
- Burstall (Prof. F. W.), [death], 91; [obituary article], 243
- Burtenshaw (J. M. L.), appointed lecturer in Bacteriology in Birmingham University, 37
- Burton (M.), Australian Sponges, 31; Sponges from East Greenland, 385
- Bushnell, Jr. (D. I.), Tribal Migration East of the Mississippi, 30
- Butcher (R. W.), Distribution of *Zostera*, 68
- Butler (C. P.), and Prof. F. J. M. Stratton, Aluminium Coating of Gratings, 810
- Butler (Dr. J. A. V.), The Fundamentals of Chemical Thermodynamics. Part 2: Thermodynamical Functions and their Applications (*Review*), 615
- Butler (Dr. N. Murray), The Challenge to Education, 981; The Future of Governments, 694; The World needs another Alexander Hamilton, 602
- Butler (R. R.), Apprenticeship and the Irish Apprenticeship Act, 72
- Buxton (B. H.), and S. O. S. Dark, Cytogenetics of *Digitalis*, 424
- Byerly (Prof. P.), Texas Earthquake of August 16, 1931, 741
- Byett (J. D.), [E. Henney and], Modern Home Laundry-work (*Review*), 757
- Cabannes (J.), Luminescence of the Upper Layers of the Atmosphere, 946
- Caccioppoli, (R.), Elliptic Equations with Partial Derivatives, with *n* Independent Variables, 40
- Cadman (Sir John), appointed a member of the Advisory Council to the Committee of the Privy Council for Scientific and Industrial Research, 531; elected president of the Institution of Petroleum Technologists, 770
- Cahill (Sir Robert), Economic Conditions in France, 659
- Cairns (H.), [A. E. Muskett, E. M. Carrothers and], Fungus Flora of Ulster, 226; 856
- Calder (Mary G.), Kidston Collection of Fossil Plant Slides (5 and 6), 115
- Calder (R.), The Birth of the Future (*Review*), 195; The Conquest of Suffering (*Review*), 896
- Caldwell (W. I.), [Dr. K. Lark-Horovitz and], Structure of the Wood used in Violins, 23
- Calman (Dr. W. T.), *Uronectes fimbriatus*, a fossil crustacean, 145
- Cameron (Dr. A. E.), Life-history and Structure of *Hæmtopota pluvialis*, L. (Tabanidæ), 226; Life-history and structure of the 'Cleg', 903
- Cameron (Dr. J.), The Skeleton of British Neolithic Man: including a comparison with that of other prehistoric periods and more modern times (*Review*), 604
- Camichel (C.), E. Fischer and L. Escande, Use of Different Vertical and Horizontal Scales in Studies on Reduced Models in Hydraulics, 673
- Camis (M.), Vitamin content of certain African Cereals (1), 471
- Campbell (H. L.), [H. C. Sherman and], Growth from the Viewpoint of Statistical Interpretation, 711
- Campbell (J. A.), Whales and Caisson Disease, 629
- Campbell (Dr. N. R.), The Philosophy of Sir James Jeans, 571; and C. C. Paterson, the Photoelectric Cell, 526
- Canals (E.), and P. Peyrot, Fluorescence of some Pure Substances, 154
- Carbutt (Col.), Racial Problems in Africa: a Suggestion, 963
- Carington (W.), Trance Personalities, 187
- Carnegie Corporation of New York, offer of Grant to London University, 152
- Carpenter (Sir Harold), proposed election as president of the Iron and Steel Institute, 415

- Dale (Sir Henry), appointed Harveian orator of the Royal College of Physicians of London, 176
- Dallimore (W.), Preservation of Natural Woodlands, 694
- Dalton (Prof. J. P.), Social Insurance, 659
- Dangeard (Prof. P.), *Traité d'algologie: introduction à la biologie et à la systématique des algues (Review)*, 490
- Dankov (N.), and A. Kotchetkov, Limiting Dimensions for Particles of Catalysts, 583
- Dann (Dr. W. J.), [T. W. Birch and], Glutathione and Vitamin C in the Crystalline Lens, 383
- le Danois (E.), and L. Beaugé, Relief of the Edge of the Continental Plateau to the West of the Entrance to the English Channel, 638
- Danyusz (M.), J. Rotblat, Prof. L. Wertenstein, and M. Zyw, Experiments on the Fermi Effect, 970, 974
- Darbyshire (O.), Spectrometer Determination of the metrical thickness and dispersive power of a thin film; Application of the theory of the transmitting echelon to the explanation of Talbot's and Powell's Bands, 74
- Darbyshire (Prof. O. V.), [obituary article], 726
- Darby (Dr. G. E.), [Prof. R. R. Gates and], Blood-Groups of British Columbian Indians, 539
- Dark (S. O. S.), [B. H. Buxton and], Cytogenetics of *Digitalis*, 424
- Darling (Dr. F. F.), Speed of a Golden Eagle's Flight, 325
- Darnois (Prof. E.), Un Nouveau corps simple: le Deuterium ou Hydrogène Lourde, 56; and Yeu Ki Heng, Measurement of the Strength of Acids, 982
- Darnon (Mlle. M.), Hydration of two Phenylglycides, 227
- Das (Prof. B. K.), [M. Rahimullah and], the Alizarin-KOH method of staining Vertebrate Skeletons, 464
- Daure (Prof. P.), Introduction à l'étude de léffet Raman: ses applications chimiques (Review), 10
- Dauvillier (Dr. A.), The Polar Aurora, 631
- Davenport (Dr. C. B.), Genetics at Cold Spring Harbor, 328; Ontogeny and Phylogeny of Man's Appendages, 548
- David (Sir Edgeworth), [death], 350; [obituary article], 523
- David (Prof. W. T.), Spectra and Latent Energy in Flame Gases, 663; 848, 854
- Davidson (C. F.), Tertiary Geology of the Island of Raasay, Inner Hebrides, 862
- Davidson (D.), The Hidden Truth in Myth and Ritual and in the Common Culture Pattern of Ancient Metrology (Review), 956
- Davidson (Dr. J.), appointed officer-in-charge of the scientific laboratory of the Metropolitan Police College, Hendon, 808
- Davidson (J.), Monthly Precipitation-evaporation ratio in Australia, as determined by saturation deficit, 747
- Davidson (Prof. L. S. P.), and others, Physiology and Pathology of Blood, 705
- Davies (Dr. D. T.), appointed Bradshaw lecturer of the Royal College of Physicians of London, 176
- Davies (E. Salter), Education in Kent, 1928-1933, 260
- Davies (Lord), Force and the Future, 282; The Problem of the Twentieth Century: a study in International Relationships. New edition (Review), 10
- Davies (L. M.) and others, Geology of Inchkeith, 862
- Davies (R. D.), appointed demonstrator in Engineering in Cambridge University, 224
- Davis (A. C.), [E. B. Lambert and], Fermentation of Mushroom Hotbeds, 703
- Davis (J.), Resistance of Mice to Irradiation, 940
- Davison (Dr. C.), The Sanriku (Japan), Earthquake Seawaves of 1933, 820
- Davy (Dr. J. Burt), An Early Record of the Sycamore Maple in Britain, 61; The Sycamore Maple in A.D. 1300, 215
- Dawson (J.), appointed a demonstrator in Pathology in Manchester University, 709
- Dawson (Dr. S.), Psychology and Social Problems, 371; 517
- Day (W. R.), and T. R. Peace, Experimental Production and the Diagnosis of Frost Injury on Forest Trees, 293
- Deacon (A. B.), edited by Camilla H. Wedgwood, Malekula: a Vanishing People in the New Hebrides (Review), 396
- Debye (Prof. P.), Matter and its Architecture (Review), 303
- Decaux (B.), and J. B. Gallé, Fluctuations in the time of Propagation of Short Radio-Electric Waves, 262
- Deisenrot-Mysovskaja (M.), [I. Starik and], A Criticism of the Photographic Method as applied to the Investigation of the Colloidal State of Polonium, 191
- Dejdar (Dr. E.), The Freshwater Medusa, *Craspedacusta*, 630
- Déjardin (G.), and Mlle. R. Schwégler, Luminescence excited by Rolling Mercury in a Glass Bulb containing Impure Neon under Low Pressure, 982
- Delavault (R.), Mechanism of the Oxidation of Magnesium Alloys at a High Temperature, 117
- Delsal (J. L.), Polarimetric Study of Beryllium Tartrates, 190
- Delsarte (J.), Sur les  $ds^2$  d'Einstein à symétrie axiale, 501
- Delion (R.), [E. Vellinger and], Superficial Properties of Certain Colouring Matters, 191
- Delsman (Dr. H. C.), Fish Eggs and Larvæ from the Java Sea, 702
- Demerec (M.), Biological Action of Small Deficiencies of X-chromosome of *Drosophila melanogaster*, 548
- Denbigh (K. G.), and Prof. R. W. Whytlaw-Gray, Disulphur Decafluoride, 781
- Denigès (G.), A New Reaction of Cantharidine, 39
- Denizot (G.), Structure of the Canary Islands considered in Relation with the Problem of Atlantis, 471
- Dennell (R.), Feeding Mechanism of the Cumacean Crustacean, *Diastylis bradyi*, 226
- Denseen (N. E.), appointed a research fellow in the department of Glass Technology of Sheffield University, 821
- Deraniyagala (P. E. P.), Reduction of Carapace in Chelonians, 423
- Desch (Dr. C. H.), Chemistry of Solids (Review), 888; Texture and Chemical Resistance, 693
- Deslandres (Dr. H.), a Simple and General Relation of the Molecular Spectrum with the Electrons and Rings of Electrons of the Constituent Atoms, 190
- Desveaux (R.), [M. Lemoigne and], Origin of the Nitrogen Deficit in Aerobic Microbial Cultures, 471
- Devauz (H.), and J. Cayrel, Influence of Temperature on the Electrical Conductivity of Cupric Sulphide in Thin Layers, 946
- De Vito (G.), [E. Parisi and], Maturation of Cheese (1), 983
- Dhar (Prof. N. R.), Chemical Aspects of Carbon Assimilation, 331; Denitrification in Sunlight, 572; and P. N. Bhargava, Chemical Reactivity and Absorption of Light, 848, 854
- Dharmatti (S. S.), Anomalous Diamagnetism of Selenium, 497; and S. K. Mukherjee, Photosynthesis of Amino Acids *in Vitro*, 499
- Dickens (Dr. F.), Acceleration of Respiration of Normal and Tumour Tissue by Thionine (Lauth's Violet), 382
- Diéniert (F.), and F. Villemaine, Photo-Chemical Reactions, 982
- Di Legge (A.), Horizontal Diameter of the Sun at the Royal Observatory at Campidoglio during 1901-10, 639
- Dingle (Prof. H.), Astrophysics at the Royal College of Science: Tribute to Prof. A. Fowler, 634; The Way and the Truth (Review), 81
- Dingwall (A.), and H. T. Beans, Occurrence of Chromium and Molybdenum in Carcinoma of the Human Breast, 711
- Ditchburn (Prof. R. W.), and Dr. H. J. J. Braddick, Absorption of Light in Gases, 935, 938
- Dittmar (H.), New Gliding Record, 176
- Ditz (E.), [G. Mignonac and], Polymerisation of Acetylene under the Influence of Heat, 471
- Dixon (K. C.), elected a Harold Fry student at King's College, Cambridge, 224
- Dneprovsky (N.), Sunspot Number and the Refractivity of the Air, 853, 854
- Dobinski (S.), Viscosity of Liquid Phosphorus, 155
- Dobry (Mme. Alma), Osmotic Pressure of Polymerised Substances, 430

- Dobson (G. M. B.), [A. R. Meetham and], Vertical Distribution of Atmospheric Ozone in High Latitudes, 822
- Dobzhansky, and Schultz, Distribution of Sex-factors in the X-chromosome, 465
- Dockeray (N. R. C.), An Elementary Treatise on Pure Mathematics (*Review*), 720
- Dodé (M.), [J. Basset and], Direct Oxidation of Iodine and Iodides at Ultra-pressures, 747
- Dodero (M.), Preparation of Cerium Silicide and Lanthanum Silicide by Igneous Electrolysis, 638
- Dolan (N. E.), [T. J. Nolan, J. Keane, M. Cassidy and], Chemical Constituents of Lichens found in Ireland (1), 154
- Donen (I.), Studies in Deciduous Fruit, 638
- Donnan (Prof. F. G.), and E. A. Guggenheim, Activities of Life and the Second Law of Thermodynamics, 255
- Douglas (David), Centenary of the death of, 803
- Douglas (Vice-Admiral Sir Percy), The Government and Inland Water Supply, 219
- Douglas (Dr. A. V.), [Prof. J. S. Foster and], Analysis of Profiles of Helium Lines in Spectra of B Stars, 417
- Dover (C.), and M. Appanna, Insects and Spike-disease of Sandal, 424
- Dowsett (H. M.), Handbook of Technical Instruction for Wireless Telegraphists. Fifth edition (*Review*), 45
- Dragone-Testi (G.), Action of Certain Salts on the Germination of Embryos of Grain outside the Seeds, 983
- Drewitt (Dr. F. D.), The Life of Edward Jenner, M.D., F.R.S., Naturalist and Discoverer of Vaccination. Second edition (*Review*), 394
- Dreyer (Prof. G.), [death], 280; [obituary article], 690
- Driberg (J. H.), Engato the Lion Cub (*Review*), 755
- Drozdzhina (V.), [R. Jaanus and], State of the Cerium Atom inside the Metallic Lattice, 639
- Drummond (Dr. D. G.), Corrections to the Refractive Indices of Quartz in the Infra-Red, 937; Infra-Red Spectra of Silica, 739
- Drury (Dr. A. N.), elected a supernumerary fellow of Trinity Hall, Cambridge, 861
- Drysdale (Dr. C. V.), The Problem of Ether Drift, 796; 833
- Dubreuil (M. H.), and others, Experimental Method in Industrial Relations, 707
- Duchemin (E.), Magnetic Susceptibility of some Hydrates of Magnesium Sulphate and of some Salts of the Magnesium Series, 638
- Dückert (R.), [G. Gutzeit, R. Webel and], A New Specific Reaction for Antimony Cations, 507
- Dudley (Surg.-Capt.), Surg.-Capt. May, and Surg.-Comdr. O'Flynn, Active Immunization against Diphtheria, 220
- Duffendack (O. S.), and Dr. J. S. Owens, Quenching of Resonance Radiation, 817
- Duften (A. F.), Reproduction of Graphs, 528
- Dunbar (Prof. C. O.), [Prof. C. Schuchert and], A Text-book of Geology. Part 2: Historical Geology. Third edition (*Review*), 829.
- Duncan (D. R.), [G. H. Cheesman and], Oxygen Preparation from Sodium Peroxide, 971
- Dunn (Dr. J. T.), Growth of Chemical Industry, 92; Science and Industry: the Fertility of Ideas, 509
- Dunn (L. C.), A New Gene affecting Behaviour and Skeleton in the House Mouse, 335
- Dunne (J. W.), The Serial Universe, 729
- Dunwoody (R. B.), National Water Resources and the Need for a Comprehensive Survey, 172
- Dupouy (G.), and C. Haenny, New Method of Absolute Measurement of the Magnetisation Coefficients and the Magnetic Susceptibilities of Liquids, 822; Paramagnetic Properties of Cerous Salts in Solution, 863
- Durell (C. V.), and A. Robson, Elementary Calculus. 2 Vols. (*Review*), 616
- Durieux (C.), [C. Mathis, J. Laigret and], Three Thousand Vaccinations against Yellow Fever in French Western Africa, 787
- Dwyer (F. P.), and D. P. Mellor, X-Ray Diffraction Studies of the Crystallisation of Amorphous Silica, 76; X-Ray Study of Opals, 583
- Dymond (Prof. J. R.), the Functions of Museums, 18
- Dželepov (B. S.), [A. J. Alichanov, A. H. J. Alichanian and], Limits of the Energy Spectra of Positrons and Electrons from Artificial Radio-Elements, 254
- Dziewonski (K.), Simplified Method of Mercurisation and Degradation of the Polycarboxylic Aromatic Acids, 823
- Earl (J. C.), A. W. Mackney, Action of Nitrous Acids on Dimethylaniline (2), 76; (3), 747
- Earland (A.), Foraminifera, Part 2, South Georgia, 67
- Earle (Dr. K. W.), Dip and Strike Problems Mathematically Surveyed (*Review*), 684
- East (E. M.), Norms of Pollen-tube growth in Incompatible Matings of Self-sterile Plants, 335; Reaction of the Stigmatic Tissue against Pollen-tube Growth in Selfed Self-sterile Plants, 548
- Edmonds (J. M.), appointed geologist on the staff of the Geological Survey, Khartoum, 660
- Edmunds (F. H.), The Water Supply and Geology of the South-East of England, 186
- Edridge-Green (Dr. F. W.), The Theory of Colour-Vision, 777
- Edwards (A. B.), Tertiary Dykes and Volcanic Rocks of South Gippsland, Victoria, 583
- Edwards (E. E.), appointed adviser in Agricultural Zoology in University College, Cardiff, 545
- Egerton (A. C. G.), and F. Ll. Smith, Estimation of the Combustion Productions from the Cylinder of the Petrol Engine (1); F. Ll. Smith and A. R. Ubbelohde (2), and A. R. Ubbelohde (3), 786; and A. R. Ubbelohde, Spectra and Latent Energy in Flame Gases, 848, 854
- Ehrlich (J.), Bark Disease of Beech, 630
- Ekeley [Potratz and], Bibliography of Indium, 329
- Ekman (Carl Daniel), Memorial to, 655
- Elford (E. J.), [Dr. P. E. Spielmann and], Road Making and Administration (*Review*), 754
- Ellenwood (Prof. F. O.), [Prof. W. N. Barnard, Dr. C. F. Hirshfeld and], Elements of Heat Power Engineering. Parts 2 and 3 (*Review*), 620
- Elliott (Dr. K. A. C.), Effect of 2:6-Dichlorophenol-Indophenol on Tumour and Kidney Respiration, 254
- Elmhirst (R.), Enteropneusts in the Clyde Sea-Area, 183
- Elton (C.), Exploring the Animal World (*Review*), 271; The Ecology of Animals (*Review*), 271
- Elvehjem (Prof. C. A.), and C. J. Koehn, Jr., Non-Identity of Vitamin B<sub>2</sub> and Flavines, 1007
- Emde (Prof. F.), [Prof. E. Jahnke und], Funktionentafeln: mit Formeln und Kurven (Tables of Functions: with Formulae and Curves). Zweite Auflage (*Review*), 476
- Emerson (Dr. R.), and L. Green, Kinetics of Photosynthesis, 289
- Emory (K. P.), Petroglyphs in the Society Islands, 740; Tuamotuan Stone Structures, 292
- Engelstad (Prof. R. B.), and N. H. Moxnes, Possible Action of Cosmic Rays on Living Organisms, 898, 901
- Eriksson-Quensel (I. B.), [Prof. The Svedberg and], Molecular Weights of Red Blood Proteins, 577; Possibility of Sedimentation Measurements in Intense Centrifugal Fields, 98
- Erlenmeyer (Prof. H.), and H. Gärtner, Some Experiments on Heavy Water, 327; [E. J. McDougall, Prof. F. Verzár, H. Gaertner and], Heavy Water in the Animal Body, 1006, 1011
- Escande (L.), [C. Camichel, E. Fischer and], Use of Different Vertical and Horizontal Scales in Studies on Reduced Models in Hydraulics, 673
- Eskala (Prof. P. E.), elected a foreign correspondent of the Geological Society of London, 878
- \*Espinasse (P. G.), Membrana Granulosa of the Mouse, 182; Specific Action of Oestrin, 738
- Esselen (Dr. G. J.), Before Papyrus . . . Beyond Rayon, 283
- Estevão (Dr. C.), Dissemination of the Brazil Nut, 376
- Evans (Sir Arthur), Presentation to; work of, 962
- Evans (Everette I.), Glutathione and Vitamin C in the Crystalline Lens, 180

- Evans (G. C.), awarded the Frank Smart botany prize of Cambridge University, 37
- Evans (Miss Myfanwy), [Prof. R. C. McLean and], The Mañile Reaction and the Systematic Position of the Gnetales, 936, 938
- Evans (Sir Vincent), [obituary article], 873
- Eve (Prof. A. S.), and Prof. D. A. Keys, Applied Geophysics in the Search for Minerals. Second edition (*Review*), 618
- Fabry (Prof. C.), Vision in the Ultra-Violet, 736
- Fairbrother (Dr. F.), Determination of Dipole Moments in Solution, 458
- Fairbrother (Dr. R. W.), appointed lecturer in Bacteriology in Manchester University, 709
- Fajardo (Dr. T. G.), Plant Diseases in the Philippines, 107
- Fakidov (I.), Vibrations of the Ice-Cap of Polar Seas, 536
- Farcas (T.), [S. Procopiu and], the Curie Ferromagnetic Point for Thin Layers of Nickel, Electrolytically Deposited, 154
- Farkas (A.), L. Farkas and P. Harteck, Experiments with Heavy Hydrogen, 32; and L. Farkas, 857
- Farkas (L.), Heavy Hydrogen, 742; [A. Farkas, P. Harteck and], Experiments with Heavy Hydrogen, 32; [A. Farkas and], Experiments with Heavy Hydrogen, 857
- Farnham (G. S.), and H. O'Neill, Crystal Re-orientation of Cold Drawn Wires due to Re-heating, 632
- Farrington (A.), Glaciation of the Wicklow Mountains, 75
- Farrington (B.), Vesalius on China-root, 947
- Faterson (Mlle. A.), Re-emission in the Fluorescence of the Bands of Mercury Vapour, 299
- Faucounau (L.), Action of Ethylene Oxide on Acetylene Magnesium Compounds, 673
- Favia (N.), [V. Puntoni and], Loss of Virulence of the Tubercle Bacillus Resulting from Association with *Bacillus tuberculophilus*, 639
- Favorsky (A. E.), and Mme. T. I. Temnikowa, Reciprocal Transpositions of Methylbenzoylcarbinol and of Phenylacetyl-carbinol, 154
- Favrelle (M.), Spermatogenesis of the Phasmida, 741
- Fawcett (A. W.), appointed lecturer in Surgical Pathology in Sheffield University, 1018
- Fazal-ud-Din, and Sher Singh Mangat, A Modification of the Gas Circulating Pump, 104
- Fearon (Dr. W. R.), An Introduction to Biochemistry (*Review*), 273
- Fedorov (F.), I. Motchan, S. Roginskij, and A. Schechter, Synthesis of Ammonia by Collision between Positive Ions, 583
- Feibleman (J.), [J. W. Friend and], Science and the Spirit of Man: a New Ordering of Experience (*Review*), 233
- Ferchmin (A.), [A. Romanova and], Hyperfine Structure of the Green Krypton Line 5570, 191
- Ferguson (Dr. A.), conferment upon, of the title of assistant professor, 113; From Log Cabin to Royal Observatory, 520; Societies and Centenaries, 592
- Fermi (E.), E. Amaldi, O. D'Agostino, F. Rasetti and E. Segrè, Artificial Radioactivity produced by Neutron Bombardment, 668
- Fernau (Prof. A.), [death], 524
- de Ferranti (V. Z.), Interference with Radio Supply by Electric Lighting, 58
- Field (J. H.), Meteorology of India, 491
- Field (M. J.), 'Little People' of the Gold Coast, 1012
- Field (Prof. R. M.), The Principles of Historical Geography from the Regional Point of View (*Review*), 829
- Filipjev (I. N.), Classification of Nematodes, 220
- Filon (Prof. L. N. G.), Science Curricula in the Universities, 429
- Fimov (I. E.), Distribution of Organic Remains in the Roofing of Coal Measures of the Donetz Basin, 583
- Finch (Prof. G. I.), A. G. Quarrell and J. S. Roebuck, The Beilby Layer, 221
- Fincham (W. H. A.), Optics (*Review*), 989
- Findlay (W. M.), Experiments on Lawns, 576
- Firth (Dr. R. W.), appointed reader in Anthropology in the London School of Economics, 152
- Fischer (E.), [C. Camichel, L. Escande and], Use of Different Vertical and Horizontal Scales in Studies on Reduced Models in Hydraulics, 673
- Fischer (Prof. M. H.), and Marian O. Hooker, The Lyophilic Colloids (their theory and practice), (*Review*), 990
- Fishberg (Dr. M.), [obituary], 409
- Fisher (Dr. W. J.), [death], 691
- Fisk (Dorothy), Exploring the Upper Atmosphere (*Review*), 3
- Fitzgerald (O.), [J. M. O'Connor, M. Moriarty and], Physiological Basis of the Sensation of Cold, 910
- Fitzpatrick (H. M.), The Trees of Ireland, 624
- Flanzy (M.), Formation of Formaldehyde in the Oxidation of Ethyl Alcohol, 39; Presence of Methyl Alcohol in the Foliar Organs of Plants, 191
- Fleming (Sir Ambrose), Memories of a Scientific Life (*Review*), 881
- Fleming (A. P. M.), Methods of Recruitment and Training in a Large Centralised Industry, 819
- Flerov (K. K.), Geographical Distribution and Systematics of the Elk or Moose (*Alces*, Gray), 335
- Fletcher (C. M.), awarded the Michael Foster studentship of Cambridge University, 152
- Fletcher (G.), [obituary article], 597
- Flett (Sir John), Geology of the Orkneys, 976
- Fleure (Prof. H. J.), Prehistoric Elements in our Heritage, 855
- Flint (E. R.), elected professor of Clinical Surgery in Leeds University, 113
- Focke (A. B.), Segregation of Polonium in Bismuth Crystals, 977
- Foex (M. A.), [M. Billy and], Mineral Precipitations in Glasses, 299
- Foeyn (E.), [Mlle. Ellen Gleditsch and], Actinium-Uranium Ratio in Radioactive Minerals, 506
- Forde (Prof. C. D.), Habitat, Economy and Society: A Geographical Introduction to Ethnology (*Review*), 613
- Formozov (A.), Competition Between Species, 823
- Forsyth (Dr. D.), presidential address to the Psychiatry Section of the Royal Society of Medicine, 825
- Fosse (R.), P. E. Thomas, and P. de Graeve, Dextro-rotatory Allantoin, 154
- Foster (Prof. J. S.), and Dr. A. V. Douglas, Analysis of Profiles of Helium Lines in Spectra of B Stars, 417
- Foulkes (Major-Genl. C. H.), "Gas!": the Story of the Special Brigade (*Review*), 952
- Fowler (Prof. A.), retirement of; work of, 562
- Fowler (Dr. G. J.), An Introduction to the Biochemistry of Nitrogen Conservation (*Review*), 48
- Fowler (H. W.), Siamese Fishes, 740
- Fowler (Sir James), [death], 16
- Fowler (Prof. R. H.), Atomic Theory, 24
- Fox (Dr. C.), presidential address to the Museums Association, 72; re-elected president, 73
- Fox (Dr. J. J.), [Sir Robert Robertson, Dr. A. E. Martin and], Two Types of Diamond, 485
- Foxon (G. E. H.), Phototropism in *Porcellana* Larvae, 104
- Foye (W. G.), and A. C. Lane, Correlation of Radioactive Minerals, 425
- Frank (Dr.), Nazi Philosophy and Truth, 564
- Fraser (Lilian), Sooty Moulds of New South Wales (2), 471
- Fraser (Prof. F. R.), appointed professor of Medicine at the British Postgraduate Medical School, 113
- Fraser-Harris (Prof. D. F.), Harvey and Literature, 95
- Frazer (Sir James George), The Fear of the Dead in Primitive Religion. Vol. 2 (*Review*), 475
- Frazer-Brunner (A.), New or Rare Fishes from the Irish Atlantic Slope, 910
- Fred (E. B.), and P. W. Wilson, Photosynthesis and Free Nitrogen Assimilation by Leguminous Plants, 711
- Freed (S.), and H. G. Thode, A Magnetic Study of the Metallic State and the Fermi-Dirac Statistics, 774
- Frenkel (Prof. J.), Wave Mechanics: Advanced General Theory (*Review*), 608
- Freundlich (Prof. H.), Plasticity as the Servant of Industry, 509; and others, Colloidal Electrolytes, 578

- Frewing (J. J.), [Dr. H. W. Thompson and], Thermal Action of Acrolein, 900, 901
- Freymann (Mme. Marie), [H. Volkringer, A. Tchakirian and], Raman Spectra of the Metallochloroforms in Relation with their Structure, 431
- Freymann (R.), and A. Stieber, Effect of Temperature and of Visible and Infra-Red Radiations on the Electrical Resistance of Boron, 982
- Fricke (Dr. H.), and H. J. Curtis, Electric Impedance of Suspensions of Yeast Cells, 102
- Friend (Dr. J. Newton), Heavy Water and Water of Crystallisation, 463; and S. Marks, Oxygen Preparation from Sodium Peroxide: A Dangerous Experiment, 778
- Friend (J. W.), and J. Feibleman, Science and the Spirit of Man: A New Ordering of Experience (*Review*), 233
- Friesen (Prof. H.), Causes of Suppression of Crossing-over in Males of *Drosophila melanogaster*, 328
- Fritsch (Prof. F. E.), Origins of Plankton, 672; and others, Problems of Fresh-water Biology, 467
- Fröhlich (A.), and E. Zak, Ability of Lung-tissue to Regulate the Water-content of the Blood of the Lungs; Influence of Purine Derivatives on the Permeability of the Heart, 300
- Frommel (E.), [D. Zimmert and], Action of Muscle Extract (Lacarnol) and of Pancreatic Extract Deprived of Insulin (Padutine) on the Nervous System of the Frog, 227
- Frost (A. V.), and M. I. Shapiro, Nature of the Active Spots of Catalysts, 507
- Fryer (J. C. F.), The Colorado Beetle, 94
- Gabiano (P.), [R. de Malleman and], Magnetic Rotatory Power of Hydrogen Arsenide and of Hydrogen Phosphide, 673
- Gaddum (Prof. J. H.), appointed professor of Pharmacology in University College, London, 152
- Gadow (Dr. H. F.), Edited by J. F. Gaskell and H. L. H. H. Green, The Evolution of the Vertebral Column: a Contribution to the Study of Vertebrate Phylogeny (*Review*), 234
- Gaertner (H.), [E. J. McDougall, Prof. F. Verzá, H. Erlenmeyer and], Heavy Water in the Animal Body, 1006, 1011
- Gaff (H. D.), [E. F. Rendell and], Lightning and High-Voltage Power Transmission Lines, 223
- Gail (O. W.), translated by H. S. Hatfield, Rumping through Physics (*Review*), 85
- Gaiger (Prof. S. H.), [death], 998
- Gallé (J. B.), [B. Decaux and], Fluctuations in the Time of Propagation of Short Radio-Electric Waves, 262
- Galloway (Prof. J. J.), A Manual of Foraminifera (*Review*), 43
- Gambier (B.), Tetrahedra Conjugated to a Quadric  $\Sigma$  and to Tangent Edges of a Quadric  $S$ , 115
- Gane (R.), Production of Ethylene by some Ripening Fruits, 1008, 1011
- Gans (Dr. D. M.), [Prof. W. D. Harkins and], The Mass of the Neutron, 968, 974
- Garbedian (H. G.), Major Mysteries of Science (*Review*), 3
- Gardner (Dr. A. D.), Bacteriology: for Medical Students and Practitioners (*Review*), 752
- Gardner (J. C. M.), Immature Stages of Indian Coleoptera (15), (Scolytidæ), 740
- Garrett (Z. B. H.), Sting of Hive-Bees, 452
- Garrod (Miss Dorothy), Palæolithic Affinities in Palestine, 30
- Garstang (Prof. W.), Report on the Tunicata. Part I. Doliolida. British Antarctic (*Terra Nova*) Expedition, 1910, 112
- Gärtner (H.), [Prof. H. Erlenmeyer and], Some Experiments on Heavy Water, 327
- Gatenby (Prof. J. B.), Methods in Cytology (*Review*), 477; [Dr. H. W. Beams, J. A. Muliyl and], Use of the Ultra-Centrifuge for Studying the Golgi Apparatus, 810
- Gates (Prof. R. R.), Finer Structure of Chromosomes, 839; Symbols for Chromosome Numbers, 1011; and Dr. G. E. Darby, Blood-Groups of British Columbian Indians, 539
- Gatty (O.), [T. Besterman and], Tests of the Medium Rudi Schneider, 965
- Gautier (C.), and R. Ricard, Spectrographic Study of Ox Bile, 155
- Gauzit (J.), Ultra-Violet Extremity of the Spectrum of the Night Sky, 298
- Gay (P. F.), [Prof. M. W. Travers, R. V. Seddon and], Cause of Change in Rate of some Gas Reactions, 662
- Gaydon (A. G.), and Dr. A. W. B. Pearse, Spectrum of Nickel Hydride, 287
- Gee (E. R.), Dhubri Earthquake of July 3, 1930, 576
- Gemant (Dr. A.), English translation by V. Karapetoff, Liquid Dielectrics (*Review*), 441
- Gemelli (A.), and G. Pastori, Vowel Sound Perception, 742
- Genders (R.), and G. L. Bailey, The Casting of Brass Ingots (*Review*), 556
- de Gerlache de Gomery (Baron A.), [Obituary article], 961
- German (Prof. F. E. E.), and O. S. Knight, Line Coordinate Charts for Vapor Pressure—Temperature Data: Boiling Points of Ring Compounds; Boiling Points for Chain Compounds (*Review*), 479
- Gershenfeld (Prof. L.), Bacteriology and Sanitary Science: for Students in Pharmacy, Chemistry and Applied Sciences. Second edition (*Review*), 752
- Gheury de Bray (M. E. J.), Reproduction of Graphs, 528
- Ghosh (A. R.), [Dr. B. C. Guha and], Synthesis of Ascorbic Acid (Vitamin C) by Means of Tissues *in Vitro*, 739
- Gianfranceschi (Father Giuseppe), [death], 131
- Gibson (Dr. C. R.), Electrical Conceptions of To-day (*Review*), 3
- Gilbert (Sir Alfred), death of; work of, 727
- Gigante (D.), Limit of Resistance of the Pigeon to Insulin, 823
- Gill (E. T.), and R. Goodacre, Fatigue Properties of Patented Steel Wire, 704
- Gilliland (T. R.), Ionospheric Investigations, 379
- Ginsburg (I.), Some American Gobies, 67
- Giorgi (Prof. G.), Metre, Kilogram, Second and 'Another Unit' System of Units, 283
- Gladkov (N. A.), Distribution of Ornithological Stations on a Lake in the Plains, 263
- Glassell (S. A.), Affinities of the Crab Fauna of California, 500
- Glauert (H.), [death], 207; [obituary article], 313; Wind Tunnel Interference on Wings, Bodies and Airscrews, 68
- Glazebrook (Sir Richard), Eightieth Birthday and Work of, 410
- Gleadon (R.), Pyramid Prophecy (*Review*), 956
- Gleditsch (Mlle. Ellen), and E. Foeyn, Actinium-Uranium Ratio in Radio-Active Minerals, 506
- Glowczynski (Z.), [F. Rogozinski and], Experimental Rickets (6), 431
- Glücksman (A.), [F. G. Spear, A. F. W. Hughes, C. W. Wilson and], Sensitivity of Dividing and Non-Dividing Cells to Radiation, 460
- Glynn (Mary D.), Infectivity of Summer Sporangia of Potato Wart Disease in Incipient Infections on Varieties Immune in the Field, 253
- Godchot (M.), and M. Mousseron, Passage from One Ring to Another by the Deamination of 2-aminocyclanols, 154
- Godwin-Austen (Robert A. C.), Fiftieth anniversary of the death of, 803
- Goebel (Dr. H.), [Prof. W. Schoeller and], Acceleration of Flower and Fruit Formation, 257
- Gohar (H. A. F.), Partnership between Fish and Anemone, 291
- Goldby (F.), appointed University lecturer in Anatomy in Cambridge University, 908
- Goldfinger (P.), and L. Scheepers, A Micromethod for the Determination of Heavy Water, 116
- Goldhaber (M.), Spontaneous Emission of Neutrons by Artificially Produced Radioactive Bodies, 25; [Dr. J. Chadwick and], A 'Nuclear Photo-effect': Disintegration of the Diplon by  $\gamma$ -Rays, 237
- Goldsmith (E. D.), Correlation in Planarian Regeneration, 984

- Gomez (M.), and A. Langevin, Utilisation of Piezoelectric Quartz, etc., 863
- Gonze (M.), Mechanism of the Oxidation of Hydrazines by Iodine; Preparation of *m.m*<sup>1</sup> Trifluorhydrazotoluene, 787
- Goodacre (R.), [E. T. Gill and], Fatigue Properties of Patented Steel Wire, 704
- Goodeve (C. F.), Vision in the Ultra-Violet, 416
- Goodrich (Prof. E. S.), Nephridia of *Amphioxus*, 540
- Goodspeed (T. H.), and F. M. Uber, Application of the Altmann Freezing-Drying Technique to Plant Cytology, 911
- Goossens (A. P.), Anatomical Study of the Roots of Grasses, 335
- Gorbov (A.), [G. Vereschagin, I. Mendelejev and], Occurrence in Nature of Water with Anomalous Density, 335
- Gorbunova (K. M.), and Z. Adzhemjan, Electrocrystallisation of Metals (4), 191
- Gordon (G. F. C.), Elementary Metallurgy for Engineers (*Review*), 513
- Gordon (Dr. H. L.), The Mental Capacity of the Natives of Kenya, 585
- Gordon (W. R.), Utilisation of Coal, 212
- Gordon (Prof. W. T.), Plant Life and the Philosophy of Geology, 367; William Hyde Wollaston, F.R.S. (1766-1828), Unveiling of Memorial Plaque, 86
- Gorman (M. J.), and D. Slattey, Influence of Time on the Growth of Red Clover in an Acid Soil, 334
- Gortani (M.), Succession of Graptolite Fauna in the Neighbourhood of Goni, Sardinia, 711
- Gorter (Dr. F. J.), Dietary Depigmentation of Young Rats, 382
- Göthlin (Prof. G.), Human Daily Requirements of Dietary Ascorbic Acid, 569
- Gotsman (B.), [A. Ogg, E. N. Grindley and], Diurnal and Secular Variations of the Earth's Magnetic Field at Cape Town, 638
- Goudet [A. Liengme and], Proportion of the Blood Groups at Geneva, 639
- Gould (R. E.), Elinvar Hairsprings in Watches, 318
- Gover (J. E. B.), A. Mawer, and F. M. Stenton, in collaboration with A. Bonner, The Place-Names of Surrey (*Review*), 893
- de Graeve (P.), [R. Fosse, P. E. Thomas and], Dextro-Rotatory Allantoin, 154
- Graham (A.), Cruciform Muscle of Lamellibranchs, 500; Structure and Relationships of Lamellibranchs possessing a Cruciform Muscle, 226
- Graham (Dr. R. J. D.), elected professor of Botany in St. Andrews University; work of, 16
- Graham-Little (Sir Ernest), The Native Problem and Research in Africa, 585
- Grandadam (P.), [P. Laffitte and], Direct Oxidation of Platinum under Pressure, 116
- Grant (Dr. R. T.), appointed director of the unit for Scientific Research work in Clinical Medicine at Guy's Hospital Medical School, 565
- Graue (G.), and H. Käding, Preparation of Protoactinium, 386
- Gray (H. St. George), Excavations at Avebury, 806
- Gray (Prof. J. G.), [obituary article], 802
- Gray (R. W.), Whales and Caisson Disease, 853
- Greaves (Dr. R. H.), and H. Wrighton, Practical Microscopical Metallography, second edition (*Review*), 513
- Green (A. L.), and G. Builder, Polarisation of Long Radio Waves, 257
- Green (Dr. H. H.), and others, Nutrition in Relation to Disease, 557
- Green (L.), [Dr. R. Emerson and], Kinetics of Photosynthesis, 289
- Greene, Jr. (A. M.), Elements of Hydraulic Power Generation (*Review*), 479
- Greenwood (Prof. M.), Recent History and Function of University Education, 804
- Gregg (J. L.), The Alloys of Iron and Molybdenum (*Review*), 513; The Alloys of Iron and Tungsten (*Review*), 620
- Gregory (J. C.), Combustion from Heracleitos to Lavoisier (*Review*), 892
- Gregory, Bt. (Sir Richard), Science in the Public Press, 474
- Gregory (Prof. W. K.), Man's Place among the Anthropoids: Three lectures on the Evolution of Man from the Lower Vertebrates (*Review*), 716
- Gresley (H. N.), Locomotive Testing Station at Vitry-sur-Seine, 526
- Grierson (R.), and D. Betts, Electrical Warming of Large Buildings, 908
- Griffin and Tatlock, Ltd., Catalogue, No. 50L, of Scientific Apparatus, 285
- Griffith (Dr. R. H.), Water Gas, with a Section on Temperature Measurement, by H. C. Exell (The Manufacture of Gas, Edited by H. Hollings. Vol. 1), (*Review*), 619
- Griffiths (E.), [G. G. Sherratt and], Determination of the Specific Heat of Gases at High Temperatures by the Sound Velocity Method, 822
- Griffiths (I.), [P. Jacobs and], awarded the Streatfeild scholarship, 37
- Grillot (E.), Lead Aceto-chloride, 911
- Grignard (V.), Preparation of Mixed Organomagnesium Compounds, 262
- Grindley (E. N.), [A. Ogg, B. Gotsman and], Diurnal and Secular Variations of the Earth's Magnetic Field at Cape Town, 638
- Griswold (C. L.), [J. V. Schaffner and], Macrolepidoptera and their Parasites, 1013
- Groddeck (Dr. G.), Exploring the Unconscious: Further Exercises in Applied Analytical Psychology (*Review*), 919
- Grøntved (J.), [C. H. Ostenfeld and], The Flora of Iceland and the Faroes (*Review*), 308
- de Groot (Dr. W.), Seeing in the Ultra-Violet, 494
- Grosrey (A.), [G. Tiercy and], Width of Photographic Spectra for Stars of the K0 type, 431; Width of the Spectrograms of F5 and G0 Stars, 583; Width of Spectrograms for Stars of the type G5, 674
- Gross (P.), [F. Brown, J. M. A. de Bruyne and], Dipole Moments of Substituted Mesitylenes, 185
- Grosse (Dr. A. V.), and M. S. Agruss, Fermi's Element 93, 773
- Grove (F. P.), presented with the Lorne Pierce medal of the Royal Society of Canada, 205
- Grove (W. B.), and C. G. C. Chesters, British Rust Fungi, 184
- Groves (A. W.), Determination of Small Amounts of Copper in Rocks, 114
- Grubb (Prof. A. C.), [H. A. Jones and], New Features of the Nitrogen Afterglow, 140
- Gruenewald (Dr. H.), and others, Measurements of Current in a Lightning Flash, 541
- Guareschi (C.), Processes of Regeneration and their Limits in Experiments on the Centrifugation of the Insect Chrysalis, 983
- Gubin (A.), Distribution of Bee-Keeping in the U.S.S.R. as Related to Climate, 639
- Guében (G.), Nuclear Structure and Excited Radioactivity, 626
- Guggenheim (E. A.), [Prof. F. G. Donnan and], Activities of Life and the Second Law of Thermodynamics, 255
- Guha (Dr. B. C.), and A. R. Ghosh, Synthesis of Ascorbic Acid (Vitamin C) by Means of Tissues *in vitro*, 739
- Guichard (M.), Study of Chemical Systems by Variation of Weight with Regularly Varying Temperature, 334
- Guillaume (Dr. C. E.), work of, 874
- Guillot (M.), Iridescence of Antique Glass, 191
- Gunther (Dr. R. T.), Contributions to Science by Early Members of Balliol College, 821; inaugural lecture in Oxford University, 709; J. F. Campbell, 1822-85, and his Refracting Quadrant, 251; Members of Merton College, Oxford, Distinguished for Scientific Achievements, 746; Oxford and the History of Science: with an appendix on Scientific Collections in College Libraries, 907; Scientific Work of Members of Corpus Christi College, Oxford, 908; Sycamore Maple in A.D. 1300, 215
- Guth (E.), and A. Haas, Relations between the Relativistic Mass Formula and Classical Mechanics, 911
- Guttmacher (A. F.), Life in the Making (*Review*), 615

- Gutzeit (G.), and R. Weibel, Use of the Antipyrine-Iodide Reagent in Analysis with the Spot Test, 227; and R. Dückert, A New Specific Reaction for Antimony Cations, 507; [P. Wenger, T. Hiller and], A Method of Electrolytic Attack of Opaque Minerals and its Application to the Technique of Etching Polished Surfaces, 507
- Györy (Prof. T.), awarded the Karl Sudhoff medal of the German Society of the History of Medicine, Natural Sciences and Technique, 967
- Haas (Prof. A.), Die kosmologischen Probleme der Physik (*Review*), 125
- Haas (A.), [E. Guth and], Relations between the Relativistic Mass Formula and Classical Mechanics, 911
- de Haas (Prof. W. J.), awarded the Rumford Medal of the Royal Society, 727; presented with the Rumford Medal of the Royal Society; work of, 905; [J. Becquerel, J. van den Handel and], Paramagnetic Rotatory Power of Siderose, 154
- Haberfeld (M.), [C. H. Cartwright and], Conductivity of Tellurium, 287
- Haberlandt (G.), Erinnerungen: Bekenntnisse und Betrachtungen (*Review*), 955
- Hachisuka (Hon. Masauji), The Birds of the Philippine Islands: with Notes on the Mammal Fauna. Part 2 (*Review*), 438
- Hadfield (Prof. G.), appointed professor of Pathology in St. Bartholomew's Hospital Medical College, 745
- Haenny (C.), Thermal Variation of the Magnetic Double Refraction of Paramagnetic Solutions of Salts of Rare Earths, 1019; [G. Dupouy and], New Method of Absolute Measurement of the Magnetisation Coefficients and the Magnetic Susceptibilities of Liquids, 822; Paramagnetic Properties of Cerous Salts in Solution, 863
- Haig (C.), Effect of Intensity and Wave-length on the Response of *Avena* to Light, 472; Spectral Sensibility of *Avena*, 824
- Hain (Dr. A. M.), Peculiar Behaviour in a Female Rat, 778
- Haines (Dr. R. W.), appointed assistant lecturer in Anatomy in University College, Cardiff, 545
- Halbert (J. N.), Irish Hemiptera (Heteroptera, Cicadina), 910
- Halerow (W. T.), Scottish Hydro-electric Stations, 451
- Haldane (Prof. J. B. S.), Human Biology and Politics (Norman Lockyer lecture), 866; Inheritance of Habits, 28; Science at the Universities, 571
- Haldane (Prof. J. S.), awarded the Copley Medal of the Royal Society, 727; presented with the Copley Medal of the Royal Society; work of, 906
- Hall (Sir Daniel), appointed Rede lecturer in Cambridge University for 1935, 1018; Longevity of Seeds, 932; Planning of Agricultural Production, 714; The Scarlet Tulip of the East, 145
- Hall (N. F.), Economic Problems of Technological Progress, 579
- Hallpike (C. S.), Origin of the Wever and Bray Phenomenon, 419
- Hallsworth (Prof. H. M.), Future of Rail Transport, 369
- Halsey (Miss F. J.), A Disease of Cauliflowers in Victoria, Australia (*Gloeosporium concentricum* (Grev.) Berk. and Br.), 432
- Hamada (H.), Bands at 4450 and 4180 Å. in the Spectra of the Night Sky and of the Aurora, 851, 854
- Hambly (W. D.), The Ovimbundu of Angola, 423
- Hamilton (W. J.), Early Stages in the Development of the Ferret (1), 226
- Hammel (F.), X-Ray Spectra of Manganese Sulphate and its Hydrates, 430
- v. Hámos (Dr. L.), Microchemical Analysis of Plane Polished Surfaces by means of Monochromatic X-Ray Images, 181
- Hampshire (C. H.), Progress in Materia Medica, 133
- Handel (J. van den), [J. Becquerel, W. J. de Haas and], Paramagnetic Rotatory Power of Siderose, 154
- Hanson (C. O.), Forestry for Woodmen. Third edition (*Review*), 400
- Hanway (K. J.), [J. Algar and], Synthesis of Diflavones, 262
- Harand (J.), Critical Temperature as a Microchemical Characteristic, 947
- d'Harcourt (R.), Les textiles anciens du Pérou et leurs techniques (*Review*), 201
- Harde (Mlle. Edna), Ascorbic Acid (Vitamin C) and Toxic Effects, 674
- Harden (Prof. A.), Fluoride as an Impurity in Sodium Phosphate, 101
- Harder (R.), and I. Störmer, Blütenentfaltung und Hormonwirkung, 385
- Hardwick (J. C.), A Psychiatrist on Religion, 825
- Hardy (E.), Lost Fragrance of Musk, 327
- Hardy (Prof. F.), Free Alumina in Soils, 326
- Hardy (Prof. G. H.), The *J*-type and the *S*-type among Mathematicians, 250
- Harington (Dr. C. R.), appointed Oliver-Sharpey lecturer of the Royal College of Physicians of London, 176
- Harkins (Prof. W. D.), and Dr. D. M. Gans, The Mass of the Neutron, 968, 974
- Harman (J. B.), awarded the E. G. Fearnside's scholarship of Cambridge University, 189
- Harmer (Sir Sidney F.), Publication of *Nomina Nuda*, 973
- Harnwell (G. P.), H. D. Smyth, S. N. Van Voorhis, and J. B. H. Kuper, Nuclear Transmutations with Heavy Hydrogen, 69
- Harrington (J. P.), Early Records of Californian Indians, 740
- Hart (T. G.), Phytoplankton of the *Discovery* Expedition, 500
- Hart (T. J.), Red 'Water-Bloom' in South African Seas, 459
- Harteck (P.), [A. and L. Farkas and], Experiments with Heavy Hydrogen, 32; [M. L. E. Oliphant, Lord Rutherford and], Nuclear Transmutations with Heavy Hydrogen, 69
- Hartree (D. R.), Numerical Solution of Differential Equations, 108; R. de L. Kronig, and H. Petersen, Fine Structure of X-Ray Absorption Edges, 466
- Hartree (E. F.), [Prof. D. Keilin and], Inhibitors of Catalase Reaction, 933, 938
- Hasratian (E.), Influence of an unconditioned Food Reflex upon the Corresponding Conditioned Reflexes, 263
- Hatt (R. T.), Pangolins and Aard-Varks, 630
- Hawkins (Prof. H. L.), Fossils and Men, 186
- Hawks (E.), The Book of Air and Water Wonders (*Review*), 617
- Haworth (Prof. W. N.), awarded the Davy Medal of the Royal Society, 727; presented with the Davy Medal of the Royal Society; work of, 906
- Hayes (J. G.), The Conquest of the North Pole: Recent Arctic Exploration (*Review*), 884
- Heath (J. W. E.), [obituary article], 350
- Hecht (S.), and A. M. Chase, Anomalies in the Absorption Spectrum of Visual Purple, 335
- Heimer (A.), and T. Heimer, Activated States in the Spectrum of Copper Hydride, 462
- Heimer (T.), [A. Heimer and], Activated States in the Spectrum of Copper Hydride, 462
- Heinemann (Dr. M.), Physico-Chemical Test for Mitogenic (Gurwitsch) Rays, 701
- Hele (Dr. T. S.), appointed assessor to the Regius professor of Physic of Cambridge University, 708
- Heller (H.), and F. E. Urban, Neutralisation of the Poisonous Action of Pituitrin in the Organism, 392
- Hencken (Dr. O'Neill), Archaeological Investigations in Ireland, 928
- Henderson (G. H.), S. Bateson, and L. G. Turnbull, Quantitative Study of Pleochroic Haloes, 576
- Henderson (Sir James), Inventions and Economic Recovery, 525
- Henderson (J.), and E. L. Craig, Economic Mammalogy (*Review*), 614
- Henderson (Prof. L. J.), work of, 597
- Henderson (M. C.), [M. S. Livingston, E. O. Lawrence and], Radioactivity Artificially Induced by Neutron Bombardment, 823
- Heng (Yeu Ki), Certain Compounds of Tartramide and of Tartaric Acid, 154; [E. Darmon and], Measurement of the Strength of Acids, 982

- Hennell (T.), Change in the Farm (*Review*), 159  
 Henney (E.), and J. D. Byett, Modern Home Laundry-work (*Review*), 757  
 Henney (K.), Principles of Radio. Second edition (*Review*), 45  
 Henri (V.), Carbonyl Group of Aldehydes and Ketones compared with Carbon Monoxide, 863  
 Henriques (Dr.), Unity of Science, 670  
 Henry (F. M.), [C. W. Brown and], Central Nervous Mechanism for Emotional Responses (2), 472  
 Henry (J. M.), A New Fundamentalism (*Review*), 81  
 Henry (L.), Absorption Spectrum of Nitrous Oxide and Energy of Dissociation of Nitrogen, 498  
 Henry (Thomas), centenary of the birth of, 598  
 Herbert (J.), Corrosion Figures of Glass, 471  
 Herčík (Dr. F.), Oberflächenspannung in der Biologie und Medizin (*Review*), 235  
 Hergensother (R. G.), [A. L. Hughes and], Electron Scattering by Atomic Electrons, 541  
 Herman (L.), The (Light) Absorption of Oxygen between 7,000 and 3,000 Å., 227  
 Hernegger (F.), Direct determination of the Degradation Constant of Ionium from the number of  $\alpha$ -particles emitted, 547  
 Heron-Allen (E.), Proliferating Nomenclature of Foraminifera (*Review*), 43  
 Herskovits (Frances S.), [Dr. M. J. Herskovits and], Rebel Destiny: Among the Bush Negroes of Dutch Guiana (*Review*), 613  
 Herskovits (Dr. M. J.), and Frances S. Herskovits, Rebel Destiny: Among the Bush Negroes of Dutch Guiana (*Review*), 613  
 Herszfeld, and A. Wronberg, Radioactivity of Samarium, 334  
 Herty (Dr.), Pulpwood for Paper in the United States, 452  
 Hertz (P.), [P. Bernays and], Axioms of Archimedes and of Cantor, 674  
 Hess (Prof. V. F.), [Dr. F. Rieder and], Effects of Cosmic Radiation in a Wilson Chamber at the Hafelekar Observatory (2,300 m.) near Innsbruck, 772  
 Hetherington (A. L.), the Research Movement and its Modern Developments, 208  
 Hettner (A.), Vergleichende Länderkunde. Band 1 u. 2 (*Review*), 479  
 Hevesy (Prof. G.), and E. Hofer, Elimination of Water from the Human Body, 879, 901; and H. Lay, Fluorescent Yield of X-Ray Emission, 98; M. Pahl, and R. Hosemann, Radioactivity of Potassium, 377  
 Hey (M. H.), Studies on the Zeolites (8), 115  
 Heyns, [Prof. Abderhalden and], Structure of Proteins, 296  
 Heyroth (F. F.), and J. R. Loofbourow, Chemical Constitution of Vitamin B, as deduced from Ultra-violet Absorption Spectra, 461  
 Hibben (S. G.), Illuminating Engineering in the United States, 490  
 Hicks (Prof. W. M.), [death], 280; [obituary article], 408  
 Higgs (A. J.), Atmospheric Ozone, 293  
 Hill (Prof. A. V.), Galvanometer Amplification by Photo-Cell, 289  
 Hill (late Sir Claude), Society and Caste in the India of To-day, 70  
 Hill (Sir Leonard), The 1933 Everest Climbing Expedition and Oxygen, 969  
 Hill (R.), A new Glycoside from Madder, 628  
 Hiller (T.), [P. Wenger, G. Gutzeit and], A Method of Electrolytic Attack of Opaque Minerals and its Application to the Technique of Etching Polished Surfaces, 507  
 Hills (A. E.), gift to Birmingham University, 281  
 Hills (E. S.), Fundamental Concepts in the Physiography of Victoria, 675  
 Hilton (W. F.), awarded the Armourers and Brasiers' Company's research fellowship in Aeronautics, 137  
 Hingston (Major R. W. G.), Darwin (*Review*), 124  
 Hinks (A. R.), Maps and Survey. Third edition (*Review*), 307  
 Hirschberg (Dr. W.), Pygmies and Bushmen, 815  
 Hirshfeld (Dr. C. F.), [Prof. W. N. Barnard, Prof. E. O. Ellenwood and], Elements of Heat-Power Engineering. Parts 2 and 3 (*Review*), 620  
 Hirvonen (R. A.), Continental Undulations of the Geoid, 221  
 Hitchen (C. S.), and R. van Aubel, Composition and Age of Crystalline Uraninite from Katanga, 982  
 Hobbs (D. F.), Fresh-water Research in New Zealand, 853  
 Hocart (A. M.), Fear and the Anthropologists (*Review*), 475  
 Hoch (H.), [F. Patat and], Determination of Spin and Statistics of the Deuteron Nucleus from Thermal Data, 156  
 Hodgkin (A. L.), awarded the Frank Smart zoological and comparative anatomy prize of Cambridge University, 37  
 Hodson (Cora B. S.), Human Sterilization To-day: A Survey of the Present Position (*Review*), 886  
 Hofer (E.), [Prof. G. Hevesy and], Elimination of Water from the Human Body, 879, 901  
 Hoffmann (B.), The New Field Theory, 322  
 Hoffsommer (H. C.), Relation of Cities and Larger Villages to changes in Rural Trade and Social Areas in Wayne County, New York, 454  
 Hogbin (Dr. H. I.), Law and Order in Polynesia: A Study of Primitive Legal Institutions (*Review*), 832  
 Holdaway (F. G.), and C. R. Mulhearn, Sheep Sweat a Factor in Blowfly Attack of Sheep, 813  
 Holder (P. D.), awarded a Robert Blair fellowship, 189  
 Holderer (M.), Why Does Water Wet Grass?, 910  
 Holiday (Dr. E. R.), and F. Campbell Smith, Spectrophotometry of Rapidly Changing Systems, 102  
 Holland (A. J.), appointed Society of Glass Technology research fellow of Sheffield University, 821  
 Holland (Sir Thomas), elected president of the Mineralogical Society, 770  
 Hollingworth (Prof. J.), Structure of the Ionosphere, 462  
 Hollingworth (S. I.), awarded the Duddell scholarship of the Institution of Electrical Engineers, 189  
 Hollister (Miss Gloria), Clearing and Dyeing Fish for Bone Study, 779  
 Holly (Dr. M.), Cyclostomes, 702  
 Holman (Prof. R. M.), and Prof. W. W. Robbins, A Textbook of General Botany: for Colleges and Universities. Third edition (*Review*), 344  
 Holmyard (Dr. E. J.), A Monument of Lexicography (*Review*), 603; An Unorthodox Chemistry (*Review*), 887  
 Holst (W.), A New Band System of Aluminium Hydride, 63; Further Band Systems of Aluminium Hydride, 322  
 Honikman (S.), H. A. Shapiro, and H. Zwarenstein, Bioassay of the Gonadokinetic Principle of the Anterior Pituitary, 947; Variations in the Ovarian Response of *Xenopus* to the Gonadokinetic Principle of the Anterior Pituitary (1), 982  
 Hooker (Marian O.), [Prof. M. H. Fischer and], The Lyophilic Colloids (Their Theory and Practice), (*Review*), 990  
 Hopfield (J. J.), A High-frequency Water Jet, and Ultrasonic Flame, 737  
 Hopkins (Sir Frederick Gowland), Clinical Medicine and Science, 867; nominated for re-election as president of the Royal Society, 727  
 Hopkins (J. C.), Parasitism of *Rhizoctonia lamellifera*, Small, 812  
 Hopkins (Dr. S. J.), and Dr. A. Wormall, Action of Phenyl Isocyanate on Insulin, 290  
 Hopwood (Prof. F. L.), Induced Radioactivity, 942; [A. Brasch, F. Lange, A. Waly, Dr. T. E. Banks, T. A. Chalmers, Dr. L. Szilard and], Liberation of Neutrons from Beryllium by X-Rays: Radioactivity Induced by means of Electron Tubes, 880, 901  
 Hora (Dr. Sunder Lal), Animal Worship in Bengal, 106; Bionomics of two Estuarine Crabs, 220; Showers of Fish, 454; and Dev Dev Mukerji, Burmese Fishes, 855  
 Horiuti (Dr. J.), and Prof. M. Polanyi, Catalytic Interchange of Hydrogen between Water and Ethylene and between Water and Benzene, 377; Direct Introduction of Deuterium into Benzene, 847, 854



- van der Horst (Dr. C. J.), The Burrow of an Enteropneust, 852
- Hosemann (R.), [Prof. G. Hevesy, M. Pahl and], Radio-activity of Potassium, 377
- Hosier (A. J.), and others, Treatment of Light Soils, 329
- Houghtaling (Helen), [E. W. Sinnott, A. F. Flakeslee and], Comparative Anatomy of Extra-Chromosomal Types in *Datura stramonium*, 708
- Housley (H.), Groups of Chemists in the Chemical Industry, 860
- Howard (A. L.), North American Timbers (*Review*), 512
- Howchin (W.), [F. Chapman, W. J. Parr and], Revision of the Nomenclature of the Permian Foraminifera of New South Wales, 675
- Hrdlička (Dr. A.), Alaskan Archaeology, 1001; Fossa in the Primate Femur, 539
- Hrushevsky (Prof. M.), [obituary], 961
- Hsü (H. F.), and J. Y. C. Watt, Guinea Worm in China, 68
- Hubble (E.), and M. L. Humason, Velocity-Distance Relation for Isolated Extra-Galactic Nebulae, 472
- Hubbs (Prof. C. L.), and Dr. L. P. Schultz, *Elephantichthys*, a New Genus, 666
- Huber (F.), [J. Weigle and], Transformation of Ammonium Chloride at  $-30^{\circ}\text{C}$ ., 674
- von Huene (Miss Erika), Phatic Mammals, 31
- Hughes (A. F. W.), [F. G. Spear, A. Glücksmann, C. W. Wilson and], Sensitivity of Dividing and Non-Dividing Cells to Radiation, 460
- Hughes (A. L.), and R. G. Hergensother, Electron Scattering by Atomic Electrons, 541
- Hughes (E. D.), Prof. C. K. Ingold, and Dr. C. L. Wilson, Concentration of Heavy Water by Spontaneous Evaporation, 142
- Hukumoto (Y.), Energy of the C-OH Bond and Molecular Structure in Alcohols, 538
- Hull (H. W.), appointed University demonstrator in Anatomy in Cambridge University, 908
- Hulubei (Horia), Intense Sources of Protons Applicable to Transmutations, 390
- Humason (N. L.), [E. Hubble and], Velocity-Distance Relation for Isolated Extra-Galactic Nebulae, 472
- Humbert (P.), *Le Calcul Symbolique*, 541
- Hume (G. S.), Oil and Gas in Western Canada. Second edition, 375
- Hume-Rothery (Dr. W.), award from the Beilby Memorial Fund; work of, 765
- Humery (R.), [P. Lemoine, R. Soyer and], Impoverishment of the Stratum of Green Sand of the Paris Region, 75
- Humoller [Austin and], Synthesis of the Aldohexoses, 32
- Hunter (J. S.), Photoelectric Thresholds of Some Turned Metallic Surfaces, 115
- Hunter (N. M.), awarded the Shipbuilding Gold Medal of the North-East Coast Institution of Engineers and Shipbuilders, 415
- Hunter (Prof. R. F.), and Prof. R. Samuel, Chemical Linkage, 632; 971, 974
- Hunter (T. G.), appointed assistant lecturer in Oil Engineering in Birmingham University, 37
- Huntington (Prof. E.), Prof. F. E. Williams, and Prof. S. van Valkenburg, Economic and Social Geography (*Review*), 987
- Hurst (Dr. C. C.), Miss E. A. Willmott, 726
- Hutchinson (G. E.), Yale North India Expedition, 87; [H. de Terra and], Climatic Changes in Central Asia, 741
- Hutchinson (J.), The Families of Flowering Plants. 2: Monocotyledons; arranged according to a new system based on their Probable Phylogeny (*Review*), 550
- Hutchinson (Dr. J. B.), Leaf-Shape Inheritance in Cotton, 631
- Hutchinson (R. W.), Heat (Matriculation Standard), 8
- Hutchison (W. B.), awarded the David Hughes scholarship of the Institution of Electrical Engineers, 189
- Huxley (Prof. J. S.), [Prof. E. N. da C. Andrade and], Simple Science (*Review*), 896; Dr. F. C. S. Schiller, and Prof. E. W. MacBride, Science and Psychical Research, 458; and others, Scientific Research and Social Needs (*Review*), 83
- Huxley (Dr. L. G. H.), Cosmic Rays and the Earth's Potential, 571; Origin of the Cosmic Corpuscles, 418
- Hyde (Sir Charles), gifts to Birmingham University, 945
- Ickringill (C. S.), and H. Peters, The 'Isolated Basins' Electricity Scheme, Upper Egypt, 528
- Ikeda (H.), [H. Ohshima and], Pairing in Starfishes, 385
- Illingworth (J. W.), and J. A. Santos, Use of Phosphomolybdic Acid in Chemical Analysis, 971, 974
- Imamura (Prof. A.), Central Core of the Earth, 257; Tilting of a Crust-Block in the Kyoto-Osaka District, 146; and Kawase, Sanriku (Japan) Earthquake Seawaves of 1933, 820
- Imperial Chemical Industries, Ltd., awarded the Rogers Field Gold Medal of the Royal Sanitary Institute, 60
- Infeld (Prof. L.), translated by L. Infeld, *The World in Modern Science: Matter and Quanta* (*Review*), 125
- Ingold (Prof. C. K.), [E. D. Hughes, Dr. C. L. Wilson and], Concentration of Heavy Water by Spontaneous Evaporation, 142; C. G. Raisin and C. L. Wilson, Direct Introduction of Deuterium into Benzene without Heterogeneous Catalysis, 734; C. G. Raisin, and C. L. Wilson, Direct Introduction of Deuterium into Benzene, 847, 854; [H. Whitaker, Prof. R. Whytlaw-Gray, E. H. Ingold and], Preparation of Protium Oxide and determination of the proportion of Deuterium in the Hydrogen of Normal Water, 661
- Ingold (E. H.), [H. Whitaker, Prof. R. Whytlaw-Gray, Prof. C. K. Ingold and], Preparation of Protium Oxide and determination of the proportion of Deuterium in the Hydrogen of Normal Water, 661
- Irvine (Sir James), Aspects of Modern Research, 926; and D. Routledge, Isomerism of Sucrose and Iso-Sucrose, 143
- Isaac (W. E.), Chlorosis in Deciduous Fruit Trees, 391
- Ishidate [Asahina and], Inversion of *d*-Camphor, 745
- Ivanenko (D. D.), Is the Transmutation of Hydrogen into Neutron Possible?, 431
- Ives (P. T.), [H. H. Plough and], Heat-Induced Mutations in *Drosophila*, 472
- Iyer, Rajagopalna, and Subrahmanyam, Oxidising Agents as Fertilisers, 940
- Jaanus (R.), and V. Drozdzhina, State of the Cerium Atom inside the Metallic Lattice, 639; and Dr. J. Shur, Magnetic Properties of Benzene Vapour, 101
- Jacks (G. V.), Research in Australia and New Zealand, 51
- Jackson (D. A.), and H. Kuhn, Hyperfine Structure of the Resonance Lines of Potassium, 25
- Jackson (R.), appointed lecturer in Philosophy in the United College, St. Andrews University, 73
- Jacobs (P.), [I. Griffiths and], awarded the Streatfeild scholarship, 37
- Jacot (A. P.), Some Hawaiian Oribatoidea, 464
- Jacquard (J. M.), death of, [1834], 189
- Jaeger (Prof. W.), translated by R. Robinson, Aristotle: Fundamentals of the History of His Development (*Review*), 991
- Jahnke (Prof. E.), und Prof. F. Emde, Funktionentafeln: mit Formeln und Kurven (Tables of Functions: with Formulae and Curves), Zweite Auflage (*Review*), 476
- Jakeman (Dr. R. G.), [C. W. Saunders, H. W. Wilson and], Electricity on Board Ship, 930
- James (Rev. E. O.), Christian Myth and Ritual: a Historical Study (*Review*), 305
- Jameson (Prof. W. W.), appointed a member of the Industrial Health Research Board of the Medical Research Council, 733
- Janet (P.), New Comparisons of National Standards of Electrical Resistance, 582
- Jansen (Capt. P.), Earth-Sounds in the East Indies, 769
- Jeans (Sir James), The Philosophy of, 337; The New World-Picture of Modern Physics, 355; Through Space and Time: based on the Royal Institution Lectures, Christmas 1933 (*Review*), 894; appointed a member of the Advisory Council to the Committee of the Privy Council for Scientific and Industrial Research, 531

- Jeffcott (Dr. H. H.), Approximate Determination of the Vibration of Beams and the Whirling of Shafts, 154; 465
- Jeffreys (Dr. H.), State of the Earth's Central Core, 324; The Philosophy of Sir James Jeans, 499
- Jenkins (Dr. H. O.), Structure of the Nitro Group, 217
- Jensen (Prof. C. O.), [death], 350; [obituary article], 524
- Jensen (H. L.), Microbiology of Australian Soils (1), 471
- Jepson (F. P.), Spread of the Water Hyacinth, 623
- Jeunehomme (W.), Mechanism of the Electrochemical Chlorination of Benzene, 910
- Joad (Prof. C. E. M.), Counter Attack from the East: the Philosophy of Radhakrishnan (*Review*), 832
- Joffé (A.), [Mme. Anne Joffé and], Spectral Distribution of the Photoelectric Effect in Cuprous Oxide, 638
- Joffé (Mme. Anne), and A. Joffé, Spectral Distribution of the Photoelectric Effect in Cuprous Oxide, 638
- Johns (Sir Arthur), Progress in Naval Construction (Andrew Laing lecture), 731
- Johnson (B. K.), Reflecting Power of Aluminised Surfaces, 216
- Johnston (T. H.), Some Australian Cestodaria; Some Monocotylid Trematodes, 391
- Jolibois (P.), Electrolysis of Saline Solutions with Distilled Water Electrodes, 787
- Jolliffe (Prof. A. E.), appointed a fellow of King's College, London, 1018
- Jones (B.), [Dr. Raeburn and], The Chad Basin: Geology and Water Supply, 293
- Jones (H.), Application of the Bloch System to the Study of Alloys and of the Properties of Bismuth, 786
- Jones (H. A.), and Prof. A. C. Grubb, New Features of the Nitrogen Afterglow, 140
- Jones (Dr. H. Spencer), Aluminium-surfaced Mirrors in Astronomy, 522
- Jones (H. V.), awarded the Dr. Price prize in Anatomy of University College, Cardiff, 545
- Jones (T. I.), Measurement of the Grid-Anode Capacitance of Screen-Grid Valves, 185
- Jones (Prof. W. Neilson), Plant Chimaeras and Graft Hybrids (*Review*), 515
- Jones (Dr. Wynn), and others, Perseveration, 860
- Jones-Bateman (Miss L.), gift to the Royal Horticultural Society, 60
- Joshi (Prof. A. C.), Chromosome Numbers in Menispermaceae, 29
- Joyce (Capt. T. A.), Origin and Use of 'Yerba Maté', 370; 722; 760
- Jungermann (L.), [A. Kailan and], Esterification Velocities of Substituted Fatty Acids, 156
- Junod (H. P.), Possession among the VaNda, 256
- Jusa (E.), and G. Breuer, Influence of the Position of the Mercapto of Methylmercapto Group on the Colour of the Monosubstituted  $\alpha$ -Naphtholazo Dyes, 156
- Juzepeczukii, Systematics of the Potato, 540
- Käding (H.), [G. Graue and], Preparation of Protoactinium, 386
- Kahan (T.), Thermal Variation of the Structural Demagnetising Factor in Nickel and Cobalt, 470
- Kailan (A.), Chemical Actions of Penetrating Radium Radiation (20), 155; and L. Jungermann, Esterification Velocities of Substituted Fatty Acids, 156
- Kalabuchov (N.), 'Anabiosis' in Vertebrates and Insects at a Temperature below Zero, 40
- Kalckar (F.), and E. Teller, Ratio of the Magnetic Moments of Proton and Deuteron, 180
- Kamiński (Prof. B.), Dielectric Potentials of Physiologically Active Substances, 776
- Kandēl (Prof. I. L.), The New German Nationalism and Education, 469
- Kane (G. P.), K. R. Krishnaswami, and H. E. Watson, Gas from Indian Oil Wells, 108
- Kaplan (Prof. J.), A New Band System in Nitrogen, 538; Direct Proof of the Existence of Metastable Molecules in Active Nitrogen, 289
- Kara-Michailova (Elisabeth), and H. Pettersson, Detection of a  $\gamma$ -Radiation from excited Xenon Nuclei, 547
- Karapetoff (Prof. V.), Wine Makers and Bottle Makers, A Parable, 625
- Karlik (Berta), and H. Pettersson, Spectrum of Polonium, 547
- Karmarkar (Dr. D. V.), Seasonal Nitrogen Cycles in Fruit Trees, 816
- Karpen (V.), An Electric Battery utilising the Energy of oxidation of Alcohol, 787; Passage of Current in Electrolytes without Electrolysis, 546
- Katz (Prof. D.), Some Problems of the Psychology of Needs, 744
- Katznelson (Z. S.), Mesenchymatic Development of the Striated Muscles in Amphibia, 432
- Kaufmann (Dr.), Ganglion Cells of *Drosophila*, 839
- Kawase [Imamura and], Sanriku (Japan) Earthquake Seawaves of 1933, 820
- Kay (Prof. H. D.), and others, Chemistry of Milk, 669
- Kaye (Dr. G. W. C.), New Acoustics Laboratory at the National Physical Laboratory, 202; Scientific Studies of Noise, 149; Sound and Noise, 929
- Keane (J.), [T. J. Nolan, M. Cassidy, N. E. Dolan], Chemical Constituents of Lichens found in Ireland (1), 154
- Keast (A. R.), Marmite: Vitamin B<sub>1</sub> Content, 696
- Keble (R. A.), [R. B. Withers and], Palaeozoic Brittle-stars of Victoria, 675
- Keeble (Sir Frederick), The Green Plant as Agricultural Engineer (Thomas Hawksley lecture), 688
- Keeler (Dr. C. E.), and Dr. W. E. Castle, Blood-group Incompatibility in Rabbit Embryos and in Man, 472; Blood-groups of Rabbits, 1012; Influence of Pregnancy upon the Titre of Immune (Blood-group) Antibodies in the Rabbit, 823
- Keeley (T. C.), K. Mendelssohn, and J. R. Moore, Experiments on Supraconductors, 773
- Keen (Dr. B. A.), Experimental Study of the Soil, 566
- Keffler (L.), [Prof. W. Swietoslowski and], Union Internationale de Chimie. Premier Rapport de la Commission Permanente de Thermochimie (*Review*), 991
- Keighley (G.), [H. Borsook and], Protein Metabolism in Man, 263
- Keilin (Prof. D.), Mechanisms of Cellular Respiration (Croonian lecture), 980; and E. F. Hartree, Inhibitors of Catalase Reaction, 933, 938
- Keiller (A.), Excavation of the West Kennet Avenue, Avebury, 566
- Keith (Sir Arthur), The Construction of Man's Family Tree (*Review*), 124
- Kellett (E. E.), A Short History of Religions (*Review*), 305
- Kellogg (J. M. B.), [I. I. Rabi, J. R. Zacharias and], Magnetic Moment of the Proton and the Deuteron, 466
- Kelly (D. F.), [Prof. J. Reilly and], Fatty Oil Production, 334
- Kemner (N. A.), Termites of Java and Celebes, 540
- Kemp (I.), elected a research student in Chemistry at Clare College, Cambridge, 152
- Kennedy-Fraser (D.), Immature Reactions to Number of Older Feeble-minded Boys, 1017
- Kenrick (Prof. F. B.), An Introduction to Chemistry (*Review*), 887
- Kerrin (Dr. J. C.), appointed assistant-director of the Routine Section of the Department of Bacteriology and Preventive Medicine of Manchester University, 709
- Ketelaar (Dr. J. A. A.), Crystal Structure of the Low Temperature Modification of Ammonium Bromide, 250
- Kettle (Prof. E. H.), appointed professor of Pathology at the British Postgraduate Medical School, 113
- Keys (Prof. D. A.), [Prof. A. S. Eve and], Applied Geophysics in the Search for Minerals. Second edition (*Review*), 618
- Kharit (A.), and N. Khaustov, Oxidation and Reduction Processes in a Working Muscle (3), 263; and A. Kostin, (4), 432
- Khaustov (N.), [A. Kharit and], Oxidation and Reduction Processes in a Working Muscle (3), 263

- Kidd (Dr. F.), appointed superintendent of the Low Temperature Research Station, Cambridge, 97; 637; Respiration of Fruits, 766; and Dr. C. West, Life-duration of Fruits, 798
- Kincer (J. B.), Drought of 1934 in the United States, 211
- King (Dr. E. J.), appointed reader in Pathological Chemistry in the British Postgraduate Medical School, 745
- King (G. B.), [E. C. Chubb, A. O. D. Mogg and], A New Variation of Smithfield Culture from a Cave on the Pondoland Coast, 334
- King (Prof. L. V.), presented with the Flavelle gold medal of the Royal Society of Canada, 205
- King (R. O.), Autoxidation of Mineral Oils and Lubricating Value, 188
- Kings (D. P.), elected Charles Kingsley bye-fellow of Magdalene College, Cambridge, 37
- Kipping (Dr. F. B.), [Dr. F. S. Kipping and], Perkin and Kipping's Organic Chemistry. New edition. Part 3 (*Review*), 556
- Kipping (Dr. F. S.), and Dr. F. B. Kipping, Perkin and Kipping's Organic Chemistry. New edition. Part 3 (*Review*), 556
- Kirrmann (A.), The Allyl Transposition, 1019
- Kisser (J.), and L. Portheim, Applicability of Hydrogen Peroxide to the Treatment of Seed, 547
- Klar (Dr. R.), Alleged Influence of Heavy Water on Mould Growth, 104
- Klinger (H.), [O. Redlich and], Theory of Apparent Molecular Volume (3), 911
- Klutke (F.), Relaxation Vibrations and Production of Vibration, 156
- Knight (O. S.), [Prof. F. E. E. Germann and], Line Coordinate Charts for Vapor Pressure-Temperature Data: Boiling Points of Ring Compounds; Boiling Points for Chain Compounds (*Review*), 479
- Kobayashi (T.), Ordovician Faunas of Korea, 1014
- Koblic (Dr. O.), A New Radioactive Element beyond Uranium, 55; Element 93: a Correction, 282
- Koehn, Jr. (C. J.), [Prof. C. A. Elvehjem and], Non-Identity of Vitamin B<sub>2</sub> and Flavines, 1007
- Kohlrausch (K. W. F.), and A. Pongratz, Raman Effect (33 and 34), 392
- Kok (J. A.), Superconductivity and Fermi-Dirac Statistics, 532
- Kolomic (I.), Drought Resistance and its Outward Signs in Different Varieties of Spring Wheat, 335
- Kon (Dr. S. K.), [R. G. Booth and], Effect of Light on the Reducing Substance (Vitamin C?), in Milk, 536
- Kopf (F.), [H. Tollner and], Measurements of the Nocturnal Radiation of Heat during the Polar Night 1932-33 on the Island of Jan Mayen, 547
- Korzybski (A.), Science and Sanity: an Introduction to Non-Aristotelian Systems and General Semantics (*Review*), 617
- Koshy (Prof. T. K.), Meiotic Chromosomes of *Allium*, 780
- Kostin (A.), [A. Kharit and], Oxidation and Reduction Processes in Working Muscle (4), 432
- Kostoff (Prof. D.), Production of Dwarf Amphidiploid Tobacco Plants, 1013
- Kostov (D.), Crossing-over in the Species Hybrids of *Nicotiana*, 192
- Kotchetkov (A.), [N. Dankov and], Limiting Dimensions for Particles of Catalysts, 583
- Kowalewski (S.), [K. Smolenski and], Combustible Liquid obtained starting with Ethylene, 674
- Krasin (A.), Influence of Illumination on Dielectric Losses in Rock Salt Irradiated with X-Rays, 583
- Krishnamurty (S. G.), The Second Spark Spectrum of Tellurium, 255
- Krishnaswami (K. R.), [G. P. Kane, H. E. Watson and], Gas from Indian Oil Wells, 108
- Krivskij (A. S.), [E. A. Stern and], Action of Metals at a distance on the Structure and Development of *Bacillus mycoides*, Fl., 507
- Kroeber (A. L.), [T. T. Waterman and], Yurok Marriage, 67
- Krogh (Prof. A.), Principles of Regulation in the Organism (*Review*), 340
- Kronig (R. de L.), [D. R. Hartree, H. Petersen and], Fine Structure of X-Ray Absorption Edges, 466
- Kropp (B.), and W. J. Crozier, Production of the Crustacean Chromatophore Activator, 711
- Kroupa (Miss Edith), Measurement of Geological Time, 530
- Krüger (Prof. K.), Road Construction in New Germany, 247
- Kruse (Prof.), Shape of Babies' Heads, 804
- Krutkov (Y.), Theory of the Brownian Movement, 788
- Kuhn (W.), and H. Martin, Structure of Amphoteric Ions, 1017
- Kuhn (H.), [D. A. Jackson and], Hyperfine Structure of the Resonance Lines of Potassium, 25
- Kuhn (R.), Synthetic Compound with Vitamin B<sub>2</sub> Activity, 966
- Kurentsov (A. I.), Origin of the High-mountain Fauna of the South Ussuri Region, 432
- Kurylenko (C.), [M. Mathieu and], Absorption of Acetone by the Nitro-celluloses, 506
- Kutzelnigg (A.), [E. Beutel and], Keratin (1), the Lead Sulphide Reaction, 155
- Kuzmin (G. A.), [W. E. Laschkarew and], Effect of Temperature on Diffraction of Slow Electrons and its Application, 62
- Lack (D.), Habitat Selection in Birds, 152
- Ladner (A. W.), and C. R. Stoner, Short-Wave Wireless Communication. Second edition (*Review*), 45
- Lafay (A.), Effect of Vortices Transported by the Wind, 154; Modifications of the Magnus Phenomenon Determined by the Structure of the Wind, 390
- Laffitte (P.), and J. Breton, Detonation Limits of Some Gaseous Mixtures, 334; and P. Grandadam, Direct Oxidation of Platinum under Pressure, 116
- Laigret (J.), [C. Mathis, C. Durieux and], Three Thousand Vaccinations against Yellow Fever in French Western Africa, 787
- Lallemand (Mme. Suzanne), Faculty and Germinative Energy of Dry, Irradiated Seeds, 911
- Lamb (Dr. C. G.), resignation of the readership in Electrical Engineering in Cambridge University, 224
- Lamb (Prof. H.), [death], 873
- Lambert (E. B.), and A. C. Davis, Fermentation of Mushroom Hotbeds, 703
- Lambrechts (A.), Appreciation of the quantity of Phlo-rhizin in the Liver and Kidneys after Intravenous Injection in the Dog, 155
- Lambrey (M.), Decomposition Velocity of some Nitric Esters at a Low Temperature, 787
- Lane (A. C.), [W. G. Foye and], Correlation by Radioactive Minerals, 425
- Lange (F.), [A. Brasch, A. Waly, Dr. T. E. Banks, T. A. Chalmers, Dr. L. Szilard, Prof. F. L. Hopwood and], Liberation of Neutrons from Beryllium by X-Rays: Radioactivity Induced by means of Electron Tubes, 880, 901
- Langevin (A.), [M. Gomez and], Utilisation of Piezoelectric Quartz, etc., 863
- Langley (Samuel Pierpont), (1834-1906), 240
- Lark-Horovitz (Dr. K.), and W. I. Caldwell, Structure of the Wood used in Violins, 23
- Larsen (H. O.), [death], 131
- Lasarew (Dr. B.), Superconductivity and the Hall Effect, 139
- Laschkarew (W. E.), and G. A. Kuzmin, Effect of Temperature on Diffraction of Slow Electrons and its Application, 62
- de Laszlo (Dr. H. G.), [Dr. V. E. Cosslett and], The Chlorine-Chlorine Distance in Carbon Tetrachloride, 63
- La Touche (J. D. D.), A Handbook of the Birds of Eastern China (Chihli, Shantung, Kiangsu, Anhwei, Kiangsi, Chekiang, Fohkien and Kwangtung Provinces). Vol. 2, Parts 3, 4 and 5 (*Review*), 646
- Laudat (M.), [L. Binet, J. Auclair and], Lowering of the Alkaline Reserve and the Movement of the Chlorine in the Blood in the course of Hyperthermia produced by Short Waves, 506
- Lauder-Thomson (Miss Isabel), [Dr. G. H. Berkeley and], Root Rots of Strawberry in Britain, 856

- Lauer (Dr. B.), [obituary article], 562
- Laughton (Prof. N. B.), and Prof. A. B. Macallum, Rôle of Insulin in Peripheral Metabolism, 325
- Laur (Prof. E.), Re-organisation of Present-Day Agriculture, 71
- Laurent (P.), [A. Chrétien and], Existence of a Frequent Type of Iodine Complex in Organic Solution, 710
- Lauscher (F.), Thermal Radiation and Restriction of Horizon, 948
- Lawrence (E. O.), [M. S. Livingston, M. C. Henderson and], Radioactivity Artificially Induced by Neutron Bombardment, 823
- Lay (H.), [Prof. G. Hevesy and], Fluorescent Yield of X-Ray Emission, 98
- Leather (Dr. J. W.), [death], 926
- Lebedev (P.), Geochemistry of Manganese in Western Siberia, 639
- Leckie (A. H.), [W. R. Angus and], Raman Spectrum of Nitrosylsulphuric Acid, 572
- Lecompte (J.), and J. Perrichet, Rotatory Dispersion in the Ultra-violet of Camphor in Sulphuric Acid Solution, 1019
- Ledingham (Prof. J. C. G.), appointed a member of the Medical Research Council, 531
- Lee (A. W.), A World-wide Survey of Microseisms, 1014
- Leeper (G. W.), Relationship of Soils to Manganese Deficiency of Plants, 972, 974
- Lefebvre (Mme. Lucie), Suppression of Certain Bands of the Spectrum of Ozone under the action of Low Temperature, 507
- Lefèvre (C.), and M. Rangier, Oxidation of Organic Sulphur applied to its determination, 507
- Legendre (J.), Maritime Mosquito, 1019
- Leh (L. L.), Shamanism in North America, 575
- Leigh-Smith (Mrs. Alice), [H. O. W. Richardson and],  $\beta$ -Rays of Radium D, 772
- Leitich (F.), Origin of the Craters on the Moon, 904
- Lejay (P.), Gravity Observations in Malaya, the Dutch Indies, Cambogia and Cochin China, 470
- Lelean (Prof. P. S.), Chlorination of Water Supplies, 56
- Lelu (Mlle. Paule), Comparative Digestive Utilisation of Albuminoid Matter in various Animal Species, 155
- Lemberg (Dr. R.), Urobilinogen, 422; [C. H. Waddington, Dr. J. Needham, W. W. Nowinski, Miss D. M. Needham and], Active Principle of the Amphibian Organisation Centre, 103
- Lemoigne (M.), and R. Desveaux, Origin of the Nitrogen Deficit in Aerobic Microbial Cultures, 471
- Lemoine (P.), R. Humery, and R. Soyer, Impoverishment of the Stratum of Green Sand of the Paris region, 75
- Lenz (Dr. E.), Electric Deflection of Cosmic Ultra-Radiation, 809
- Leroux (L.), Detection and Rapid Estimation of Very Low Concentrations of Active Chlorine in Water, 1019
- Lesser (Dr. A.), Pawnee Ritual Games, 939
- Lessing (Dr. R.), Fluorine in Coal, 699
- Letort (M.), Kinetics of the Thermal Decomposition of the Vapour of Acetaldehyde, 470
- Leuck (G. J.), and H. Mark, X-Ray examination of Carbohydrate Acetates, 817
- Levan (A.), Distribution of Chromosome Numbers in a progeny of Triploid *Allium schoenoprasum*, 254
- Levi (G. R.), and M. Tabet, Fibrous Structure in Ionic Lattices (2), 639
- Levi-Civita (T.), Tidal Friction and Planetary Motion, 941
- Levinstein (Dr. H.), plea for Patent Law reform, 525; Science and Armaments, 964
- Levy (Prof. H.), Power in Social Psychology, 972; Science in an Irrational Society (Conway memorial lecture), (Review), 889; The Autobiography of H. G. Wells (Review), 882
- Lévy (Mlle. Jeanne), Experimental Alcoholism, 947
- Lewis (Dr. A.), German Sterilisation Laws, 767
- Lewis (H.), Training for Administration in the Chemical Industry, 860
- Lewis (Dr. S. Judd), Spectroscopy in Science and Industry (Review), 199
- Lewis (Dr. W. B.), elected an unofficial (Drosier) fellow of Gonville and Caius College, Cambridge, 945
- Liche (H.), Photic Reactions of *Limnaea stagnalis*, 674
- Lidbetter (E. J.), Heredity and the Social Problem Group. Vol. 1 (Review), 917
- Liengme (A.), and Goudet, Proportion of the Blood Groups at Geneva, 639; and Nicole, A New Micro-organism Pathogenic to Man: *Bacillus cysticus fragilis*, 639; and Mlle. Piquet, the Interferometry of Hirsch, 639
- Lifshitz (S.), Apparent Duration Unit of Sound Perception, 431
- Lilienstern (M.), [O. Walther and], Diagnosis of Sex in Hemp, 155
- von Linde (Prof. K.), [death], 802; [obituary article], 998
- Lindsay (Sir Harry), appointed director of the Imperial Institute, 531
- Lindsay (K. M.), Public Efforts at Planning in Great Britain, 542
- Lindsay (M.), Exploration of the Greenland Ice-Sheet, 490
- Ling-Chao (Tsien), [Ny Tsi-Zé and], Oscillations with Hollow Quartz Cylinders cut along the Optical Axis, 214
- Linlithgow (Marquess of), appointed a member of the Medical Research Council, 493
- Linnett (J. W.), [Dr. H. W. Thompson and], Spectrum of Acrolein, 937, 938
- Linstead (R. P.), and others, Phthalocyanines, 386
- Lipman (Prof. J. G.), awarded the Chandler medal of Columbia University, 376
- Lipson (H.), [C. A. Beevers and], Crystal Structure of the Alums, 327
- Littleton (J. T.), and G. W. Morey, The Electrical Properties of Glass (Review), 236
- Livingston (M. S.), M. C. Henderson, and E. O. Lawrence. Radioactivity Artificially Induced by Neutron Bombardment, 823
- Ljungdahl (Dr. G.), Magnetic Survey of Sweden, 146
- Lloyd (Dr. D. Jordan), Tannin Chemistry (Review), 611
- Lloyd (H.), Automatic Firedamp Recorder, 492
- Lobashov (M.), and F. Smirnov, Nature of the action of Chemical Agents on Mutational Process in *Drosophila melanogaster* (2), 823
- Lock (G.), [F. Böck, K. Schmidt and], Perkin's synthesis of Cinnamic Acid, 392
- Loewenthal (M.), Life and Soul: Outlines of a Future Theoretical Physiology and of a Critical Philosophy (Review), 721
- Löffler (H.), [A. Wacek and], Detection of certain Volatile Amines with the view of the Investigation of Biological Processes, 155
- Lombardi (L.), and E. Bottani, Distribution of the Continuous Current in a Homogeneous Conductor subjected to the Influence of a Permanent Magnetic Field (2), 823
- Loofbourow (J. R.), [F. F. Heyroth and], Chemical constitution of Vitamin B<sub>1</sub> as deduced from Ultra-violet Absorption Spectra, 461
- Lorentz (late Prof. H. A.), Collected Papers. Vol. 7 (Review), 514
- Louis (Prof. H.), Mineral Deposits (Review), 235
- Love (W. H.), Sensitivity of Dividing and Non-Dividing Cells to Radiation, 252
- Lovern (Dr. J. A.), Fish Liver Oils rich in Vitamin A, 422; Composition of Fish Fats, 799
- Löwe (Dr. F.), Optische Messungen des Chemikers und des Mediziners (Review), 199
- Lowry (Prof. T. M.), Chemistry in Space (Review), 717; Crystal Chemistry (Review), 827; Physical Methods in Chemistry, 366; Polarimetric Methods in Chemistry, 920; 958; Valency Types and Problems (Review), 267
- Lucas (Keith), (Review), 475
- Lucas (Miriam S.), Ciliates from Bermuda Sea Urchins, 575
- Lucas (R.), A New Type of Powerful Electromagnet for the Study of Double Refraction and of Atomic Jets, 190
- Luchetti (G.), Causes of 'Intoxication' of Soil, 392
- Lundstrom (F. O.), [C. W. Whittaker and], Manufacture of Potassium Nitrate, 781
- Luthi (R.), [J. Weigle and], Some Negative Results on the Dielectric Constant, 674

- Lyons (Sir Henry), Scientific Societies and Museums, 374 ;  
Work of Sir Flinders Petrie, 874
- Lyons (J.), and M. O'Shea, Influence of the Stage of  
Lactation on Fat Estimations by the Gerber Method,  
334
- Lythgoe (Dr. R. J.), Practical Physiology of the Sense  
Organs, 97
- McAdie (A.), Fog (*Review*), 896
- Macallum (Prof. A. B.), [Prof. N. B. Laughton and], Rôle  
of Insulin in Peripheral Metabolism, 325
- Macarthur (Capt. John), Australian Wool and, 692
- MacBride (Prof. E. W.), Huxley (*Review*), 124 ; Prof. J. S.  
Huxley, Dr. F. C. S. Schiller and], Science and  
Psychical Research, 458
- McCance (R. A.), and H. L. Shipp, Chemistry of Flesh  
Foods and their losses on Cooking, 53
- McCandless (E. L.), [Dr. R. F. Mehl, F. N. Rhines and],  
Orientation of Oxide Films on Metals, 1009, 1011
- McClellan (Capt. W. N.), Inland Water Survey, 814
- Macdonald (Prof. H. M.), Electromagnetism (*Review*),  
610 ; Mathematical Aspects of the Propagation of  
Light, 482 ; Theories of Light, 366 ; [Lt.-Col. E. W.  
Watt and], British Association : Aberdeen Meeting,  
1934, 144
- McDougall (E. J.), Prof. F. Verzár, H. Erlenmeyer and H.  
Gaertner, Heavy Water in the Animal Body, 1006,  
1011
- McDougall (Prof. W.), Religion and the Sciences of Life :  
with other Essays on Allied Topics (*Review*), 7
- Maddowall (R. K.), Improved Method for the Handling  
and Dilution of Sulphuric Acid for Spraying Weeds,  
540
- Macfadgen (W. A.), Fossil Foraminifera from the Burd-  
wood Bank and their Geological Significance, 67
- MacFadyen (W. A.), Coastal Erosion of 'Coral Rock',  
105
- MacGillivray (Miss C. H.), [Dr. J. M. Bijvoet and], The  
Crystal Structure of  $\text{Hg}(\text{NH}_3)_2\text{Cl}_2$ , 849
- McGowan (Sir Harry), Fuel Research, 805 ; Uneven  
Front of Research (Messel memorial lecture), 510
- Macgregor (Prof. D. H.), and others, Economic Planning,  
503
- Machatschek (Prof. F.), Geomorphologie. Zweite Auflage  
(*Review*), 555
- McIlhenny (E. A.), Incubation of Alligators, 539
- McInerney (A. J.), The Rôle of the Deserts (*Review*), 556
- Mackney (A. W.), [J. C. Earl and], Action of Nitrous Acids  
on Dimethylaniline (2); 76 ; (3), 747
- McLachlan (Dr. N. W.), Loud Speakers : Theory, Per-  
formance, Testing and Design (*Review*), 119
- McLean (Prof. R. C.), appointed secretary of the Com-  
mittee of the International Conference of University  
Representatives, 71 ; Transpiration Current in Horse-  
tails, 66 ; and Miss Myfanwy Evans, The Maïle  
Reaction and the Systematic Position of the Gnetales,  
936, 938
- McMahon (E.), [J. Carroll and], Hatching Experiments on  
the Potato Eelworm (*Heterodera schachtii*), 66
- Macmillan (H.), National Planning in Industry, 564
- Macmillan (Lord), appointed a trustee of the Beit Memorial  
Fellowship for Medical Research, 531
- Macnaughtan (D. J.), and others, Bearing Metals, 671
- McPetrie (Dr. J. S.), A Determination of the Electrical  
Constants of the Earth's Surface at Wave-lengths of  
1.5 and 0.46 m., 74 ; Electrical Properties of Materials  
at High Radio Frequencies, 897, 901 ; [Dr. R. L.  
Smith-Rose and], Measurement of the Electrical  
Constants of Soil by a Lecher-wire method at a Wave-  
length of 1.5 m., 74 ; Electrical Properties of Soil at  
very High Frequencies, 781
- McPhee (E. T.), Official Year Book of the Commonwealth  
of Australia, No. 26, 1933 (*Review*), 49
- MacRobert (Prof. T. M.), Some Integrals of Associated  
Legendre Functions, 226
- Majorana (Q.), New Interference Apparatus, 638
- Malan (Dr. D. J.), [Dr. B. F. J. Schonland, H. Collens  
and], Development of the Lightning Discharge, 177
- Maliuga (D.), [V. Sadikov and], Autoclave Splitting of  
Blood Albumin with 2 per cent Phosphoric Acid (1),  
639
- de Malleman (R.), and P. Gabaino, Magnetic Rotatory  
Power of Hydrogen Arsenide and of Hydrogen  
Phosphide, 673
- Malmesbury (Earl of), president of the Health Congress  
of the Royal Sanitary Institute, 1935, 249
- Mangat (Sher Singh), [Fazal-ud-Din and], A Modification  
of the Gas Circulating Pump, 104
- Mann, Billington, and Kaimal, Yield of Rubber from Vege-  
tatively Propagated Clones, 31
- Mann (T.), [Prof. J. K. Parnas, P. Ostern and], Linkage  
of Chemical Changes in Muscle, 1007, 1011
- Mansfield (W. S.), appointed director of the Cambridge  
University Farm, 945
- Manter (H. W.), Trematodes from Deep-water Fishes, 855
- Mao (Y. T.), The Chinese Mitten Crab, 17
- Mark (Prof. H.), Das Schwere Wasser, 56
- Mark (H.), [G. J. Leuck and], X-Ray Examination of  
Carbohydrate Acetates, 817
- Marks (S.), [Dr. J. Newton Friend and], Oxygen Prepara-  
tion from Sodium Peroxide : a Dangerous Experi-  
ment, 778
- Marmier (L.), A Catalyst for the Production of Nitric  
Acid by the Oxidation of Ammonia, 863
- Marmite Food Extract Co., Ltd., Vitamin B<sub>1</sub> Potency of  
Marmite, 770
- Marques (Mme. Branca Edmée), Fractional Precipitation  
of Radiferous Barium Sulphate, 39
- Marquis (F. J.), appointed a member of the Industrial  
Health Research Board of the Medical Research  
Council, 733
- Marrack (Dr. J. R.), appointed professor of Chemical  
Pathology at London Hospital Medical College, 152 ;  
Chemistry of Antigenes and Antibodies, 468
- Marriage (A.), elected a minor research student at Clare  
College, Cambridge, 152
- Marshall (A.), War by Poison (*Review*), 952
- Marshall (Dr. F. H. A.), Sexual Physiology as applied to  
Practice (*Review*), 643
- Marshall (Miss Sheina M.), Production of Microplankton  
in the Great Barrier Reef Region, 636 ; Seasonal  
variations in the size of *Calanus finmarchicus* in the  
Clyde Sea-area, 292
- Martin (Dr. A. E.), [Sir Robert Robertson, Dr. J. J. Fox  
and], Two Types of Diamond, 485
- Martin (A. J. P.), T. Moore, Marion Schmidt, and Dr.  
F. P. Bowden, Absorption Spectrum of Vitamin E, 214
- Martin (Dr. D. J.), An Introduction to Thermodynamics  
for Chemists (*Review*), 49
- Martin (Dr. H.), Utilisation of Petroleum products as  
Horticultural Spray Materials, 977
- Martin (H.), [W. Kuhn and], Structure of Amphoteric  
Ions, 1017
- Martin (Dr. L. C.), Modern Tendencies in Optics (*Review*),  
989
- Martin (L. W. O.), A Theory of Association, 983
- Martin (T.), Faraday (*Review*), 616
- Martindale (J. G.), [Prof. E. N. da C. Andrade and],  
Crystallisation of Metals from Sparse Assemblages, 321
- Marvin (F. S.), Philosophy of Life (*Review*), 7
- Mashino (Dr. M.), awarded the medal for "special merit  
in research" of the Society of Chemical Industry,  
Japan, 97
- Mason (T. G.), and E. Phillis, Translocation of Nitrogen, 184
- Mathieu (M.), Study by Röntgen Rays of the fixation  
of Acetone by Nitrocellulose, 298 ; and C. Kurylenko,  
Absorption of Acetone by the Nitrocelluloses, 506
- Mathis (C.), J. Laigret, and C. Durieux, Three Thousand  
Vaccinations against Yellow Fever in French Western  
Africa, 787
- Mattauch (Dr. J.), Isotopes, 466
- Matthews (B. H. C.), [Prof. E. D. Adrian and], Electrical  
Changes in the Cerebral Cortex, 901
- Maulik (S.), Inheritance of Habits, 253
- Mawer (A.), [J. E. B. Gover, F. M. Stenton, and, in col-  
laboration with A. Bonner], The Place-names of  
Surrey (*Review*), 893

- Maxwell, Bt. (Sir Herbert), Reduction of Traffic Noise, 701
- Maxwell (H.), Chronology of Scottish Caves, 316
- Maxwell (Sir John Stirling), re-elected chairman of the British Wood Preserving Association, 1003
- May (Surg.-Capt.), [Surg.-Capt. Dudley, Surg.-Comdr. O'Flynn and], Active Immunization against Diphtheria, 220
- Maycock, The University in the New Age, 491
- Maynard (G.), [J. Reid Moir and], Roman Remains at Ipswich, 384
- Mayneord (W. V.), Biological Effects of High-energy Radiation, 857
- Mayo (Prof. E.), The Human Problems of an Industrial Civilisation (*Review*), 201; 549
- Mazza (F. P.), and L. Pannain, Mechanism of the Action of Histozyyme, 40
- Meade (A.), The New Modern Gasworks Practice. Being the third edition of "Modern Gasworks Practice". Vol. 1: Design and Construction of Gasworks, Carbonisation Plant, Mechanical Handling of Materials (*Review*), 400
- Médard (L.), New Results on the Raman Effect of the Hydroxyl Radical, 506
- Mee (A. J.), Taste and Chemical Constitution, 977
- Mees (Dr. C. E. K.), Scientific Thought and Social Reconstruction (Steinmetz Memorial Lecture), 601; Sound Recording for the Cinematograph (Sir Henry Truman Wood Memorial Lecture), 260
- Meetham (A. R.), and G. M. B. Dobson, Vertical Distribution of Atmospheric Ozone in High Latitudes, 822
- Megaw (E. C. S.), Magnetron Oscillations, 324
- Megaw (H. D.), Cell Dimensions of Ordinary and 'Heavy' Ice, 900, 901
- Mehl (Dr. R. F.), E. L. McCandless, and F. N. Rhines, Orientation of Oxide Films on Metals, 1009, 1011
- Meier (Dr. Florence E.), Toxic Effects of Ultra-Violet Radiation, 632
- Mellanby (Dr. E.), Nutrition and Disease: the Interaction of Clinical and Experimental Work (*Review*), 830
- Mellanby (Dr. K.), appointed Wandsworth scholar at the London School of Hygiene and Tropical Medicine, 733
- Meller (Dr. H. B.), The Smoke Abatement Outlook, 224
- de Mello (I. F.), and M. Raimundo, A New Parasite in the Blood of Birds, 741
- Mellor (D. P.), [F. P. Dwyer and], X-Ray Diffraction Studies of the Crystallisation of Amorphous Silica, 76; X-Ray Study of Opals, 583
- Mellor (Dr. J. W.), A Comprehensive Treatise on Inorganic and Theoretical Chemistry. Vol. 13 (*Review*), 236; Uncle Joe's Nonsense: for Young and Old Children (*Review*), 441
- Mendeleejev (I.), [G. Vereschagin, A Gorbov and], Occurrence in Nature of Water with Anomalous Density, 335
- Mendelssohn (K.), [T. C. Keeley, J. R. Moore and], Experiments on Supraconductors, 773
- Mercer (W. B.), Micro-organisms and Plant Growth, 218
- Merrill, and Wilson, Paschen Series in Stellar Spectra, 466
- Métadier (J.), Action of the Magnetic Field on the Brownian Movement, 1019
- Mettler (D.), Skating Rinks and Wave Bathing Pools, 209
- Metz (C. W.), Rôle of the 'Chromosome Sheath' in Mitosis, and Its Possible Relation to Phenomena of Mutation, 263
- Meunier (P.), Determination of very small amounts of Aluminium in Complex Media, 1019
- Meyer (Prof. E.), M. Schein, and B. Stoll, Light of Very Short Wave-Length (2100 Å.) in the Solar Spectrum, 535
- Meyer (G. M.), Medieval Spices, 414
- Meyer (S. L.), Alleged Stimulation of Moulds by Paraffin in Heavy Water, 665
- Meyers (C. H.), [N. S. Osborne and], Steam Tables, 491
- Michel-Lévy (A.), and H. Muraour, Experiments in Micro-pyrotechny, 191; Luminosity of Waves of Shock, 39
- Michelmores (A. P. G.), and W. Allan, Phases of the Red winged Locust, 30
- Miesowicz (M.), Refractive Indices of Some Liquids in the Domain of the Short Electric Waves, 155
- Mignonac (G.), and E. Ditz, Polymerisation of Acetylene under the Influence of Heat, 471
- Miles (A. A.), appointed reader in Bacteriology in the British Postgraduate Medical School, 745
- Mill (Dr. H. R.), Annals of the Arctic (*Review*), 884
- Millat (L.), [Raymond-Hamet and], New Alkaloid from *Mitragyna*, Mitrinermine, 638
- Miller, Jr. (G. S.), awarded the Joseph Leidy Medal of the Academy of Natural Sciences of Philadelphia, 878
- Mills (J.), Signals and Speech in Electrical Communication (*Review*), 916
- Milne (Prof. E. A.), Analysis of Stellar Variations, 69
- Milne (G. S.), awarded the Vickers Armstrong scholarship of the Institution of Naval Architects, 637
- Milne-Thomson (Prof. L. M.), The Calculus of Finite Differences (*Review*), 231
- Mimno (Prof. H. R.), Wireless Echoes from Regions above the F Layers, 63
- Minot (Dr. G. R.), Dr. W. P. Murphy, and Dr. G. H. Whipple, awarded jointly the Nobel prize for Medicine and Physiology for 1934, 691
- Miranda (C.), Fermi's Differential Equation, 817
- Mirrlees (S. T. A.), Meteorology of Greenland, 704
- Mirsky (Jeannette), Northern Conquest: the Story of Arctic Exploration from Earliest Times to the Present (*Review*), 884
- Mitchell (Prof. A. C. G.), and Prof. M. W. Zemansky, Resonance Radiation and Excited Atoms (*Review*), 953
- Mitchell (K.), appointed assistant lecturer in Applied Mathematics in Leeds University, 152
- Mitchell (Sir Peter Chalmers), retirement of; work of, 280
- Mitkevich (A. V.), Anomalous Case of Magnetic Viscosity, 1020; Some Conditions Increasing the Phenomenon of Magnetic Viscosity, 191
- Mitra (Kalipada), Social Life in Ancient India, 666
- Miwa (T.), and S. Yoshii, Formation of Urease by *Aspergillus*, 257
- Miyabe (Prof. N.), Deformations of the Crust around Sakura-jima (Japan), 940; Sanriku (Japan) Earthquake Seawaves of 1933, 820
- Moberly (Sir Walter Hamilton), appointed chairman of the University Grants Committee, 297
- Moerman (N. F.), [Prof. A. Smits and], Complexity of the Solid State, 698
- Moffatt (J. R.), appointed farm manager at the Rothamsted Experimental Station, 878
- Mogg (A. O. D.), [E. C. Chubb, G. B. King and], A New Variation of Smithfield Culture from a Cave on the Pondoland Coast, 334
- Mohr (Dr. C. B. O.), and Dr. Nora Wooster, The Scientific Approach to Peace, 854
- Moir (Dr. J. C.), appointed reader in Obstetrics and Gynaecology in the British Postgraduate Medical School, 745
- Moir (J. Reid), and J. P. T. Burchell, Classification of Stone Age Cultures, 526; Palæolithic Pottery, 766; and G. Maynard, Roman Remains at Ipswich, 384
- Molchanov (Prof. P. A.), Russian Studies of the Stratosphere, 353
- Molliard (M.), Heather and Mycorrhiza, 946; and A. Crépin, Characters presented by Green Plants which Develop in Air Enriched with Carbon Dioxide, 982
- Moneriff (Dr. A. A.), appointed Goulstonian lecturer of the Royal College of Physicians of London, 176
- Monforte (F.), [G. Scagliarini and], Reaction between Sodium Nitropentacyanide and Alkali Sulphides (4), 983
- Monnier (Dr. A.-M.), L'Excitation électrique des tissus: essai d'interprétation physique (*Review*), 511
- Monro (Prof. T. K.), The Physician: as Man of Letters, Science and Action (*Review*), 394
- Montandon (F.), Alpine Landslips, 32
- Mookerjee (Prof. Himadri Kumar), Causes of Formation of Different Forms of Vertebrae, 182

- Moore (J. R.), [T. C. Keeley, K. Mendelssohn and], Experiments on Supraconductors, 773
- Moore (Prof. R. C.), Historical Geology (*Review*), 829
- Moore (T.), [A. J. P. Martin, Marion Schmidt, Dr. F. P. Bowden and], Absorption Spectrum of Vitamin E, 214
- Moorhouse (F. S.), [A. P. Orr and], Great Barrier Reef Expedition, 1928-29. Scientific Reports. Vol. 2. No. 4, 636
- Moran (Dr. T.), Dr. G. A. Reay, and Dr. E. C. Smith, Muscle Proteins, 798
- More (J. A.), [Prof. J. A. S. Watson and], Agriculture: the Science and Practice of British Farming. Third edition (*Review*), 830
- Moreau (R. E.), Breeding Habits of Hornbills, 899
- Morey (G. W.), [J. T. Littleton and], The Electrical Properties of Glass (*Review*), 236
- Moriarty (M.), [J. M. O'Connor, O. Fitzgerald and], Physiological Basis of the Sensation of Cold, 910
- Morison (C. G. T.), proposed appointment as Reader in Soil Science in Oxford University, 861
- Morris (K. R. S.), Bionomics of the Tsetse Fly on the Gold Coast, 939
- Morrison (F. R.), [A. R. Penfold and], Essential Oils of the Genus *Calythrix* (1), 75
- Mortensen (Prof. T.), and others, Littoral Fauna of Hong Kong, 328
- Morton (F.), Results of a Journey to Abyssinia, Egypt and the Quarnero Islands in 1931-32, 392
- Morton (L. T.), How to Use a Medical Library, 493
- Morton (W. B.), Stability and Oscillations of Certain Permanent Arrangements of Parallel Vortices, 190
- Mosaner (Dr. W.), Speed of Snakes, 318
- Mott (R. A.), Dud Dudley and the Coal-Iron Industry, 842
- Mottram (Dr. J. C.), Sensitivity of Dividing and Non-Dividing Cells to Radiation, 252
- Motz (H.), [J. J. Trillat and], Diffraction of Electrons by India-rubber, 226
- Mougin (P.), Ministère de l'Agriculture: Direction des Eaux et du Génie rural-Etudes glaciologiques, 1920-1930. Tome 7, 992
- Mousseron (M.), [M. Godehot and], Passage from one Ring to another by the Deamination of 2-Aminocyclanols, 154
- Mowdawalla [Ramaswamy, Narayanaswami and], Dielectrics, 816
- Moxnes (N. H.), [Prof. R. B. Engelstad and], Possible Action of Cosmic Rays on Living Organisms, 898, 901
- Muckenthaler (H.), Isotopic Ratio of Oxygen and the Atomic Weight of Hydrogen, 977
- Muir (Sir Robert), tribute to, 94
- Muir (Sir Thomas), [obituary article], 449
- Mukherjee (S. K.), [Prof. N. R. Dhar and], Photosynthesis of Amino Acids *in vitro*, 499
- Mukerji (Dev Dev), [Dr. Sunder Lal Hora and], Burmese Fishes, 855
- Mukerji (Dr. S. K.), [obituary article], 802
- Mukerji (Dr. S. K.), Raman Spectra of Decahydro- and Tetrahydro-Naphthalene, 811
- Muliyil (J. A.), [Dr. H. W. Beams, Prof. J. B. Gatenby and], Use of the Ultra-Centrifuge for Studying the Golgi Apparatus, 810
- Muller (G.), [E. Vellinger and], Oxidation of Mineral Oils by Atmospheric Oxygen at Moderate Temperatures, 262
- Müller (Dr. A.), and Dr. R. E. Clay, X-Ray Plant at the Davy-Faraday Laboratory, 942
- Müller (J.), and Dr. S. Pilat, Cyclic Components of Paraffin Wax, 459
- Mulliken (Prof. S. P.), [death], 998
- Munro (G. H.), and Dr. H. C. Webster, Nature of Atmospheres, 880, 901
- Munro (Dr. N. G.), The Ainu, 464
- Muraour (H.), [A. Michel-Lévy and], Experiments in Micropyrotechny, 191; Luminosity of Waves of Shock, 39
- Murdock (Prof. G. P.), Our Primitive Contemporaries (*Review*), 164
- Murphy (Dr. W. P.), [Dr. G. R. Minot, Dr. G. H. Whipple and], awarded jointly the Nobel prize for Medicine and Physiology for 1934, 691
- Murray (Prof. D. A.), [death], 691
- Murray (D. S.), The Laboratory: its Place in the Modern World (*Review*), 889
- Murray (Dr. J.), The Educational Machine, 528
- Murray (Dr. J. A.), Prof. C. O. Jensen, 524
- Murzajev (P.), Mineralogical and Geochemical Prognoses, 263
- Muskett (A. E.), H. Cairns, and E. M. Carrothers, Fungus Flora of Ulster, 226; 856
- Musya (K.), Sanriku (Japan), Earthquake Seawaves of 1933, 820
- Myers (G. S.), Three New Deep-Water Fishes from the West Indies, 740
- Myers (Dr. J. G.), Hive-Bees do not Necessarily Sacrifice their Lives when they Sting, 290
- Myres (Prof. J. L.), The Man of Science and the Science of Man, 17; 41
- Nadson (G. A.), and E. A. Stern, Biological Action of Metals at a Distance, 335
- Naegeli (Prof. O.), Allgemeine Konstitutionslehre in naturwissenschaftlicher und medizinischer Betrachtung. Zweite Auflage (*Review*), 309
- Nagl (F.), [E. Schally and], 'Streaking' in Chemical Investigations (6), 392
- Nakaya (Prof. U.), and F. Yamasaki, Spark Investigation by the Wilson Chamber, 496
- Narayanaswami [Ramaswamy, Mowdawalla and], Dielectrics, 816
- Natta (G.), [G. Bruni and], Structure of Guttapercha, Studied by Electron Rays, 228; Structure of Unstretched Rubber Studied by Means of Electron Rays, 507
- Nayar (T. B.), Metal Images from Southern India, 575
- Nayder (T.), Density of Liquid Iodine, 191
- Needham (Miss D. M.), [C. H. Waddington, Dr. J. Needham, W. W. Nowinski, R. Lemberg and], Active Principle of the Amphibian Organisation Centre, 103
- Needham (Dr. J.), Morphology and Biochemistry, 275; [C. H. Waddington, W. W. Nowinski, Miss D. M. Needham, R. Lemberg and], Active Principle of the Amphibian Organisation Centre, 103
- Neuberg (Mlle. I.), [M. Tiffeneau and], Action of Phenylmagnesium Bromide on Lævorotatory Dibenzoylglyceric Aldehyde, 227
- Neuburger (M. C.), Kristallchemie der anorganischen Verbindungen (*Review*), 827
- Neujmin (H.), [Prof. A. Terenin and], Photodissociation of Molecules in the Schumann Ultra-Violet, 255
- Neuman (M. B.), [A. I. Serbinov and], Effect of Nitrogen Peroxide on the Kinetics of Ethane Oxidation, 546
- Neville (Prof. E. H.), British Association Mathematical Tables, 778
- Newbigin (Dr. Marion), [death], 131; [obituary article], 206
- Newman (Prof. F. H.), and H. J. Walke, Induced Positron Radioactivity, 288; Induced Radioactivity and Transmutation, 64; Induced Radioactivity, 537
- Newman (Sir George), The Rise of Preventive Medicine (*Review*), 394
- Newton (Dorothy E.), [W. H. Brittain and], Pollen Constancy of Bees, 31
- Nicholls (Dr. A. G.), Biology of *Calanus finmarchicus*, 292
- Nicol (Dr. H.), Micro-organisms and Plant Growth, 218
- Nicole [A. Liengme and], A New Micro-organism Pathogenic to Man: *Bacillus cysticus fragilis*, 639
- Nicholls (Dr. A. G.), Developmental Stages of *Euchæta norvegica*, 424
- Nierenstein (Dr. M.), History of Organic Analysis, 95; The Natural Organic Tannins: History, Chemistry, Distribution, 611
- Nishira (Y.), R. Sagane, M. Takeuchi, and R. Tomita, Energies of the Positrons in Induced Radioactivity, 941

- Noble (R. J.), Longevity of Spores of the Fungus *Urocystis tritici*, Koern, 76
- Nolan (J. J.), a Method for Counting Atmospheric Ions and Determining their Mobility, 982
- Nolan (T. J.), Chemical Constituents of Lichens found in Ireland (2), 154; J. Keane, M. Cassidy, and N. E. Dolan, Chemical Constituents of Lichens found in Ireland (1), 154
- North (B. Viswa), and M. Suryanarayana, Effect of Yeast Extract on the Growth of Plants, 27
- North (Dr. F. J.), The Museum of Practical Geology, 419
- du Noüy (Dr. P. Lecomte), The *p*-H of Serum inactivated by Heat, 628
- Nowinski (W. W.), [C. H. Waddington, Dr. J. Needham, Miss D. M. Needham, R. Lemberg and], Active Principle of the Amphibian Organisation Centre, 103
- Nowlan (Prof. F. S.), Analytic Geometry. Second edition (Review), 684
- Oakley (K. P.), Phosphatic Calculi in Silurian Polyzoa, 1014
- O'Connor (Miss Cecilia), [Dr. R. N. Salaman and], A New Potato Epidemic in Great Britain, 932, 938
- O'Connor (J. M.), M. Moriarty, and O. Fitzgerald, Physiological Basis of the Sensation of Cold, 910
- Odhner (Dr. N. H.), Antarctic Nudibranchs, 1013
- O'Flynn (Surg.-Comdr.), [Surg.-Capt. Dudley and May and], Active Immunization against Diphtheria, 220
- Ogawa (F.), Nerve Cells of Earthworm, 666
- Ogg (A.), E. N. Grindley, and B. Gotsman, Diurnal and Secular Variations of the Earth's Magnetic Field at Cape Town, 638
- Ogilvie (Prof. A. G.), Co-operative Research in Geography; with an African Example, 368; The Native and His Industries in Northern Rhodesia, 588
- O'Gorman (Col. M.), Research and Road Traffic, 310; Science and Road Traffic, 965
- Öhman (Dr. Y.), Effects of Polarisation in the Spectrum of  $\beta$  Lyræ, 534
- Ohshima (H.), and H. Ikeda, Pairing in Starfishes, 385
- Oka (Asajiro), The Ascidian *Clavelina* in the Pacific, 666
- Oldfield (R. C.), awarded the Arnold Gerstenberg studentship of Cambridge University, 908
- Oldham (R. D.), Development of the Rhone Delta, 703
- Oliphant (Dr. M. L.), elected a fellow of St. John's College, Cambridge, 37; Secondary Emission from Elements Bombarded with Neutrons, 735; P. Harteck, and Lord Rutherford, Nuclear Transmutations with Heavy Hydrogen, 69; E. S. Shire, and B. M. Crowther, Nuclear Disintegration Experiments with Pure Isotopes, 904
- Oliver (D. A.), Electroacoustical Reproducers (Review), 119
- Ollano (Dr. Z.), Secondary Emission from Elements Bombarded with Neutrons, 735
- Olsen (C.), Absorption of Manganese by Plants, 465
- Olsson (Dr. E.), Isotope Effect in the Band Spectrum of Sodium Hydride, 697
- O'Neill (H.), [G. S. Farnham and], Crystal Re-orientation of Cold Drawn Wires due to Reheating, 632
- Oparin (A. I.), Metabolism in Sugar Beet at Low Temperatures and the Storage of Beet in a Frozen State, 335
- Oppenheimer (Jane M.), Developing Stages of *Fundulus*, 912
- Orechovitch (V. N.), and N. V. Bromley, Histolytic Properties of the Regenerating Blasteme, 507
- Orford (Margaret), Neolithic Stone Implements found at Regina in the Western Transvaal, 335
- Ornstein (L. S.), and H. Brinkman, Arc Discharge, 501
- Orr (A. P.), Weight and Chemical Composition of *Euchæta norvegica*, Boeck, 424; and F. S. Moorhouse, Great Barrier Reef Expedition, 1928-29. Scientific Reports. Vol. 2, No. 4, 636
- Orr (W. J. C.), and Dr. D. W. Thomson, Diffusion of Heavy into Light Water, 776
- Orr (Prof. W. McF.), [death], 280; [obituary article], 487
- Osborne (N. S.), and C. H. Meyers, Steam Tables, 491
- O'Shea (M.), [J. Lyons and], Influence of the Stage of Lactation on Fat Estimations by the Gerber Method, 334
- Ostenfeld (C. H.), and J. Grøntved, The Flora of Iceland and the Faroes (Review), 308
- Ostern (P.), [Prof. J. K. Parnas and], Chemistry of Anaerobic Recovery in Muscle, 627; [Prof. J. K. Parnas, T. Mann and], Linkage of Chemical Changes in Muscle, 1007, 1011
- Owen (B. B.), Dissociation Constant of Boric Acid, 541
- Owens (Dr. J. S.), Measuring Rate of Evaporation, 330; [O. S. Duffendack and], Quenching of Resonance Radiation, 817
- Paget, Bt. (Sir Richard), Production and Planning, 140
- Pahl (M.), [Prof. G. Hevesy, R. Hosemann and], Radioactivity of Potassium, 377
- Paic (M.), Rotatory Dispersion of the Sera of Normal and Syphilitic Rabbits, 471
- Pajevskij (V.), Probability of Survival under the Mortality Conditions of a Given Calendar Period, 39
- Palache (C.), Form Relations of the Lead Oxychlorides, Laurionite, Paralaurionite, and Fiedlerite, 114
- Palfray (L.), and Mlle. Suzanne Tallard, Influence of the Free Acidity on the Determination of Aldehydes and Ketones by Hydroxylamine Hydrochloride, 431
- Pallary (P.), Algerian Stone Age, 975
- Pannain (L.), [F. P. Mazza and], Mechanism of the Action of Histozyyme, 40
- Parejas (E.), Some Species of *Actiniscus* of the Upper Cretaceous of Brasses (Préalps médianes) and of the Island of Elba, 582; [L. W. Collet and], Presence of the Upper Cretaceous in an Alpine Nappe of Elba, 582; [L. W. Collet and], Tertiary of the Saleve (1), 674
- Pâris (R.), Thermometric Study of the Precipitation of Insoluble Ferrocyanides, 863
- Parisi (E.), and G. De Vito, Maturation of Cheese (1), 983
- Parker (G. H.), Prolonged Activity of Momentarily Stimulated Nerves, 472
- Parker (R. H.), [G. J. Burrows and], Some Tetra-covalent Platinum Compounds Derived from Tertiary Arsines, 583
- Parker (W. H.), Mummy Wheat, 730
- Parnas (Prof. J. K.), and P. Ostern, Chemistry of Anaerobic Recovery in Muscle, 627; P. Ostern, and T. Mann, Linkage of Chemical Changes in Muscle, 1007, 1011
- Parr (A. E.), Deep Sea Berysomorphi and Percomorphi from the Waters around the Bahama and Bermuda Islands, 30
- Parr (W. J.), [F. Chapman, W. Howchin and], Revision of the Nomenclature of the Permian Foraminifera of N.S.W., 675
- Parsons (C. W.), Penguin Embryos, 630
- Parsons (Dr. F. G.), British Neolithic Man (Review), 604
- Parsons (Dr. L. M.), The Universe of our Experience (Review), 81
- Parsons (Dr. T. R.), Fundamentals of Biochemistry: in Relation to Human Physiology. Fourth edition (Review), 162
- Partansky (A. M.), [H. K. Benson and], Rate and Extent of Anaerobic Decomposition of Sulphite Waste Liquor by Bacteria of Sea-water Mud, 984
- de Passillé (A.), Dissociation of the Ammonium Phosphates, 470; Method of Preparation of Pure Arsenic, 39
- Pastori (G.), [A. Gemelli and], Vowel Sound Perception, 742
- Patat (F.), and H. Hoch, Determination of Spin and Statistics of the Deuteron Nucleus from Thermal Data, 156
- Paterson (C. C.), Electron in Industry, 805; Modern Street Lighting, 957; [Dr. N. R. Campbell and], the Photoelectric Cell, 526
- Patton (R. T.), Ecological Studies in Victoria (3), 675
- Pauling (L.), and L. O. Brockway, Structure of the Carboxyl Group (1), 547; and J. Sherman, Structure of the Carboxyl Group (2), 547
- Paulsen (O.), Raman Observations on Dichloroethylene, 392



- Paulsen (Prof. O.), Red 'Water-Bloom' in Iceland Seas, 974  
 Pauthenier (M.), and L. Agostini, Law of Charge of a Spherical Particle in an Ionised Field, 787  
 Pavari (Prof. A.), The Fascist Government and the Restoration of Italian Forests, 528  
 Pavlov (Prof. I. P.), Eighty-fifth Birthday, and Work of, 351  
 Pawlow (Prof. I. P.), Autorisierte Übersetzung aus dem Russischen von Prof. G. Volborth, Vorlesungen über die Arbeit der Grosshirnhemisphären (*Review*), 792  
 Pax (F.), Anthozoa of the North Sea and Baltic, 576  
 Payman (W.), and D. W. Woodhead, The Pressure Wave sent out by an Explosive, (3), 976  
 Payne (C. J.), [B. W. Anderson and], Specific Gravity of Lapis Lazuli, 627  
 Peace (T. R.), [W. R. Day and], Experimental Production and the Diagnosis of Frost Injury on Forest Trees, 293  
 Peake (H. J. E.), Excavations in Berkshire, 316  
 Peano (Giuseppe), Scientific work of, 566  
 Pearce (Dr. J. A.), [Dr. J. S. Plaskett and], Dimensions of the Galactic System, 577  
 Pearce (J. G.), National Scheme of Foundry Education, 72  
 Pearl (Prof. R.), Weight of Negro Brains, 1012; and Ruth De Witt Pearl, The Ancestry of the Long-Lived. (*Review*), 886  
 Pearl (Ruth De Witt), [Prof. R. Pearl and], The Ancestry of the Long-Lived (*Review*), 886  
 Pearce (Dr. R. W. B.), [A. G. Gaydon and], Spectrum of Nickel Hydride, 287  
 Peers (Sir Charles), Ancient Monuments of Cyprus, 730  
 Peet (late Prof. T. E.), proposed memorial to, 962  
 Peirce (Prof. G. J.), Movement of Sap in Trees, 385  
 Pembrey (Prof. M. S.), [death], 171; [obituary article], 350  
 Pendlebury (H. M.), [Dr. A. S. Corbet and], The Butterflies of the Malay Peninsula (*Review*), 164  
 Pendred (L. St. L.), A Survey of Ships and Engines (Thomas Lowe Gray lecture), 875  
 Pendse (C. G.), elected an Isaac Newton Student of Cambridge University, 821  
 Penfold (A. R.), and F. R. Morrison, Essential Oils of the Genus *Calythrix* (1), 75; G. R. Ramage, and J. L. Simonsen, Essential Oil of *Calythrix tetragona*, var. 'A', 984; G. R. Ramage, and J. L. Simonsen, Identity of Darwinol with *d*-myrtenol, 546  
 Penrose (Dr. L. S.), Heredity and Disease in Man, 630; Inheritance of Mental Ability, 1017  
 Pérard (A.), and M. Romanowski, New Comparisons of National Standards of Electrical Resistance, 582  
 Percival (Dr. J.), Wheat in Great Britain (*Review*), 606  
 Pérez (Prof. C.), Evolution of the Hermit Crab, 106  
 Perrett (Dr. W.), Some Questions of Musical Theory, 248  
 Peretti (G.), Groups of Electromagnetic Waves in Anisotropic Media, 583  
 Perrichet (J.), [J. Lecompte and], Rotatory Dispersion in the Ultra-Violet of Camphor in Sulphuric Acid Solution, 1019  
 Perrier (E.), *Traité de Zoologie*. Fasc. 10: Les mammifères (*Review*), 794  
 Perrier (Prof. R.), *Traité de Zoologie*. Index Alphabétiques des 10 fascicules (*Review*), 794  
 Perrin (F.), Dissymetry of the Positive and Negative  $\beta$  spectra and the Intrinsic Mass of the Neutrino or Ergon, 191  
 Perrin (R.), Metamorphism, 155  
 Petavel (Capt. J. W.), The United States United Communities Bill from the Point of View of India's Educational Problems, 282  
 Petch (T.), The Genus *Isaria*, 1013  
 Peters (H.), [C. S. Ickringill and], The 'Isolated Basins' Electricity Scheme, Upper Egypt, 528  
 Petersen (Dr. H. E.), Wasting Disease of Eelgrass (*Zostera marina*), 143  
 Petersen (H.), [D. R. Hartree, R. de L. Kronig and], Fine Structure of X-Ray Absorption Edges, 466  
 Pethybridge (G. H.), W. C. Moore, and Dr. A. Smith, Fungus and other Diseases of Crops, 1928-1932, 424  
 Petinof (N.), Grain Quality Control of Irrigated Wheats of the Transvolga Areas, 583  
 Petrie (D. P. R.), elected to a Dominion and Colonial exhibition at Trinity College, Cambridge, 224  
 Petrie (Sir Flinders), Archaeology of the Caucasus, 182; Portrait of; Work of, 874  
 Petterson (Dr. H.), The "Johannes Schmidt" Ridge in the Indian Ocean, 29; 536  
 Petterson (H.), Ultra-violet Spectrum of Radium Emanation, 392; [Elisabeth Kara-Michailova and], Detection of a  $\gamma$ -radiation from Excited Xenon Nuclei, 547; [Berta Karlik and], Spectrum of Polonium, 547  
 Peyrot (P.), [E. Canals and], Fluorescence of some Pure Substances, 154  
 Pfozter (G.), [Prof. E. Regener and], Intensity of the Cosmic Ultra-Radiation in the Stratosphere with the Tube-Counter, 325  
 Phillips (Prof. H. B.), Differential Equations. Third edition (*Review*), 684  
 Phillis (E.), [T. G. Mason and], Translocation of Nitrogen, 184  
 Piaggio (Prof. H. T. H.), Evolution of Ideas of Space (*Review*), 611; New Form of Graphical Representation (*Review*), 476  
 Piekara (A.), and M. Schérer, Influence of the Magnetic Field on the Dielectric Constant of Liquids, 862  
 Pierucci (M.), and L. B. Silva, Electric Arcs with Fused Metals and Salts as Electrodes, 495  
 Pilat (Dr. S.), [J. Müller and], Cyclic Components of Paraffin Wax, 459  
 Pilsbury (H. A.), Systematics of Pulmonates, 540  
 Pincherle (L.), Natural Width of X-Ray Lines, 983  
 Pinches (Dr. T. G.), [obituary article], 16  
 Piotrowski (S.), The Variable Stars, 355, 1933 Herculis and 354, 1933 Ophiuchi, 822  
 Piquet (Mlle.), [A. Liengme and], the Interferometry of Hirsch, 639  
 Pirrone (F.), Field of High Frequency, 192; Indones; the Field of High Frequency, 40  
 Pitt (Miss Frances), The Naturalist on the Prowl (*Review*), 648  
 Plaskett (Dr. J. S.), and Dr. J. A. Pearce, Dimensions of the Galactic System, 577  
 Plath (Prof. O. E.), Bumble Bees and their Ways (*Review*), 614  
 Plenderleith (Dr. H. J.), the Preservation of Antiquities (*Review*), 516  
 Plimmer (Prof. R. H. A.), Organic and Bio-chemistry. Fifth edition (*Review*), 162  
 Plotz (H.), Filtrability of the Tubercle Bacillus, 471; [Mlle. N. Choucroun and], Differences between the Electrifications of Various Varieties of the Tubercle Bacillus, 334  
 Plough (H. H.), and P. T. Ives, Heat-Induced Mutations in *Drosophila*, 472  
 Pochon (J.), Rôle of a Cellulolytic Bacterium of the Stomach, etc., 947  
 Pooock (Dr. R. W.), [Dr. E. S. Cobbold and], The Cambrian of Shropshire, 185  
 Poivilliers (G.), Perspective Property of Certain Surfaces and its Application to Aerial Phototopographic Surveys, 75  
 van der Pol (B.), and T. J. Weijers, Fine Structure of Valve Characteristics, 107  
 Polanyi (Prof. M.), Heavy Water in Chemistry, 843; [Dr. J. Horiuti and], Catalytic Interchange of Hydrogen between Water and Ethylene and between Water and Benzene, 377; [Dr. J. Horiuti and], Direct Introduction of Deuterium into Benzene, 847, 854  
 Polesitskii (A.), Distribution of Radioactive Elements between a Liquid Phase and a Solid Crystalline Phase, 675  
 Pollard (Prof. A. F. C.), Design of Theodolite Axes, 420; 973, 974  
 Pongratz (A.), [K. W. F. Kohlrausch and], Raman Effect (33 and 34), 392  
 Poole (Dr. H. H.), and Dr. W. R. G. Atkins, Measurement of the Current Generated by a Rectifier Photoelectric Cell, 810

- Poole (Dr. J. H. J.), Measuring Resistances of the Order of  $10^{12}$  ohms with a Ballistic Galvanometer, 154
- Poor (Prof. V.), Analytical Geometry (*Review*), 616
- Portheim (L.), [L. Kisser and], Applicability of Hydrogen Peroxide to the Treatment of Seed, 547
- Posejpal (V.), Formation of Hydrogen in a Vacuum, 390
- Post (Dr. G. E.), Flora of Syria, Palestine and Sinai. Second edition, extensively revised and enlarged by J. E. Dinsmore (*Review*), 440
- Post (K.), Production of Early Blooms of Chrysanthemums, 146
- Posthumus (Dr. K.), Magnetron Oscillations of a New Type, 179; 699
- Potapov (A. I.), New Colorimetric Methods for the Determination of the Toxic Aluminium in the Soil, 192; Plant Growth in Sub-tropical Soil as a Function of Mineral Nutrition, 546
- Potapov (N.), and N. Stankov, Periodicity of Mineral Nutrition within the Twenty-four Hours, 263
- Potratz and Ekeley, Bibliography of Indium, 329
- Powell (R. W.), Thermal and Electrical Conductivity of Metals and Alloys (1), 75
- Praeger (Dr. R. Ll.), Flora of Ireland, 910
- Prat (H.), Resistance of Cutting of Vegetable Tissues, 976
- Pratt (J. D.), The Chemist and Warfare, 563
- Prentice (J. P. M.), New Star in Hercules, 963
- Prescott (J. A.), Single Value Climatic Factors, 747
- Preston (J. M.), Modern Textile Microscopy (*Review*), 122
- Priestley (F. W.), appointed lecturer in Veterinary Bacteriology in Manchester University, 708
- Priestley (R. E.), appointed Vice-Chancellor of Melbourne University; work of, 207
- Pringle (J. W. S.), elected a Martin Thackeray student at King's College, Cambridge, 224
- Prins (Dr. J. A.), Grondbeginselen van de Hedendaagse Naturkunde (*Review*), 164; Spectrum of Chlorophyll, 457
- Procopiu (S.), and T. Farcas, the Curie Ferromagnetic Point for Thin Layers of Nickel, Electrolytically Deposited, 154
- Proctor (B. E.), Microbiology of the Upper Air, 741
- Prokofiewa (E. G.), Mitogenetic Radiation of the Urea-Urease System, 574
- Pruzhanskaja (E.), Symbiosis as a Factor Producing Races in Micro-organisms, 1020
- Przibram (Prof. K.), Natural Blue Rock-salt (4), 911
- Pullin (V. E.), Engineering Radiography (*Review*), 618
- Puntoni (V.), Development of *Anopheles* Larvæ in the Waters of Sewers, 392; and N. Favia, Loss of Virulence of the Tubercle Bacillus resulting from Association with *Bacillus tubercophilus*, 639
- Pyke (E. E.), Vegetative Propagation of Cacao, 107
- Pyne (G. T.), [Prof. J. J. Ryan and], Cryoscopy of Milk, 334; 386
- Quarrell (A. G.), [Prof. G. I. Finch, J. S. Roebuck and], The Beilby Layer, 221
- Quintin (Mlle. M.), Heat of Dilution of Salts, 75
- Rabi (I. I.), J. M. B. Kellogg, and J. R. Zacharias, Magnetic Moment of the Proton and the Deuteron, 466
- Radhakrishnan (S.), East and West in Religion (*Review*), 305
- Rae (Prof. W. N.), and Prof. J. Reilly, Physico-Chemical Practical Exercises (*Review*), 615
- Raeburn (Dr.), and B. Jones, The Chad Basin: Geology and Water Supply, 293
- Raghavan (M. D.), and T. G. Aravamuthan, Iron Age Site, Kilpauk, Madras, 939
- Rahimullah (M.), and Prof. B. K. Das, The Alizarin-KOH method of Staining Vertebrate Skeletons, 464
- Raisin (C. G.), [Prof. C. K. Ingold, C. L. Wilson and], Direct Introduction of Deuterium into Benzene without Heterogeneous Catalysis, 734; C. L. Wilson, and Prof. C. K. Ingold, Direct Introduction of Deuterium into Benzene, 847, 854
- Raj (Dr. B. Sundara), Madras Fisheries, 1932-33, 575
- Raimundo (M.), [I. F. de Mello and], A New Parasite in the Blood of Birds, 741
- Rajagopalna (Iyer, Subrahmanyam and], Oxidising Agents as Fertilisers, 940
- Ramachandran (T. N.), Jaina Temples, 106
- Ramage (G. R.), [A. R. Penfold, J. L. Simonsen and], Essential Oil of *Calythrix tetragona*, var. 'A', 984; Identity of Darwinol with *d*-Myrtenol, 546
- Ramakrishnan (K. P.), [K. R. Ramanathan and], The Indian Southwest Monsoon and the Structure and Depressions Associated with it, 763
- Ramaswamy, Narayanaswami, and Mowdawalla, Dielectrics, 816
- Ramanathan (K. R.), and K. P. Ramakrishnan, The Indian Southwest Monsoon and the Structure of Depressions Associated with it, 763
- Ramón y Cajal (Prof. S.), [death], 660; [obituary article], 871
- Ramsbottom (J.), Physiological Studies of Fungi (*Review*), 80; Physiological Studies of Fungi, 291
- Randall (J. T.), The Diffraction of X-Rays and Electrons by Amorphous Solids, Liquids and Gases (*Review*), 895
- Randerson (W.), [D. A. Spencer and], North Sea Monster (*Review*), 85
- Rangier (M.), [C. Lefèvre and], Oxidation of Organic Sulphur Applied to its Determination, 507
- Ransley (C. E.), [Dr. C. J. Smithells and], Diffusion of Gases through Metals, 814
- Rao (I. Ramakrishna), Raman Spectrum of Water, 147
- Rao (Dr. S. Ramachandra), Magnetism of Tin, 288; Chromosome Division in Grasshoppers, 702; and P. S. Varadachari, Magnetic Properties of Organic Vapours, 812
- Rao (V. K. Ranga V.), awarded the Garton Foundation studentship in Social Sciences, 189
- Raunkiaer (Prof. C.), The Life Forms of Plants and Statistical Plant Geography (*Review*), 606
- Ravazzoni [Contardi and], Enzymic Scission of the Nucleic Acid of Yeast, 857
- Ray (Dr. Harendranath), and Mukunda Chakraverty, Lunar Periodicity in the Conjugation of *Conchophthirus lamellidensis* Ghosh, 663
- Rây (Sir P. C.), Synthesis of Thiocamphor and other Cyclic Thioketones, 1010
- Raymond-Hamet, and L. Millat, New Alkaloid from *Mitragyna*, Mitrinermine, 638
- Read (Prof. J.), An English Dictionary of Organic Compounds (*Review*), 751
- Reay (Dr. G. A.), [Dr. T. Moran, Dr. E. C. Smith and], Muscle Proteins, 798
- Record (Prof. S. J.), Identification of the Timbers of Temperate North America: including Anatomy and Certain Physical Properties of Wood (*Review*), 512
- Redlich (O.), and H. Klinger, Theory of Apparent Molecular Volume (3), 911
- Redmayne (Sir Richard), Coal Mining in Great Britain, 731; Review of the Experimental Working of the Five Days Week by Boots Pure Drug Company at Nottingham, 927; Scientific Research and New Uses for Coal, 784
- Reed (R. D.), Geology of California (*Review*), 48
- Regener (Prof. E.), and V. H. Regener, Ultra-Violet Solar Spectrum and Ozone in the Stratosphere, 380; and G. Pfozter, Intensity of the Cosmic Ultra-Radiation in the Stratosphere with the Tube-Counter, 325
- Regener (V. H.), [Prof. E. Regener and], Ultra-Violet Solar Spectrum and Ozone in the Stratosphere, 380
- Reid (E. D.), New Congrid Eels, 903
- Reid (Mrs. Eleanor Mary), and Miss Marjorie Elizabeth Jane Chandler, The London Clay Flora (*Review*), 6
- Reilly (Prof. J.), and D. F. Kelly, Fatty Oil Production, 334; [Prof. W. N. Rae and], Physico-Chemical Practical Exercises (*Review*), 615
- Rendall (V.), Wild Flowers in Literature (*Review*), 124
- Rendell (E. F.), and H. D. Gaff, Lightning and High-Voltage Power Transmission Lines, 223
- Renn (C. E.), Wasting Disease of *Zostera* in American Waters, 416
- Renwick (F. F.), Dufay Colour Process, 769

- Reynolds (Miss T. M.), and Prof. R. Robinson, Constitution of Vasicine, 142
- Rheinboldt (Prof. H.), Chemische Unterrichtsversuche: Ausgewählte Beispiele für den Gebrauch an Hochschulen und Höheren Lehranstalten (*Review*), 516
- Rhine (Dr. J. B.), Extra-Sensory Perception (*Review*), 308
- Rhines (F. N.), [Dr. R. F. Mehl, E. L. McCandless and], Orientation of Oxide Films on Metals, 1009, 1011
- Rhodes and Mann, Yield of Rubber from Vegetatively Propagated Clones, 31
- Ricard (R.), La Conquête Spirituelle du Mexique, 454; [C. Gautier and], Spectrographic Study of Ox Bile, 155
- Rich (Florencé), Freshwater Algæ of Africa (11), 747
- Richard (G.), Action of Potassium Cyanide on an  $\alpha$ -Chloroketone, 299
- Richards (D. S.), Wireless Communications with the Mount Everest Expedition, 1933, 247
- Richards (F. S.), Design of Theodolite Axes, 973, 974
- Richardson (H. O. W.), and Mrs. Alice Leigh-Smith,  $\beta$ -Rays of Radium D, 772
- Richet (C.), Anaphylaxy in Therapeutics, 638
- Richter (Dr. S.), Archæology of North-East Greenland, 779
- von Richter (V.), edited by Prof. R. Anschütz and Dr. F. Reindel. Vol. 1: Chemistry of the Aliphatic Series. Newly translated and revised by E. N. Allott (*Review*), 615
- Rideal, Hughes, Yudkin, and Kemp, Hydrolysis of Palmityl Chloride, etc., 389
- Rieder (Dr. F.), Wilson Chamber Studies of the Ultra-radiation on the Hafelekar (2,300 metres), 947; and Prof. V. F. Hess, Effects of Cosmic Radiation in a Wilson Chamber at the Hafelekar Observatory (2,300 m.), near Innsbruck, 772
- Riggs (Dr. E. S.), A New Marsupial Saber-tooth from the Pliocene of Argentina, and its Relationships to other South American Predacious Marsupials, 762
- Rintoul (W.), Technical Education and Training of Chemists for Industry, 819
- Riordáin (S. P. O.), Recent Acquisitions from Co. Donegal in the National Museum, 262
- Ritchie (Dr. P. D.), Asymmetric Synthesis and Asymmetric Induction (*Review*), 991
- Ritson (Prof. J. A. S.), and H. Stafford, Stemming Materials, 492
- Rivault (R.), [D. Bodroux and], Some Attempts to Photograph the Television Emissions from London and a Local Station on Short Waves, 430
- de la Rivière (R. Dujarric), Le poison des Amanites mortelles (*Review*), 832
- Rivera (V.), Biological Action of Metals at a Distance, 392
- Rjabinin (G. N.), and L. W. Shubnikow, Dependence of Magnetic Induction on the Magnetic Field in Supraconducting Lead, 286
- Roaf (Prof. H. E.), Normal and Abnormal Colour Vision, 371; 442
- Robbins (Prof. W. W.), [Prof. R. M. Holman and], A Textbook of General Botany: for Colleges and Universities. Third edition (*Review*), 344
- Roberts (C.), Gone Rustic (*Review*), 894
- Robertson (Prof. J. K.), Interferometer Patterns of the Hydrogen Isotopes, 378
- Robertson (Dr. J. M.), Orientation of Molecules in the *p*-Benzoquinone Crystal by X-Ray Analysis, 138; Shape of the Dibenzyl Molecule, 381
- Robertson (Sir Robert), Dr. J. J. Fox, and Dr. A. E. Martin, Two Types of Diamond, 485
- Robinson (D. T.), appointed assistant lecturer in Bacteriology in Manchester University, 709
- Robinson (Prof. H. R.), Atomic Constants deduced from Secondary Cathode Ray Measurements, 179
- Robinson (Prof. R.), [Miss T. M. Reynolds and], Constitution of Vasicine, 142
- Robson (A.), [C. V. Durell and], Elementary Calculus. 2 Vols. (*Review*), 616
- Robson (Dr. J. M.), Recent Advances in Sex and Reproductive Physiology (*Review*), 643
- Rockefeller (W. C.), Graphical Determination of a Flight Course, 146
- Rodès (Father Luis), Periodicity of Earthquakes, 631
- Roebuck (J. S.), [Prof. G. I. Finch, A. G. Quarrell and], The Beilby Layer, 221
- Rogers (Sir Leonard), Value of Anti-Diphtheritic Serum Treatment, 845
- Rogers (L.), appointed reader in Surgery in the British Postgraduate Medical School, 746
- Rogers (W. M.), Heterotopic Spinal Cord Grafts in Salamander Embryos, 336
- Rogers (W. S.), Root Studies (4), 780; and M. C. Vyvyan, Root Systems of Apple Trees, 424
- Roginsky (Prof. S.), An Equation for the Kinetics of Activated Adsorption, 935, 938
- Rogozinski (F.), and Z. Glowczynski, Experimental Rickets (6), 431
- Rohmer (P.), Miss Ursula Sanders, and N. Bezssonoff, Synthesis of Vitamin C by the Infant, 142
- Rolleston (Dr. J. D.), appointed FitzPatrick lecturer of the Royal College of Physicians of London, 176
- Roman (Prof. F.), elected a foreign correspondent of the Geological Society of London, 878
- Romanova (M.), and A. Ferchmin, Hyperfine Structure of the Green Krypton Line 5570, 191
- Romanowski (M.), Attainment of a 50 per cent Hygrometric State round an Otto Wolff Standard Resistance of Lacquered Wire, Exposed to Variations due to Inequalities of Atmospheric Moisture, 710; [A. Péraud and], New Comparisons of National Standards of Electrical Resistance, 582
- Romero (L.), Standardisation of Electricity Supply, 58
- Roonwal (M. L.), Respiratory System of the White-Fly, *Dialeurodes dissimilis* Quaint. and Baker (Homoptera, Aleyrodidae), 218
- Root (H. F.), [F. G. Benedict and], Potentialities of Extreme Old Age, 548
- Rose (Sir Arthur), appointed Chairman of the Carnegie Trust for the Universities of Scotland, 176
- Rose (R. C.), [Dr. W. H. Cook and], Solubility of Gluten, 380
- Rosen (J.), High-Voltage Alternators, 1002
- Rosenberg (H. T.), Parasites of the Codling Moth, 780
- Rosendahl (F.), Hydrogenation of Coal in Germany, 504
- Rosenthal (Dr. A. H.), Photographic Intensity Measurements of Lines of the Paschen Series of Hydrogen in the Infra-Red Solar Spectrum, 533
- Roskill (O. W.), Sources and Supply of Industrial Information in Great Britain with Reference to Planning, 542
- Rossier (P.), Comparison of the Atmospheric Extinction in the Ultra-Violet and the Visible Spectrum, 431; Comparison of Two Criteria of Spectral Classification of Stars; Central Wave-length in Astronomical Spectrography, 227; Generalisation of the Russel Formula for the Calculation of the Colour Index of a Star, 674; Relation between the Effective Wave-length and the Absolute Colour Index of a Star, 674
- Rossini (F. D.), Energies of the Atomic Linkages in the Normal Paraffin Hydrocarbons, 547; Heats of Combustion of Hydrocarbons, 541
- Rostagni (A.), Ionisation of Gases by Atom Beams, 626
- Rostand (J.), translated by Joan Fletcher, Toads and Toad Life (*Review*), 123
- Rotblat (J.), [M. Danysz, Prof. L. Wertenstein, M. Żyw and], Experiments on the Fermi Effect, 970, 974
- Roughley (T. C.), The Australian Oyster, 66
- Rousset (A.), Experimental Study of the Critical Opalescence of Binary Mixtures, 787
- Routledge (D.), [Sir James Irvine and], Isomerism of Sucrose and Iso-Sucrose, 143
- Rowatt (T.), appointed director of the Royal Scottish Museum, 808
- Roy (A. K.), [Flight-Lieut. R. G. Veryard and], Meteorological Conditions Affecting Aviation over the North-West Frontier, 904
- Roy-Pochon (Mme.), Photoelectric Cells of the Boundary Type, 190
- Rubinstein (A. M.), [I. I. Chernijaev and], Stromholm's Triaminosulphate, 431
- Rücker (F.), Reflective Power of Animal Surfaces in the Ultra-Red Region of the Spectrum, 300

- Rudge (Dr. E. A.), award from the Beilby Memorial Fund; work of, 765
- Rudorf (Dr. G.), Mendeléeff Periodic Law, 176
- Runciman (S.), Byzantine Civilisation (*Review*), 795
- Rupp (H. M. R.), Australian Orchids: a Review of the Genus *Cymbidium* in Australia, 391; Habitat, Character and Floral Structure of *Cryptanthemis Slateri* (Orchidaceae), 471
- Russell (Earl), awarded the Sylvester Medal of the Royal Society, 727; presented with the Sylvester Medal of the Royal Society; work of, 906
- Russell (Dr. E. S.), Study of Behaviour, 368; 835; and others, Interpretation of Animal Behaviour, 996
- Russell (Sir John), British Agriculture in 1934, 135; Eternal Village (*Review*), 887; Geography of Human Endeavour (*Review*), 987; History of Wheat in Great Britain (*Review*), 606; and others, Brood Diseases of Bees, 979
- Ruston (Dr. A. G.), and D. Witney, Hooton Pagnell: the Agricultural Evolution of a Yorkshire Village (*Review*), 887
- Rutherford (Lord), Artificial Nuclear Transmutations (Ludwig Mond lecture), 964; Mme. Curie, 90; Periodic Law (Mendeléeff Centenary lecture), 211; Progress Report of the Academic Assistance Council, 804; [M. L. Oliphant, P. Harteck and], Nuclear Transmutations with Heavy Hydrogen, 69
- Ruttledge (H.), Exploration of Nanda Devi, 731
- Rutzler, Jr. (J. E.), [W. D. Bancroft and], Reversible Coagulation in Living Tissue (12), 911
- Ruzicka (Prof. L.), Conception of 'Synthesis' in Organic Chemistry, 700; Goldberg, Meyer, Brünger, and Eichenberger, Artificial Production of the Male Sex Hormone, 563
- Ryan (Prof. J. J.), and G. T. Pyne, Cryoscopy of Milk, 334; 386
- Ryves (Lieut.-Col. and Mrs. B. H.), Habits of the Corn-Bunting, 106
- Sadikov (V.), and D. Maliuga, Autoclave Splitting of Blood Albumin with 2 per cent Phosphoric Acid (1), 639; and V. A. Vadova, Alcoholysis of Serum Albumin, 432
- Sagane (R.), [Y. Nishvia, M. Takeuchi, R. Tomita and], Energies of the Positrons in Induced Radioactivity, 941
- Saini (H.), [J. Weigle and], Transformation of Ammonium Bromide at  $-40^{\circ}\text{C}$ ., 674
- St. Joseph (J. K. S.), awarded the Harkness scholarship of Cambridge University, 37
- Saito (S.), Development of the Tusser Caterpillar, 815
- Salaman (Dr. R. N.), and Miss Cecilia O'Connor, A New Potato Epidemic in Great Britain, 932, 938
- Salcewicz (J.), [Prof. W. Swietoslowski and], Application of Newton's Laws of Cooling to the Measurement of Very Small Thermal Effects, 947
- Salmon (Sir Isidore), elected president of the Decimal Association, 967
- Salomon (R.), [P. Bricout and], Use of the Cathode Ray Oscillograph for the Study of the Magnetisation of Ferromagnetic Substances, 582
- Salow (H.), and Dr. W. Steiner, Absorption Spectrum of Oxygen at High Pressures and the Existence of  $\text{O}_4$  Molecules, 463
- Salzberg (B.), Thermionic Valves for Ultra-High Frequencies, 668
- Samuel (L. W.), [Dr. R. K. Schofield and], Titration of Protein with Trichloroacetic Acid, 665
- Samuel (Prof. R.), [Prof. R. F. Hunter and], Chemical Linkage, 632; 971, 974
- Sanders (Miss Ursula), [P. Rohmer, N. Bezssonoff and], Synthesis of Vitamin C by the Infant, 142
- Sandford (Dr. K. S.), and W. J. Arkell, Paleolithic Man and the Nile Valley in Nubia and Upper Egypt, 165
- Sanfourche (A.), Oxidation of Silicon at Low Temperature, 787
- Sanner (V. H.), *L* Absorption Spectra in the Very Soft X-Ray Region, 100
- Santos (J. A.), [J. W. Illingworth and], Use of Phosphomolybdic Acid in Chemical Analysis, 971, 974
- Sargent (M. C.), Causes of Colour Change in Blue-Green Algae, 471
- Sarton (Dr. G.), Obligations of Science, 670
- Sartory (A. and R.), J. Meyer, and H. Bäuml, Differentiating between the Parasitic Cellulolytic Fungi of Paper, 506
- Sassoon (Sir Philip), Developments in British Air Transport, 728
- Saudek (R.), A British Pair of Identical Twins Reared Apart, 1012
- Saunders (C. W.), H. W. Wilson, and Dr. R. G. Jakeman, Electricity on Board Ship, 930
- Saunders (J. T.), proposed as Secretary General of Faculties of Cambridge University, 861
- Scagliarini (G.), and F. Monforte, Reaction between Sodium Nitrito Pentacyanide and Alkali Sulphides (4), 983
- Schaffner (J. V.), and C. L. Griswold, Macrolepidoptera and their Parasites, 1013
- Schally (E.), and F. Nagl, 'Streaking' in Chemical Investigations (6), 392
- Scharff (Dr. R. F.), [obituary article], 487
- Scheepers (L.), [P. Goldfinger and], A Micromethod for the Determination of Heavy Water, 116
- Schein (M.), [Prof. E. Meyer, B. Stoll and], Light of Very Short Wave-Length (2100 Å.) in the Solar Spectrum, 535
- Schérer (M.) [A. Piekara and], Influence of the Magnetic Field on the Dielectric Constant of Liquids, 862
- Schiller (Dr. F. C. S.), [Prof. J. S. Huxley, Prof. E. W. MacBride and], Science and Psychological Research, 458
- Schilling (V.), Causation of Cancer, 411
- Schlapp (R.), Electron Configurations  $p^2s$ ,  $p^4s$ , 115
- Schmidt (K.), [F. Böck, G. Lock and], Perkin's Synthesis of Cinnamic Acid, 392
- Schmidt (Marion), [A. J. P. Martin, T. Moore, Dr. F. P. Bowden and], Absorption Spectrum of Vitamin E, 214
- Schmidt (M. T.), [L. F. Audrieth and], Fused 'Onium' Salts as Acids (1), 335
- Schmidt (Prof. W.), High Gods in North America: Upton Lectures in Religion, Manchester College, Oxford, 1932 (*Review*), 305
- Schmidt (Prof. W.), Turbulence near the Ground, 856
- Schmidt (W.), and E. Brezina, Action of Air-Suction Arrangements in Works, 392
- Schneirla (T. C.), Raiding and other Outstanding Phenomena in the Behaviour of Army Ants, 472
- Schober (Dr. H.), Vision in the Ultra-Violet, 898
- Schoeller (Prof. W.), and Dr. H. Goebel, Acceleration of Flower and Fruit Formation, 257
- Schofield (Dr. R. K.), The Passing of Rural Crafts (*Review*), 159; and L. W. Samuel, Titration of Protein with Trichloroacetic Acid, 665
- Schönberg (Prof. A.), Microchemical Detection of Elementary Sulphur, 628
- Schonland (Prof. B. F. J.), Thunderstorms and Lightning, 136; [Dr. T. E. Allibone and], Development of the Spark Discharge, 736; H. Collens, and Dr. D. J. Malan, Development of the Lightning Discharge, 177
- Schopfer (W. H.), Action of Crystallised  $\text{B}_1$  and  $\text{B}_2$  on a Micro-organism; Existence in the Pollinia of Orchids of a Growth Factor for Micro-organisms, 227; Action of the Growth Factor in the Mucorinæ, 227; Nature of the Growth Factor of Micro-organisms; Preparation by Dialysis of the Growth Factor of Micro-organisms, 674; Technique of the Preparation of Extract of Wheat for the Study of the Growth Factor of Micro-organisms, 507
- Schorlemmer (Carl), Centenary of the Birth of, 488
- Schrire (I.), [R. W. S. Cheetham, H. Zwarenstein and], Influence of Testicular and of Urinary Extracts on the Creatinine Excretion in Rabbits, 947
- Schubart (Dr. O.), Tausendfüßler oder Myriapoda. 1: Diplopoda (*Review*), 648
- Schuchert (Prof. C.), and Prof. C. O. Dunbar, A Textbook of Geology. Part 2: Historical Geology. Third edition (*Review*), 829

- Schultz (Dr. L. P.), [Prof. C. L. Hubbs and], *Elephantichthys*, a new genus, 666
- Schultz [Dobzhansky and], Distribution of Sex-factors in the X-Chromosome, 465
- Schuster (Sir Arthur), [obituary article], 595
- Schwanwitsch (Prof. B. N.), and G. N. Sokolov, Wing Pattern in Butterflies, 420
- Schwarz (E.), Races of the Chimpanzee, 106
- Schwarz (Prof. E. R.), Textiles and the Microscope (*Review*), 122
- Schwarz (K.), Velocity in Heavy Water ( $D_2O$ ) of the Ester Hydrolysis Catalysed by Hydrogen Ions, 156
- Schwéglér (Mlle. R.), [G. Déjardin and], Luminescence excited by rolling Mercury in a Glass Bulb containing impure Neon under Low Pressure, 982
- Schwob (M.), Dispersion and Thermal Variation of the Electrical Double Refraction of some Optically Active Liquids, 262
- Scott (Dr. A. B.), Historic Sequence of Peoples, Culture and Characteristics in Scotland, 400 B.C.—A.D. 950, 858
- Scott (C. W. A.), and T. C. Black, awarded the £10,000 prize in the England-Melbourne Air Race, and the British Silver Medal of the Royal Aeronautical Society, 728
- Searle (A. B.), The Chemistry and Physics of Clays: and other Ceramic Materials. Second edition (*Review*), 201
- Sears and Barrell, The Imperial Standard Yard, 147
- Seddon (R. V.), [Prof. M. W. Travers, P. F. Gay and], Cause of Change in Rate of some Gas Reactions, 662
- Sederholm (Dr. J. J.), [death], 131
- Seeliger (Prof. R.), Einführung in die Physik der Gasentladungen. Zweite Auflage (*Review*), 123
- Seligman (Prof. C. G.), appointed Lloyd Roberts lecturer of the Royal College of Physicians of London, 176; conferment upon, of the title of emeritus professor, 113
- Seltzer (P.), Influence of a Forest on the Temperature of the Air, 506
- Semmens (Dr. Elizabeth Sidney), Bursting of Cell by Polarised Sunlight, 813
- Sen (S. K.), The Sucking Apparatus in Ticks, 664
- Sen (S. N.), Showers of Fish, 454
- Sen-Gupta (Prof. P. K.), Absorption Spectrum of Mercuric Sulphide, 498
- Senderens (J. B.), Action of Sulphuric Acid, cold or at a moderate temperature, on the Aromatic Esters, 75
- Serbinov (A. J.), and M. B. Neuman, Effect of Nitrogen Peroxide on the Kinetics of Ethane Oxidation, 546
- Serebrovskij (A.), Properties of Mendelian Equations, 263
- Serruys (M.), Working Characteristics of Internal Combustion Motors, 1019
- Seward (Prof. A. C.), awarded the Darwin medal of the Royal Society, 727; presented with the Darwin medal of the Royal Society; work of, 906; London Clay Flora (*Review*), 6
- Sewell (Lieut.-Col. R. B. Seymour), The John Murray Expedition to the Arabian Sea, 685
- Shand (Prof. S. J.), Minerals of Kimberlite, 465
- Shankland (Commdr. E. C.), Marconi's Wireless Pilot, 387
- Shapiro (B. G.), and H. Zwarenstein, Effect of Hypophysectomy and Castration on Muscle Creatine in *Xenopus laevis*, 947
- Shapiro (H. A.), [S. Honikman, H. Zwarenstein and], Bio-assay of the Gonadokinetic Principle of the Anterior Pituitary, 947; [S. Honikman, H. Zwarenstein and], Variations in the Ovarian Response of *Xenopus* to the Gonadokinetic Principle of the Anterior Pituitary (1), 982
- Shapiro (M. I.), [A. V. Frost and], Nature of the Active Spots of Catalysts, 507
- Sharp (Dr. H. H.), Head-Hunters of New Guinea, 220
- Sharpey-Schafer (Sir E.), awarded the Cameron prize of Edinburgh University, 152; Essentials of Histology: Descriptive and Practical, for the use of students. Thirteenth edition, edited by Dr. H. M. Carleton (*Review*), 648
- Shaw (Sir Napier), Natural History of Weather, 38
- Shedlovsky (T.), and A. S. Brown, Electrolytic Conductivity of Alkaline Earth Chlorides, 69
- Sheehy (E. J.), Derangement of the Digestive Processes in the Milk-fed Calf, due to Abnormal Curd Formation in the Fourth Stomach, 154
- Sheffield (Dr. F. M. L.), Nature of Intracellular Inclusions in Plant Virus Diseases, 741
- Sheldon (C. C.), [J. B. Brown and], Unsaturated Acids in Animal Oils and Fats, 817
- Shelton (E. C.), New Multiple-electrode Thermionic Valve, 577
- Shepard (Prof. H. H.), Relative Toxicity at High Percentages of Insect Mortality, 323
- Sheppard (T.), Scientific Meetings and the Public, 601
- Sherman (H. C.), and H. L. Campbell, Growth from the Viewpoint of Statistical Interpretation, 711
- Sherman (J.), [L. Pauling and], Structure of the Carboxyl Group (2), 547
- Sherratt (G. G.), and E. Griffiths, Determination of the Specific Heat of Gases at High Temperatures by the Sound Velocity Method, 822
- Sherrington (Sir Charles S.), Language Distribution of Scientific Periodicals, 625
- Shimoizumi (J.), [N. Yagi and], Temperature Range in Rats, 145
- Shimotomai, Polyploidy in *Chrysanthemum*, 295
- Shin-Piaw (Choong), [Ny Tsi-Zé and], Series of Cæsium Atoms in an Electric Field, 1010
- Shipp (H. L.), [R. A. McCance and], Chemistry of Flesh Foods and their Losses on Cooking, 53
- Shire (E. S.), [M. L. Oiphant, B. M. Crowther and], Nuclear Disintegration Experiments with Pure Isotopes, 904
- Shkolnik (M.), Effect of Boron upon the Development of Flax in Water and Soil Cultures, 335
- Shubnikow (Dr. L. W.), [G. N. Rjabinin and], Dependence of Magnetic Induction on the Magnetic Field in Supraconducting Lead, 286; [O. N. Trapeznikowa and], Anomaly in the Specific Heat of Ferrous Chloride at the Curie Point, 378
- Shull (Prof. A. F.), with the collaboration of Prof. G. R. Larue, and A. G. Ruthven, Principles of Animal Biology. Fourth edition (*Review*), 440
- Shur (Dr. J.), [Dr. R. Jaanus and], Magnetic Properties of Benzene Vapour, 101
- Sibilia (C.), Sexuality in certain species of the genus *Chaetomium*, 40
- Sidgwick (Dr. N. V.), Some Physical Properties of the Covalent Link in Chemistry (*Review*), 267
- Siegbahn (Prof. K. M. G.), awarded the Hughes medal of the Royal Society, 727; presented with the Hughes medal of the Royal Society; work of, 906
- Sigerist (Dr. H. E.), translated by Eden and Cedar Paul, Great Doctors: a Biographical History of Medicine (*Review*), 394
- 'Sigmond (Dr. E.), Általános talajtan (*Review*), 46
- Silva (L. B.), [M. Pierucci and], Electric Arcs with Fused Metals and Salts as Electrodes, 495
- Simonsen (J. L.), [A. R. Penfold, G. R. Ramage and], Essential Oil of *Calythrix tetragona*, var. 'A.', 984; Identity of Darwinol with *d*-myrtenol, 546
- Simpson (Dr. G. C.), Lightning and Aircraft (*Review*), 618
- Sinnott (E. W.), Helen Houghtaling, and A. F. Blakeslee, Comparative Anatomy of Extra-Chromosomal types in *Datura stramonium*, 708
- Sircar (Sir Nitratn), elected president of the Indian Association for the Cultivation of Science, 137
- Sirkar (Dr. S. C.), Rotational Raman Scattering in Benzene Vapour, 850, 854
- de Sitter (Prof. W.), [death], 841; [obituary article], 924
- Skellet (A. M.), Proposal of a method of Observing the Solar Corona without an Eclipse, 823
- Skene (Dr. MacGregor), appointed Melville Wills professor of Botany in Bristol University, 981
- Skerl (A. C.), and F. A. Bannister, Lusakite, a Cobalt-bearing Silicate from Northern Rhodesia, 114
- Skinner (B. F.), Extinction of Chained Reflexes, 335
- Skinner (E. F.), appointed lecturer in Psychology in Sheffield University, 1018
- Skoog (F.), and K. V. Thimann, Inhibition of the Development of Lateral Buds by Growth Hormone, 824

- Skovsted (Dr. A.), Chromosomes of Cotton Hybrids, 221  
 Skowron (Dr. S.), Effect of the Male Sex Hormone on the Genital Tract of the Female, 627  
 Slattery (D.), [M. J. Gorman and], Influence of Lime of the Growth of Red Clover in an Acid Soil, 334  
 Slavik (Prof. F.), elected a foreign member of the Geological Society of London, 878  
 Slee (Commdr. J. A.), Wireless Communication and the Mercantile Marine, 95  
 Sleicher (Dr.), The Load-Dispatcher, 453  
 Slipher (Dr. V. M.), [Dr. A. Adel and], The Atmospheres of the Giant Planets, 148  
 Sloan (D. H.), and W. M. Coates, Fast Mercury Ions and the Excitation of X-Rays, 941  
 Smirnov (F.), [M. Lobashov and], Nature of the Action of chemical Agents on Mutational Process in *Drosophila melanogaster* (2), 823  
 Smith (C.), Regional Water Supplies, 172  
 Smith (Eng.-Capt. E. C.), Maudslay, Sons and Field and the Royal Navy, 36  
 Smith (Dr. C. F.), A Guide to Electricity for Home and School (*Review*), 619  
 Smith (D. M.), Metallurgical Analysis by the Spectrograph (*Review*), 199  
 Smith (Dr. E. C.), [Dr. T. Moran, Dr. G. A. Reay and], Muscle Proteins, 798  
 Smith (Rev. E. W.), Anthropology and the African, 413  
 Smith (Sir Frank), Engineer and Modern Civilisation (Gustave Canet lecture), 126; 167; Food Storage and Transport (Hardy Memorial lecture), 411; presented with the Gustave Canet gold medal of the Junior Institution of Engineers, 37  
 Smith (F. Campbell), [Dr. E. R. Holiday and], Spectrophotometry of Rapidly Changing Systems, 102  
 Smith (F. L.), [A. C. G. Egerton and], Estimation of the Combustion Productions from the Cylinder of the Petrol Engine (1), [A. C. G. Egerton, A. R. Ubbelohde and], (2), 786  
 Smith (Sir G. Elliot), Pioneering in Chinese Palaeontology and Archaeology (*Review*), 121  
 Smith (Prof. G. M.), The Fresh-water Algæ of the United States (*Review*), 201  
 Smith (Dr. H. G.), Minerals and the Microscope. Third edition (*Review*), 273  
 Smith (J. L. B.), South African species of the Triglid Genera: *Lepidotrigla* and *Peristedion*, 582  
 Smith (R. A.), Capture of Electrons by Positive Ions, 1014  
 Smith (Dr. S. Watson), Climate and Health, 174  
 Smith (Dr. Theobald), [death], 926  
 Smith (Dr.), Isomers of Carotene, 147  
 Smithells (Dr. C. J.), and C. E. Ransley, Diffusion of Gases through Metals, 814  
 Smith-Rose (Dr. R. L.), and J. S. McPetrie, Electrical Properties of Soil at very High Frequencies, 781; Measurement of the Electrical Constants of Soil by a Lecher-wire Method at a Wave-length of 1.5 m., 74  
 Smits (Prof. A.), and N. F. Moerman, Complexity of the Solid State, 698  
 Smolenski (K.), and S. Kowalewski, Combustible Liquid obtained starting with Ethylene, 674  
 Smuts (Genl. J. C.), Future of Liberty, 654; Holism in International Affairs, 1001; Native Affairs in Africa, 949  
 Snow (C. P.), The Search (*Review*), 890  
 Sokolov (G. N.), [Prof. B. N. Schwanwitsch and], Wing Pattern in Butterflies, 420  
 Soster (N.), A Body of Oleaginous Appearance in the Epidermal Cells of the leaves of *Haworthia cymbiformis*, 639  
 Southall (Prof. J. P. C.), Mirrors, Prisms and Lenses: a Text-book of Geometrical Optics. Third edition (*Review*), 989  
 Southwell (Dr. T.), appointed lecturer in Parasitology in Liverpool University, 113  
 Souttar (Dr. H. S.), Radium and Cancer: a Monograph (*Review*), 791  
 Souty (P.), Influence of Circularly Polarised Light on the Velocity of Mutarotation of some Sugars, 390  
 Soyer (R.), [P. Lemoine, R. Humery and], Impoverishment of the Stratum of Green Sand of the Paris region, 75  
 Soyster (H. B.), and others, U. S. Petroleum Industry, 767  
 Spagnoletti (P. H.), [C. M. Benham and], British Empire Broadcasting, 57  
 Spargo (Dr. J. W.), Virgil the Necromancer: Studies in Virgilian Legends (*Review*), 891  
 Spear (F. G.), A. Glücksmann, A. F. W. Hughes, and C. W. Wilson, Sensitivity of Dividing and Non-dividing Cells to Radiation, 460  
 Spemann (H.), awarded the Adolf Fick prize, 878  
 Spencer (D. A.), and W. Randerson, North Sea Monster (*Review*), 85  
 Spencer (Dr. L. J.), Beryllium Minerals (Euclase and Phenakite) from Africa, 114; Thirteenth list of new Mineral Names; a New Meteoric Stone from Silverton, N.S.W., 115  
 Spengler (O.), translated by C. F. Atkinson, The Hour of Decision. Part 1: Germany and World-Historical Evolution (*Review*), 516  
 Spielmann (Dr. P. E.), and E. J. Elford, Road Making and Administration (*Review*), 754  
 Spiers (F. W.), [G. W. Brindley and], Effect of Dispersion and of Lattice Distortion on the Atomic Scattering Factor of Copper for X-Rays, 850, 854  
 Spilsbury (Sir Bernard), appointed Croonian lecturer of the Royal College of Physicians of London, 176  
 Sprague (Dr. T. A.), Dr. N. L. Britton, 131  
 Sprengel (H. J. P.), centenary of, 280  
 Srinivasan (M.), Invert Sugar from the Cashew 'Apple', 903  
 Stafford (H.), [Prof. J. A. S. Ritson and], Stemming Materials, 492  
 Stamp (Sir Josiah), America and Trade Prospects, 450  
 Standley (P. C.), Common Weeds of the Chicago Region, 703  
 Stankov (N.), [N. Potapov and], Periodicity of Mineral Nutrition within the twenty-four hours, 263  
 Starik (I.), and M. Deisenrot-Mysovskaja, A Criticism of the Photographic Method as applied to the Investigation of the Colloidal State of Polonium, 191  
 Startup (C. W.), appointed assistant lecturer in Physiology in University College, Cardiff, 545  
 Staudinger (Prof. H.), Determination of the Molecular Weights of Colloids, 428  
 Stebbing (Prof. L. Susan), Logic in Practice (*Review*), 344  
 Steele (Prof. B. D.), [obituary article], 171  
 Steele (Dr. Catherine C.), An Introduction to Plant Biochemistry (*Review*), 795  
 Štefánik (General Milan R.), work of, 845  
 Stefanini (Prof. G.), elected a foreign correspondent of the Geological Society of London, 878  
 Stegman (B. K.), Phylogeny of the genus *Nucifraga*, 507  
 Stein (Sir Aurel), Prehistory of Indo-Iranian Borderlands (Huxley memorial lecture), 666  
 Steiner (Dr. W.), [H. Salow and], Absorption Spectrum of Oxygen at High Pressures and the existence of O<sub>4</sub> Molecules, 463  
 Stekhoven, Jr. (J. H. S.), [L. A. de Coninck and], The Free-living Nemas of the Belgian Coast (2), 975  
 Stensiö (Dr. E. A.), The Cephalaspids of Great Britain (*Review*), 200  
 Stenton (F. M.), [J. E. B. Gover, A. Mawer, and, in collaboration with A. Bonner], The Place-Names of Surrey (*Review*), 893  
 Stephen (A. C.), Scottish Marine Fauna, 384  
 Stern (E. A.), and A. S. Krivskij, Action of Metals at a distance on the Structure and Development of *Bacillus mycoides*, Fl., 507; [G. A. Nadson and], Biological Action of Metals at a Distance, 335  
 Sterne (T. E.), Accuracy of Least Squares Solutions, 421  
 Stevens (Capt. A. W.), American Stratosphere Ascent of July 29, 1934, 707  
 Stevens (Prof. F. L.), [death], 691  
 Stevens (S. S.), Attributes of Tones, 712  
 Steyn (Dr. D. G.), The Toxicology of Plants in South Africa: together with a consideration of Poisonous Foodstuffs and Fungi (*Review*), 607  
 Stickland (Dr. L. H.), appointed biochemist in the Cancer Research Laboratories, Leeds University, 672  
 Stieber (A.), [R. Freymann and], Effect of Temperature and of Visible and Infra-red Radiations on the Electrical Resistance of Boron, 982

- Stiles (Dr. W. S.), White and Coloured Headlight Beams in Fog, 768
- Stock (Prof. A.), Hydrides of Boron and Silicon (*Review*), 267
- Stock (C.), A Second Eocene Primate from California, 263
- Stoll (B.), [Prof. E. Meyer, M. Schein and], Light of Very Short Wave-length (2100 Å.) in the Solar Spectrum, 535
- Stone (J.), & Co., Ltd., Ceralumin C, 248
- Stone (M. H.), Boolean Algebras and their Application to Topology, 264
- Stoner (C. R.), [A. W. Ladner and], Short-Wave Wireless Communication. Second edition (*Review*), 45
- Stopes (Dr. Marie), Birth Control To-day: a practical handbook for those who want to be their own masters in this vital matter (*Review*), 516
- Stora (Mlle. Cécile), Relation between the Curve of Spectral Sensibility and the Curve of Absorption in Photocells with Colouring Matters, 39
- Störmer (Prof. C.), Luminous Night Clouds, 219
- Störmer (I.), [R. Harder and], Blütenentfaltung und Hormonwirkung, 385
- Stoyko (N.), Influences of Magnetic Disturbances on the Velocity of Propagation of long Electromagnetic Waves, 863
- Strada (M.), Crystalline Structure of Thallium Cyanide, 711; [G. Bruni and], New Methods for separating Heavy Water H<sub>2</sub>O from ordinary Water H<sub>2</sub>O, 471
- Strain (H. H.), *d*-Sorbitol, 577
- Strangeways (Dr. Dorothy), appointed assistant lecturer in Histology in University College, Cardiff, 545
- Stratton (Prof. F. J. M.), The New Star in Hercules, 974; [C. P. Butler and], Aluminium Coating of Gratings, 810
- Strömberg (Dr. G.), Origin of the Galactic Rotation, 632
- Strum (Prof. L.), Binding Energies of the Neutron and the Proton, 497
- Sturt (G.), ('G. Bourne'), The Wheelwright's Shop. Reprint (*Review*), 159
- Subrahmanyam [Iyer, Rajagopalna and], Oxidising Agents as Fertilisers, 940
- Sucksmith (Dr. W.), Gyromagnetic Effect for a Ferromagnetic Substance above its Curie Point, 936, 938
- Sulaiman (Sir Shah Mohammed), A Modified Theory of Relativity, 501
- Summer (F. B.), Does 'Protective Coloration' Protect?, 984; Test of the possible effects of Visual Stimuli upon the Hair Colour of Mammals, 548
- Sur (N. K.), Physical characteristics of Fronts during the Indian South-west Monsoon, 764
- Suryanarayana (M.), [B. Visva Nath and], Effect of Yeast Extract on the Growth of Plants, 27
- Sutherland (Dr. G. B. B. M.), Vibration Spectra and Force Constants of 'Heavy' Acetylene, 775
- Sutton (H.), and W. J. Taylor, Influence of Pickling on the Fatigue Strength of Duralumin, 632
- Suzuki (T.), Noto (Japan) Earthquake of 1933, 32
- Svedberg (Prof. The), G. Boestad, and Inga-Britta Eriksson-Quensel, Possibility of Sedimentation Measurements in Intense Centrifugal Fields, 98; and Inga Britta Eriksson-Quensel, Molecular Weights of Red Blood Proteins, 577
- Swanger (W. H.), 'Dry Ice' in the Machine Shop, 529
- Swietoslawski (Prof. W.), Degree of Dehydration of Binary Azeotropes, 262; Traduit par M. Thon, Thermochimie (*Review*), 991; and L. Keffler, Union Internationale de Chimie. Premier Rapport de la Commission Permanente de Thermochimie (*Review*), 991; and J. Salecwiez, Application of Newton's Laws of Cooling to the Measurement of very small Thermal Effects, 947
- Swinton (Dr. W. E.), The Dinosaurs: a Short History of a Great Group of Extinct Reptiles (*Review*), 613
- Syrovatskii (I. J.), Biology of some Black Sea Fishes, 432
- Szilard (Dr. L.), [A. Brasch, F. Lange, A. Waly, Dr. T. E. Banks, T. A. Chalmers, Prof. F. L. Hopwood and], Liberation of Neutrons from Beryllium by X-Rays: Radioactivity Induced by means of Electron Tubes, 880, 901; and T. A. Chalmers, Detecting Neutrons liberated from Beryllium by Gamma Rays: a new technique for Inducing Radioactivity, 494; Chemical Separation of the Radioactive Element from its Bombarded Isotope in the Fermi Effect, 462
- Tabet (M.), [G. R. Levi and], Fibrous Structure in Ionic Lattices (2), 639
- Taft (Prof. T. H.), Elementary Engineering Thermodynamics (*Review*), 344
- Tait (Dr. J. B.), and others, Currents of the Sea and their Biological Importance, 543
- Takeuchi (M.), [Y. Nishira, R. Sagane, R. Tomita and], Energies of the Positrons in Induced Radioactivity, 941
- Talbot (Henry Fox), work of, 770
- Tallard (Mlle. Suzanne), [L. Palfray and], Influence of the Free Acidity on the Determination of Aldehydes and Ketones by Hydroxylamine Hydrochloride, 431
- Tamm (Prof. I.), Interaction of Neutrons and Protons, 1010, 1011; Nuclear Magnetic Moments and the Properties of the Neutron, 380
- Tāning (Dr. A. V.), The Ridge in the Indian Ocean between Chagos Is. and Socotra, 536
- Taradoire (T.), Action of Sulphur on Chlorates, 673
- Tardi (Capt. P.), *Traité de Géodésie. Fasc. 1 et 2* (*Review*), 757
- Tate (G. H. H.), American Opossums, 423
- Tattersall (Prof. W. M.), A Fish new to the British Fauna, 145
- Tawil (E. P.), Laws of the Production of Electricity by Torsion in Quartz (Strepho-electricity), 910
- Tawney (Prof. R. H.), appointed Alfred Marshall lecturer in Cambridge University for 1934-35, 708
- Tayama (R.), [H. Yabe and], Submarine Terraces around Japan, 976
- Taylor (Dr. A. M.), appointed lecturer in Natural Philosophy in St. Andrews University, 73
- Taylor (E. G.), [Prof. J. E. Coates and], Electrical Conductivity of Salts in Anhydrous Hydrogen Cyanide, 141
- Taylor (Prof. E. G. R.), Late Tudor and Early Stuart Geography, 1583-1650: A Sequel to Tudor Geography, 1485-1583 (*Review*), 125
- Taylor (Dr. E. McKenzie), and Harbans Lal Uppal, Flow of Water under Structures on Sand Foundation, 425; Water Pressures on Works on Sand Foundations, 465
- Taylor (Prof. G. I.), Formation of Emulsions, 904
- Taylor (H. S.), Applications of Heavy Hydrogen in Research, 388
- Taylor (W. H.), Aluminosilicate Framework Structures, 69
- Taylor (W. J.), [H. Sutton and], Influence of Pickling on the Fatigue Strength of Duralumin, 632
- Tchakirian (A.), [H. Volkringer, Mme. Marie Freymann and], Raman Spectra of the Metallochloroforms in relation with their Structure, 431
- Tchoubar (Mlle. B.), [M. Tiffeneau and], Transpositions in the Cyclohexane Series, 470
- Telford (Thomas), centenary of the death of, 351
- Teller (E.), [F. Kalckar and], Ratio of the Magnetic Moments of Proton and Deuteron, 180
- Te-Lou (Tchang), A New Method for the Study of Detonation in the Motor, 946
- Temnikowa (Mme. T. I.), [A. E. Favorsky and], Reciprocal Transpositions of Methylbenzoylcarbinol and of Phenylacetylcarbinol, 154
- Temple (Prof. G.), The General Principles of Quantum Theory (*Review*), 85
- Terenin (Prof. A.), and H. Neujmin, Photodissociation of Molecules in the Schumann Ultra-violet, 255
- de Terra (H.), and G. E. Hutchinson, Climatic Changes in Central Asia, 741
- Thatcher (late Prof. R. W.), The Periodic Table in Plant Physiology, 221
- Theiler (Sir Arnold), awarded the gold medal for 1934 of the Royal Agricultural Society, 878
- Thibaud (J.), Some Properties of Positive Electrons, 257
- Thimann (K. V.), [F. Skoog and], Inhibition of the Development of Lateral Buds by Growth Hormone, 824
- Thode (H. G.), [S. Freed and], A Magnetic Study of the Metallic State and the Fermi-Dirac Statistics, 774
- Thomas (D. E.), Muckleford Fault in the Strangeways Area, Guildford [Australia], 711
- Thomas (P. E.), [R. Fosse, P. de Graeve and], Dextro-Rotatory Allantoin, 154

- Thomas (Prof. T. Y.), The Differential Invariants of Generalised Spaces (*Review*), 611
- Thompson (C. J. S.), The Mystic Mandrake (*Review*), 891
- Thompson (Prof. D'Arcy W.), elected president of the Royal Society of Edinburgh, 660
- Thompson (H. W.), appointed advisory Entomologist in Leeds University, 113
- Thompson (Dr. H. W.), and J. J. Frewing, Thermal Decomposition of Acrolein, 900, 901; and J. W. Linnett, Spectrum of Acrolein, 937, 938
- Thompson (N.), [E. T. S. Appleyard, S. E. Williams and], Situation of the  $A(^3\Sigma)$  Level in the Nitrogen Molecule, 322
- Thomsen (Prof. T.), elected president of the International Congress of Anthropological and Ethnological Sciences 1938, 223
- Thomson (Dr. D. W.), [W. J. C. Orr and], Diffusion of Heavy into Light Water, 776
- Thomson (Prof. G. H.), The Orthogonal Matrix transforming Spearman's Two-factor Equations into Thomson's Sampling Equations in the Theory of Ability, 700
- Thomson (G. W.), Technical Education in Scotland, 819
- Thornton (Prof. W. M.), Electrical Properties of Insulating Materials, 692
- Thorpe (Prof. J. F.), and Prof. M. A. Whiteley, Thorpe's Dictionary of Applied Chemistry. Supplement. Vol. 1 (*Review*), 556
- Tiercy (G.), Distribution of the Temperatures in the Interior of the Stars, 431; Equation of Condition for the Extremes of Ionisation in the Peripheral Layer of a Variable Star, 227; Function Introduced in the Calculation of the Distribution of the Temperatures in the Interior of a Star; a Particular Model of the Temperature Distribution in a Star, 582; and A. Grosrey, Width of Photographic Spectra for Stars of the K0 type, 431; Width of the Spectrograms of F5 and G0 Stars, 583; Width of Spectrograms for Stars of the type G5, 674
- Tietjen (Friedrich), centenary of the birth of, 564
- Tietjens (Dr. O. G.), translated by Dr. L. Rosenhead, Fundamentals of Hydro- and Aero-mechanics: based on lectures of Prof. L. Prandtl (*Review*), 398; translated by Prof. J. P. Den Hartog, Applied Hydro- and Aero-mechanics: based on lectures of Prof. L. Prandtl (*Review*), 398
- Tiffeneau (M.), and Mlle. I. Neuberg, Action of Phenylmagnesium Bromide on Lävrotatory Dibenzoylglyceric Aldehyde, 227; and Mlle. B. Tchoubar, Transpositions in the Cyclohexane Series, 470
- Tilho (J.), Possibility of the capture of the Logone, a tributary of Lake Tchad, by the Niger, 822; Two Sketches concerning the final capture of the Logone and its consequences for the Tchad Basin, 946
- Tillyard (Dr. R. J.), Feeding of Trout in Tasmania, 328
- Tizard (H. T.), Science at the Universities, 372; 405; 629
- Tobler (Prof. T.), Die Flechten: eine Einführung in ihre allgemeine Kenntnis (*Review*), 721
- du Toit (Dr. A. L.), Crustal Movements in South Africa, 107
- Tolansky (Dr. S.), Negative Nuclear Spins and a Proposed Negative Proton, 26; Nuclear Spin of Iodine, 851, 854
- Tollner (H.), and F. Kopf, Measurements of the Nocturnal Radiation of Heat during the Polar Night 1932-33 on the Island of Jan Mayen, 547
- Tolman (R. C.), Effect of Inhomogeneity on Cosmological Models, 263; Possible Failure of Energy Conservation, 548
- Tombs (D. M.), awarded a Robert Blair fellowship, 189
- Tomita (R.), [Y. Nishira, R. Sagane, M. Takeuchi and], Energies of the Positrons in Induced Radioactivity, 941
- Topley (B.), and W. F. K. Wynne-Jones, Ionic Product of Heavy Water, 574
- Topley (Prof. W. W. C.), An Outline of Immunity (*Review*), 752
- Torrey (T. W.), Temperature Coefficient of Nerve Degeneration, 472
- Toryu (Y.), Respiration in *Ascaris*, 903
- Trapeznikova (O. N.), and Dr. L. W. Shubnikow, Anomaly in the Specific Heat of Ferrous Chloride at its Curie Point, 378
- Travers (A.), and Yu Kwong Chu, Dimetaphosphoric Acid, 191; Hydration of Phosphoric Anhydride, 227
- Travers (Prof. M. W.), The Thermal Decomposition of Acetaldehyde, 569; R. V. Seddon, and P. F. Gay, Cause of Changes in Rate of some Gas Reactions, 662
- Treloar (H. M.), Foreshadowing of Monsoonal Rain in Northern Australia, 816
- Tremblot (R.), Spectrum and Orbit of the Double Stars Auriga, 154
- Tribe (F. N.), Educational Provisions of the Unemployment Bill, 72
- Trillat (J. J.), and H. Motz, Diffraction of Electrons by India-rubber, 226
- Trowell (O. A.), elected a fellow of St. John's College, Cambridge, 37
- Truchet (R.), and J. Chapron, Raman Spectrum of Conjugated Double Links in a Nucleus, 117
- Tsi-Zé (Ny), and Choong Shin-Piaw, Series of Cesium Atoms in an Electric Field, 1010; and Tsien Ling-Chao, Oscillations with Hollow Quartz Cylinders cut along the Optical Axis, 214
- Tsuboi (Prof. C.), Deformations of the Crust around Sakura-jima (Japan), 940
- Tubbs (F. R.), Pruning of the Tea Plant, 184
- Tucholski (Dr. T.), Increase of the percentage of Diplogen in Water during very Slow Evaporation, 29
- Turing (A. M.), elected a Harold Fry student at King's College, Cambridge, 224
- Turnbull (Prof. H. W.), Invariant Theory of the Correlation, 862
- Turnbull (L. G.), [G. H. Henderson, S. Bateson and], Quantitative Study of Pleochroic Haloes, 576
- Turner (Dr. E. O.), and others, Reduction of Traffic Noise, 633
- Turner (J. S.), appointed University demonstrator in Botany in Cambridge University, 672; awarded the Gedge prize of Cambridge University, 637
- Turrill (Dr. W. B.), Prof. W. Neilson Jones's Plant Chimeras and Graft Hybrids (*Review*), 515; Dr. L. Cockayne, 170
- Tutin (Dr. J.), Atomic Theory, 23
- Tutin (T. G.), The Fungus on *Zostera marina*, 573
- Tutton (Dr. A. E. H.), Recent Glacier Survey, 992
- Twarowska (Mlle. B.), Extinction of the Fluorescence of a Solution of Biacene in *p*-Dichlorobenzene at  $-180^{\circ}\text{C}$ ., 431
- Twiss (Dr. D. F.), Electrodeposition of Rubber, 742
- Twyman (F.), and F. Brech, X-Irradiation of Fused Silica, 180
- Tyson (L.), American System of Radio-Broadcasting, 260
- Tyzzler (E. C.), 'Blackhead' in Turkeys, 292
- Ubbelohde (A. R.), [A. C. G. Egerton, F. L. Smith and], Estimation of the Combustion Products from the Cylinder of the Petrol Engine (2); [and A. C. G. Egerton], (3), 786; Spectra and Latent Energy in Flame Gases, 848, 854
- Uber (F. M.), [T. H. Goodspeed and], Application of the Altmann Freezing-Drying Technique to Plant Cytology, 911
- Udolskaja (N.), Drought Resistance of Spring Wheat Varieties, 192; Elements of Mineral Nutrition as factors altering the Drought Resistance of Plants, 263
- Unna (P. J. H.), Traffic Noise, 937
- Uppal (Harbans Lal), [Dr. E. McKenzie Taylor and], Flow of Water under Structures on Sand Foundation, 425; Water Pressures on Works on Sand Foundations, 465
- Urban (F. F.), [H. Heller and], Neutralisation of the Poisonous Action of Pituitrin in the Organism, 392
- Urbain (P.), and M. Wada, Detection of the Alkali Metals by the Arc Spectra Method, 1019
- Urey (Prof. H. C.), awarded the Nobel prize for Chemistry for 1934; work of, 803
- Urwick (Major L. R.), The Idea of Planning, 542
- Uvarov (B. P.), Geochemistry of Living Matter, 11; Third International Locust Conference, 485



- Vadova (V. A.), [V. S. Sadikov and], Alcoholysis of Serum Albumin, 432
- Vale (E.), Local Colour : a Landscape Analysis for Sight-seers (*Review*), 894
- Valentine (A. S.), and E. M. Bergstrom, Hydro-Electric Development in Great Britain, 1016
- Valette (Mlle. S.), [A. Charriou and], Influence of Anti-oxygen Bodies on the Sensibility of Photographic Emulsions, 190; Linear Deformations of Nitrocellulose Films as a Function of the Atmospheric Humidity, 227; Realisation of Acetylcellulose Films not Deformed by Water, 910
- van Valkenburg (Prof. S.), [Prof. E. Huntington, Prof. F. E. Williams and], Economic and Social Geography (*Review*), 987
- Vallet (P.), Recording Apparatus for the Study of Reactions with Regularly Varying Temperatures, 75
- Vallois (Prof. A. V.), Prehistoric Pathology, 902
- Vande Velde (A. J. J.), Sterilisation of Biological Powders (5), 787
- Varadachari (P. S.), [S. Ramachandra Rao and], Magnetic Properties of Organic Vapours, 812
- Vardaniane (L.), Age of the Surface Relief of Ciscaucasia, 40
- Vavilov (S.), [E. Brumberg and], Accuracy of the Photometric Method of Extinction, 1020
- Vegard (Prof. L.), Situation of the  $A(^3\Sigma)$  level in the Nitrogen Molecule, 697
- Veil (Mlle. Suzanne), Autophotographic Localisation of Radioactive Ions in Gelatine, 910; Qualitative Chemical Observations in Flat Sheets of Gelatine, 673
- Vellard (J.), Periodic Destruction of the Fauna of the Rivers of the Grand Chaco by Variations of Salinity, 39; Variations of the Reactions of Spider Venoms, 191
- Vellinger (E.), and R. Delion, Superficial Properties of Certain Colouring Matters, 191; and G. Muller, Oxidation of Mineral Oils by Atmospheric Oxygen at Moderate Temperatures, 262
- Ventura (Maria), Embryological Observations on *Manihot palmata*, Muell., 300
- Verdesio (E.), Special Education in Uruguay, 909
- Verschagin (G.), A. Gorbov, and I. Mendelejev, Occurrence in Nature of Water with Anomalous Density, 335
- Vernadsky (W.), Should Heavy Water be looked for from the Geochemical Point of View?, 787
- Verney (E. B.), elected a professorial fellow of Downing College, Cambridge, 672
- Vernon-Harcourt (Augustus George), Centenary of the Birth of; work of, 963
- Vernotte (P.), Control of the Regularity of Graduation of a Thermometer, 262
- Verona (O.), Spontaneous Cultures of the Cellulositic Aerobe, *Cytophaga Winogradskii*, n.sp., 639
- Veronica (Sister), Sparrows and Bees, 420
- Verrier (Mlle. M. L.), Action of Light on Visual Purple, 39
- Verschaffelt (J. E.), Bridgman Effect, 787
- Versluys (Prof. J.), Distribution of Marine Animals and the History of the Continents, 706
- Veryard (Flight-Lieut. R. G.), and A. K. Roy, Meteorological Conditions Affecting Aviation over the North-West Frontier, 904
- Verzár (Prof. F.), [E. J. McDougall, H. Erlenmeyer, H. Gaertner and], Heavy Water in the Animal Body, 1006, 1011
- Vetter (Q.), elected president of the Congress of 1937 of the International Academy of the History of Science, 671
- Villemaine (F.), [F. Diénert and], Photo-Chemical Reactions, 982
- Vinogradov (A.), Vanadium in Marine Animals and in Mineral Oils, 855
- Voisey (A. H.), Physiography of the Middle North Coast District of New South Wales, 983
- Volarovitch (M.), Viscosity of Molten Rocks, 191
- Volklinger (H.), A. Tchakirian, and Mme. Marie Freymann, Raman Spectra of the Metallochloroforms in Relation with their Structure, 431
- Volterra (V.), Generalised Function Theory, 293
- Vorobjev (A.), Electrical Resistance of Rock Salt Irradiated with X-Rays, 1020
- Vowles (H. P.), Introduction of Hindu-Arabic Numerals into Western Europe, 1008
- Vyvyan (M. C.), [W. S. Rogers and], Root Systems of Apple Trees, 424
- Wacek (A.), and H. Löffler, Detection of Certain Volatile Amines with the View of the Investigation of Biological Processes, 155
- Wada (M.), [P. Urbain and], Detection of the Alkali Metals by the Arc Spectra Method, 1019
- Waddell (L. A.), Hostility of Starlings to Swallows, 219
- Waddington (C. H.), Dr. J. Needham, W. W. Nowinski, Miss D. M. Needham, and R. Lemberg, Active Principle of the Amphibian Organisation Centre, 103
- Wakker (C.), Application of Some Photoelectric Cells to the Determination of Nitrous Gases and Ozone, 674
- Wald (G.), Carotenoids and the Vitamin A Cycle in Vision, 65
- Walke (H. J.), Annihilation Radiation from Paraffin Bombarded with Neutrons, 495; Spontaneous Emission of Neutrons from Radioactive Isotopes, 215; [Prof. F. H. Newman and], Induced Positron Radioactivity, 288; Induced Radioactivity and Transmutation, 64; Induced Radioactivity, 537
- Walker (Prof. Miles), Conjugate Functions for Engineers (*Review*), 164
- Walker (Sir Gilbert), Recent Gliding Performances and their Meteorological Conditions, 347
- Walker (W. P.), awarded the Duke of Northumberland Prize of the Institution of Naval Architects, 637
- Walter (G.), Action of Chlorosulphonic Acid on Naphthalene, 300
- Walther (H.), Dissipation Constants of Solids, 704
- Walther (O.), and M. Lilienstern, Diagnosis of Sex in Hemp, 155
- Walton (E. T. S.), [J. D. Cockcroft and], Nuclear Transmutations with Heavy Hydrogen, 69
- Waly (A.), [A. Brasch, F. Lange, Dr. T. E. Banks, T. A. Chalmers, Dr. L. Szilard, Prof. F. L. Hopwood and], Liberation of Neutrons from Beryllium by X-Rays: Radioactivity Induced by Means of Electron Tubes, 880, 901
- Wambacher (Hertha), [Marietta Blau and], Photographic Desensitisers and Oxygen, 538; Physical and Chemical Investigations on the Photographic Detection of H-Rays, 392
- Ward (E.), [obituary], 243
- Ward (F. Kingdon), Plant Collecting in Asia, 492
- Wark (C. W.), Influence of Sulphate of Ammonia on Stubble-Sown Oat Crops in Victoria, 432
- Warmington (E. H.), Greek Geography (*Review*), 617
- Warren (A. G.), Detection of Small Flaws in Metals by Radiography, 942
- Warren (F. L.), [R. J. Clark and], Density of Dead Sea Water, 29
- Warren (H.), J. G. D. Clarke, W. A. MacFadyen, and H. and M. E. Godwin, Lea Valley Mesoliths, 423
- Wassermann (Dr. A.), Kinetic Measurements with the Pulfrich-Stufen-Photometer, 101
- Waterman (A. J.), Survival of Young Rabbit Embryos on Artificial Media, 263
- Waterman (T. T.), and A. L. Kroeber, Yurok Marriage, 67
- Waters (Dr. W. A.), A General Equation for Induced Polarity, 178
- Waterston (Prof. D.), Physical Characters of a Scottish Bishop, 815
- Watson (Prof. H. E.), appointed Ramsay Memorial professor of Chemical Engineering at University College, London, 113
- Watson (H. E.), [G. P. Kane, K. R. Krishnaswami and], Gas from Indian Oil Wells, 108
- Watson (Prof. J. A. S.), Scientific Progress and Economic Planning in Relation to Agriculture and Rural Life, 373; and J. A. More, Agriculture: the Science and Practice of British Farming. Third edition (*Review*), 830

- Watt (Lt.-Col. E. W.), and Prof. H. M. Macdonald, British Association: Aberdeen Meeting, 1934, 144
- Watt (J. Y. C.), [H. F. Hsu and], Guinea Worm in China, 68
- Watters (R. A.), The Intra-Atomic Quantity, 877
- Watts (Prof. W. W.), president-elect of the British Association; work of, 410
- Wayland (E. J.), Ancient Earthworks, etc. in Uganda and Zimbabwe, 975
- Weatherburn (Prof. C. E.), awarded the Hector medal and prize of the Royal Society of New Zealand, 213
- Webel (R.), [G. Gutzeit, R. Dückert and], A New Specific Reaction for Antimony Cations, 507
- Webster (Dr. H. C.), [G. H. Munro and], Nature of Atmospheres, 880, 901
- Webster (J. C.), presented with the Tyrrel medal of the Royal Society of Canada, 205
- Weibel (R.), [G. Gutzeit and], Use of the Antipyrine-Iodide Reagent in Analysis with the Spot Test, 227
- Weigle (J.), and F. Huber, Transformation of Ammonium Chloride at  $-30^{\circ}\text{C}$ ., 674; and R. Luthi, Some Negative Results on the Dielectric Constant, 674; and H. Saini, Transformation of Ammonium Bromide at  $-40^{\circ}\text{C}$ ., 674
- Weijers (T. J.), [B. van der Pol and], Fine Structure of Valve Characteristics, 107
- Weiss (Prof. F. E.), Northward Extension of Mediterranean Flora, 667
- Weiss (P.), Variation of Saturation Magnetisation at Low Temperatures, 115
- Welch (M. B.), Some Mechanical Properties of Alpine Ash (1), 75
- Wells (E. F. V.), Lions, Wild and Friendly (*Review*), 755
- Wells (H. G.), Experiment in Autobiography: Discoveries and Conclusions of a Very Ordinary Brain (since 1866). Vol. 1 (*Review*), 553; Vol. 2 (*Review*), 882; Power in Social Psychology, 972
- Wells (L.), Thames Estuary Fisheries, 318
- Welo (Dr. L. A.), Humidity-Resistance Relations in Carbon-Coated Hygroscopic Materials, 936, 938
- Wenger (P.), G. Gutzeit, and T. Hiller, A Method of Electrolytic Attack of Opaque Minerals and its Application to the Technique of Etching Polished Surfaces, 507
- Wenzel (Dr. R. N.), appointed to an industrial fellowship in the Mellon Institute of Industrial Research, 696
- Wertenstein (Prof. L.), [M. Danysz, J. Rotblat, M. Żywnand], Experiments on the Fermi Effect, 970, 974
- West (Dr. C.), [Dr. F. Kidd and], Life-Duration of Fruits, 798
- Westcott (Dr. Cynthia), Brand Canker of Rose, 631
- Westcott (C. H.), [T. Bjerge and], Radioactivity Induced by Bombardment with Neutrons of Different Energies, 177; Radioactivity Induced by Neutron Bombardment, 286
- Westermark (Dr. E.), Pagan Survivals in Mohammedan Civilisation (*Review*), 305
- Western (R. W.), Taxation and Scientific Research, 92
- Wetzel (N. C.), Motion of Growth (8), 264
- Wheeler (Dr. R. E. M.), appointed honorary director of the Institute of Archaeology, London University, 152
- Wheeler (Dr. T. S.), Theory of Liquids, 667
- Whelan (C. B.), Later Stone Age in Northern Ireland, 702
- Whipple (Dr. F. J. W.), awarded the Buchan prize of the Royal Meteorological Society, 846; Phenomena Related to the Great Siberian Meteor, 38; Siberian Meteor of June 30, 1908, 816; [Dr. H. Mary Browning and], Air Waves of Unknown Origin, 532
- Whipple (Dr. G. H.), [Dr. G. R. Minot, Dr. W. P. Murphy and], awarded the Nobel prize for Medicine and Physiology for 1934, 691
- Whitaker (H.), Prof. R. Whytlaw-Gray, E. H. Ingold, and Prof. C. K. Ingold, Preparation of Protium Oxide and Determination of the Proportion of Deuterium in the Hydrogen of Normal Water, 661
- Whiteley (Prof. M. A.), [Prof. J. F. Thorpe and], Thorpe's Dictionary of Applied Chemistry. Supplement. Vol. 1 (*Review*), 556
- Whitley (G.), Extinction of the Bird of Providence, 464
- Whittaker (C. W.), and F. O. Lundstrom, Manufacture of Potassium Nitrate, 781
- Whytlaw-Gray (Prof. R. W.), [K. G. Denbigh and], Disulphur Decafluoride, 781; [H. Whitaker, E. H. Ingold, Prof. C. K. Ingold and], Preparation of Protium Oxide and Determination of the Proportion of Deuterium in the Hydrogen of Normal Water, 661
- Wilberforce (Prof. L. R.), impending resignation from Liverpool University, 113
- Wildt (Dr. R.), The Atmospheres of the Giant Planets, 418
- Wilkins (A. F.), Angle of Incidence of Short Waves in Radio Reception, 859
- Wilkinson (T. W.), From Track to By-Pass: a History of the English Road (*Review*), 893
- Willheim (R.), Carbohydrate Metabolism of Carcinoma, 392
- Williams (Dr. Anna W.), Streptococci in Relation to Man in Health and Disease (*Review*), 752
- Williams (Dr. C. B.), Insect Immigration in Great Britain, 186
- Williams (E. G.), Interstellar Matter, 108
- Williams (F. C.), awarded the Ferranti scholarship of the Institution of Electrical Engineers, 189
- Williams (Prof. F. E.), [Prof. E. Huntington, Prof. S. van Valkenburg and], Economic and Social Geography (*Review*), 987
- Williams (Mrs. Mary Jane), bequest to Oxford University, 429
- Williams (R. C.), Evaporated Metal Mirrors, 329
- Williams (S. E.), [E. T. S. Appleyard, N. Thompson and], Situation of the  $A(^3\Sigma)$  Level in the Nitrogen Molecule, 322
- Williams (Prof. W. R.), Jubilee of, 962
- Williamson (Dr. G. C.), Memoirs in Miniature: a Volume of Random Reminiscences (*Review*), 515
- Williamson (Mrs. H. S.), [obituary article], 998
- Willis (J. H.), The Agaricaceæ of Gilled Fungi: Some Species Common in Victoria, 107
- Willmott (Miss E. A.), [obituary article], 726
- Wilman (Miss M.), The Rock-Engravings of Griqualand West and Bechuanaland, South Africa (*Review*), 679
- Wilson (Dr. C. L.), [E. D. Hughes, Prof. C. K. Ingold and], Concentration of Heavy Water by Spontaneous Evaporation, 142; [Prof. C. K. Ingold, C. G. Raisin and], Direct Introduction of Deuterium into Benzene without Heterogeneous Catalysis, 734; Direct Introduction of Deuterium into Benzene, 847, 854
- Wilson (C. W.), [F. G. Spear, A. Glücksmann, A. F. W. Hughes and], Sensitivity of Dividing and Non-Dividing Cells to Radiation, 460
- Wilson (Prof. H. A.), The Mysteries of the Atom (*Review*), 895
- Wilson (H. W.), [C. W. Saunders, Dr. R. G. Jakeman and], Electricity on Board Ship, 930
- Wilson (Jessie A. R.), New Species of *Psymmophyllum* from the Upper Carboniferous of Scotland, 115
- Wilson (P. W.), [E. B. Fred and], Photosynthesis and Free Nitrogen Assimilation by Leguminous Plants, 711
- Wilson [Merrill and], Paschen Series in Stellar Spectra, 466
- Wiman (Prof. C. J.), elected a foreign member of the Geological Society of London, 878
- Windred (G.), Theory and Applications of Photoelectric Effects, 332
- Winterbotham (Brig. H. St. J. L.), Ordnance Survey. Professional Papers, New Series, No. 16: The National Plans, 678; 870
- Winterbottom (J. M.), Bird Population Studies (5), 335
- Withers (R. B.), and R. A. Keble, Palæozoic Brittle-Stars of Victoria, 675
- Witney (D.), [Dr. A. G. Ruston and], Hooton Pagnell: the Agricultural Evolution of a Yorkshire Village (*Review*), 887
- Witts (Dr. L. J.), appointed professor of Medicine in St. Bartholomew's Hospital Medical College, 745
- Wodzicki (Dr. K.), Hormonal Interruption of Broodiness in Hens, 383; Presence of the Right Oviduct in the Domestic Duck, 823
- Wolff (B.), Animalium Cavernarum Catalogus, 284
- Woltereck (Prof. R.), Science and Intellectual Liberty, 27
- Wolterstorff (Dr. W.), The Chinese Mitten Crab, 17
- Wood (W. A.), Cold-Working of Copper, 576; Distortion of the Crystal Lattice of  $\alpha$ -Brass, 572

- Woodhead (D. W.), [W. Payman and], The Pressure Wave sent out by an Explosive (3), 976
- Woods-Humphery (G. E.), Peace and War in the Air, 433
- Woolley (Dr. C. L.), Archaeology in Iraq, 999
- Wooster (Dr. Nora), [Dr. C. B. O. Mohr and], The Scientific Approach to Peace, 854
- Wordie (J. M.), expedition to Ellesmere Island, 490
- Wormall (Dr. A.), [Dr. S. J. Hopkins and], Action of Phenyl Isocyanate on Insulin, 290
- Worthington (Dr. E. B.), The Changing British Fish Fauna, 26
- Wouters (J.), Raman Spectrum of Carbon Bromotrichloride, 787
- Wright (Mrs. Anna Allen), and Prof. A. H. Wright, Handbook of Frogs and Toads: the Frogs and Toads of the United States and Canada (*Review*), 123
- Wright (Prof. A. H.), [Mrs. Anna Allen Wright and], Handbook of Frogs and Toads: the Frogs and Toads of the United States and Canada (*Review*), 123
- Wrighton (H.), [Dr. R. H. Greaves and], Practical Microscopical Metallography. Second edition (*Review*), 513
- Wrinch (Dr. D. M.), Chromosome Behaviour in Terms of Protein Pattern, 978
- Wronberg (A.), [Herszfinkiel and], Radioactivity of Samarium, 334
- Wynne-Jones (W. F. K.), [B. Topley and], Ionic Product of Heavy Water, 574
- Wyss-Chodat (F.), Studies on the Bacteriophage, 639
- Yabe (H.), and R. Tayama, Submarine Terraces Around Japan, 976
- Yagi (N.), and J. Shimoizumi, Temperature Range in Rats, 145
- Yamaha (G.), and S. Abe, Iso-Electric Points of Bacterial Suspensions, 328
- Yamasaki (F.), [Prof. U. Nakaya and], Spark Investigation by the Wilson Chamber, 496
- Yeates (G. K.), The Life of the Rook (*Review*), 893
- Yeh (W.), Frequency of the Number of Isotopes of the Chemical Elements, 299
- Yerkes (Dr. R. M.), Chimpanzee Twins, 21; Relational Learning in Chimpanzees, 184
- York (Archbishop of), Science and Human Values, 764
- Young (Charles Augustus), centenary of the birth of, 926
- Young (Sir E. Hilton), Inland Water Supply, 93; Lessons of the Drought, 171; Value of Milk, 600
- Young (Dr. J.), appointed professor of Obstetrics and Gynaecology at the British Postgraduate Medical School, 113
- Young (W. A.), Reproduction of Graphs, 528
- Yonge (Prof. C. M.), ABC of Biology (*Review*), 399; Origin and Nature of the Association between Invertebrates and Unicellular Algae, 12
- Yoshii (S.), [T. Miwa and], Formation of Urease by *Aspergillus*, 257
- Zacharias (J. R.), [I. I. Rabi, J. M. B. Kellogg and], Magnetic Moment of the Proton and the Deuteron, 466
- Zagami (V.), Content of the *E* Factor in Leguminous Seeds, 192
- Zaïcoff (R.), Generalised Wave Mechanics (3), 299
- Zak (E.), [A. Fröhlich and], Ability of Lung-Tissue to Regulate the Water-Content of the Blood of the Lungs; Influence of Purine Derivatives on the Permeability of the Heart, 300
- Zanotelli (G.), Paramagnetic Rotation in a Variable Magnetic Field, 639
- Zappi, and Cortelezzi, Structures of Halogen Compounds of Non-Metals, 386
- Zemansky (Prof. W.), [Prof. A. C. G. Mitchell and], Resonance Radiation and Excited Atoms (*Review*), 953
- Zenkovitch (B.), Whales of the Far East, 583
- Zeuner (Dr. F.), Phylogenesis of the Stridulating Organ of Locusts, 460
- Zhukovsky (Prof. P.), (P. Joukovsky), La Turquie Agricole (Partie Asiatique-Anatolie) (*Review*), 272
- Ziegler (Dr. W.), Electric Waves in Insulators, 425
- Ziemecki (Dr. S.), Rock Salt Absorption of Cosmic Rays, 773
- Zimmer (C.), Cumacea from East Greenland, 385
- Zimmet (D.), and E. Frömmel, Action of Muscle Extract (Lacarnol) and of Pancreatic Extract Deprived of Insulin (Padutine) on the Nervous System of the Frog, 227
- Zirkle (Dr. C.), Plant Hybridisation before Kölreuter, 623
- Zirnhelt (Mlle. Mathilde), New Culture Medium Specially Favourable to the Development and Maintenance of the Virulence of *B. typhi murium*, 582
- Zöllner (Johann Carl Friedrich), centenary of the birth of, 692
- Zombory (L.), [V. Zsivny and], Berthierite from Kisbánya, Carpathians, 114
- Zsivny (V.) and L. Zombory, Berthierite from Kisbánya, Carpathians, 114
- Zvjaginsev (Prof. O.), New Platinum Mineral, 318
- Zwarenstein (H.), [R. W. S. Cheetham, I. Schrire and], Influence of Testicular and of Urinary Extracts on the Creatinine Excretion in Rabbits, 947; [S. Honikman, H. A. Shapiro and], Bio-Assay of the Gonado Kinetic Principle of the Anterior Pituitary, 947; Variations in the Ovarian Response of *Xenopus* to the Gonado Kinetic Principle of the Anterior Pituitary (1), 982; [B. G. Shapiro and], Effect of Hypophysectomy and Castration on Muscle Creatine in *Xenopus laevis*, 947
- Zwicky (F.), [W. Baade and], Super-Novæ; Cosmic Rays from Super-Novæ, 472
- Żyw (M.), Induced Radioactivity of Potassium, 64; [M. Danysz, J. Rotblat, Prof. L. Wertenstein and], Experiments on the Fermi Effect, 970, 974

## TITLE INDEX

- Aard-Varks, Pangolins and, R. T. Hatt, 630  
 Abattoir Design, 455  
 Aberdeen and District, A Scientific Survey of, 352  
 Abyssinia, Egypt and the Quarnero Islands, Journey to, in 1931-32, F. Morton, 392  
 Academic Assistance Council, Progress report of the, Lord Rutherford, 804  
 Academy of Natural Sciences of Philadelphia, award of the Joseph Leidy medal to G. S. Miller, Jr., 878  
 Acetaldehyde: The Thermal Decomposition of, Prof. M. W. Travers, 569; Vapour of, Kinetics of the Thermal Decomposition of the, M. Letort, 470  
 Acetone: Absorption of, by the Nitrocellulose, M. Mathieu and C. Kurylenko, 506; Fixation of, by Nitrocellulose, Study by Röntgen Rays of the, M. Mathieu, 298  
 Acetylcellulose Films not Deformed by Water, Realisation of, A. Charriou and Mlle. S. Valette, 910  
 Acetylene: 'Heavy', Vibration Spectra and Force Constants of, Dr. G. B. B. M. Sutherland, 775; Magnesium Compounds, Action of Ethylene Oxide on, L. Fauconnau, 673; Polymerisation of, Under the Influence of Heat, G. Mignonac and E. Ditz, 471  
 Acids, Measurement of the Strength of, E. Darmois and Yeu Ki Heng, 982  
 Acrolein: Spectrum of, Dr. H. W. Thompson and J. W. Linnett, 937, 938; Thermal Decomposition of, Dr. H. W. Thompson and J. J. Frewing, 900, 901  
*Actiniscus* of the Upper Cretaceous of Brasses (Préalps médianes) and of the Island of Elba, E. Parejas, 582  
 Active Chlorine in Water, Detection and Rapid Estimation of Very Low Concentrations of, L. Leroux, 1019  
 Adsorption, Activated, An Equation for the Kinetics of, Prof. S. Roginsky, 935, 938  
 Adult Education in Practice, Edited by R. Peers (*Review*), 344  
*Aequiueus latifrons* (Steindachner), Reproductive Habits and Life-History of the Cichlid Fish, C. M. Breder, Jr., 939  
 Aerial: Phototopographic Surveys, Perspective Property of Certain Surfaces and its Application to, G. Poivilliers, 75; Ship, An, 225  
 Aero Engine, New 24-Cylinder, 18  
 Aeronautical Research Committee, Report for Year 1933-34, 922  
 Aeronautics and Meteorology, Co-operation between, 602  
 Aeroplanes, Long-Range, Launching of, 875  
 Africa: Native Affairs in, Gen. Smuts, 949; Racial Problems in, a Suggestion, Col. Carbutt, 963; Research in, The Native Problem and, Sir Ernest Graham-Little, 585; South, Natives of, Western Civilization and the, Edited by Dr. I. Schapera (*Review*), 587  
 Agaricaceæ, The, or Gilled Fungi: Some Species Common in Victoria, J. H. Willis, 107  
 Agarics, *Collybia apalosarca* and the Veils: An Evolutionary Study in, E. J. H. Corner, 940  
 Agassiz, Prof. J. L. R., on Fishes, 710  
 Agricultural: Botany, National Institute of, Address by Sir John Russell, 135; Industries, International Congress of, Fourth, 284; Production: Planning of, Sir Daniel Hall, 714; Economic Planning and, 713; Science, Boussingault and, 995; and Rural Life, Scientific Progress and Economic Planning in Relation to, Prof. J. A. S. Watson, 373; Re-organisation of Present-Day, Prof. E. Laur, 71; Sixteenth International Congress of, 71; The Science and Practice of British Farming, Prof. J. A. S. Watson and J. A. More. Third edition (*Review*), 830  
 Ainu, The, Dr. N. G. Munro, 464  
 Air: and Water Wonders, The Book of, E. Hawks (*Review*), 617; Race, England-Australia, C. W. A. Scott and T. C. Black Winners of the, 655; Refractivity of the, Sunspot Number and the, N. Dneprovsky, 853, 854  
 Aircraft: British Military, Competitive Trials of, 842; Rotary Wing, J. De La Cierva, 781  
 Airship Developments in the United States, 875  
 Air -: Speed Record, Warrant Officer F. Agello, 660; -Suction Arrangements in Works, Action of, W. Schmidt and E. Brezina, 392; Temperature of the, Influence of a Forest on the, P. Seltzer, 506; Transport, British, Developments in, Sir Philip Sassoon, 728; Treatment of, with the View of Extracting Krypton and Xenon as Essential Products, etc., G. Claude, 154; Waves: Caused by the Fall of the Meteorite on June 30, 1908, in Central Siberia, I. S. Astarowitsch, 38; of Unknown Origin, Dr. H. Mary Browning and Dr. F. J. W. Whipple, 532  
 Airy and Greenwich Observatory, 261  
 Alaskan Archaeology, Dr. A. Hrdlička, 1001  
 Albuminoid Matter in Various Animal Species, Comparative Digestive Utilisation of, Mlle. Paule Lelu, 155  
 Alcoholism: and Male Mortality, Dr. R. Bandel, 352; Experimental, Mlle. Jeanne Lévy, 947; International Congress on, 137  
 Alcohols, C-OH Bond and Molecular Structure in, Energy of the, Y. Hokumoto, 538  
 Aldehydes and Ketones, Influence of the Free Acidity on the Determination of, by Hydroxylamine Hydrochloride, L. Palfray and Mlle. Suzanne Tallard, 431  
 Aldohexoses, Synthesis of the, Austin and Humoller, 32  
 Algebraic Surfaces (*Review*), 437  
 Algerian Stone Age, P. Pallary, 975  
 Algæ, Unicellular, Invertebrates and, Origin and Nature of the Association between, Prof. C. M. Yonge, 12  
 Algologie: *Traité d'*, introduction à la biologie et à la systématique des algues, Prof. P. Dangeard (*Review*), 400  
 Alizarin-KOH Method of Staining Vertebrate Skeletons, M. Rahimullah and Prof. B. K. Das, 464  
 Alkali Metals, Detection of the, by the Arc Spectra Method, P. Urbain and M. Wada, 1019  
 Alkaline: Earth Chlorides, Electrolytic Conductivity of, T. Shedlovsky and A. S. Brown, 69; Metals in Natural Waters, R. Bossuet, 334  
 Allantoin, Dextro-Rotatory, R. Fosse, P. E. Thomas and P. de Graeve, 154  
 Alligators, Incubation of, E. A. McIlhenny, 539  
*Allium*: Meiotic Chromosomes of, Prof. T. K. Koshy, 780; *Schoenoprasum*, Triploid, Distribution of Chromosome Numbers in a Progeny of, A. Levan, 254  
 Alloys: Atomic Arrangement in, Prof. W. L. Bragg and Dr. E. J. Williams, 668; of Iron and Molybdenum, The, J. L. Gregg (*Review*), 513; Structure of, Prof. W. L. Bragg (Bakerian lecture), 38  
 Alluvial Matter in Suspension in the Waters of the River Arve at Geneva, in 1933, Transmutation of, L. W. Collet and J. Buffle, 582  
 Allyl Transposition, A. Kirmann, 1019  
 Almanacs for 1835, 821  
 Alpine: Ash, Mechanical Properties of, (1) *Eucalyptus Delegatensis* R.T.B., M. B. Welch, 75; Landslips, F. Montandon, 32  
 Általános talajtan, Dr. E. Sigmond (*Review*), 46  
 Alternators, High-Voltage, J. Rosen, 1002  
 Alumina, Free, in Soils, Prof. F. Hardy, 326  
 Aluminised Surfaces, Reflecting Power of, B. K. Johnson, 216  
 Aluminium: Coating of Gratings, C. P. Butler and Prof. F. J. M. Stratton, 810; Hydride: A new Band System of, W. Holst, 63; Further Band Systems of, W. Holst, 322; in Bridge work, 212; in Complex Media, Determination of very Small Amounts of, P. Meunier, 1019; -Surfaced Mirrors in Astronomy, Dr. H. Spencer Jones, 522

- Aluminosilicate Framework Structures, W. H. Taylor, 69  
 Alums, Crystal Structure of the, C. A. Beevers and H. Lipson, 327  
 Amanites mortelles, Le poison des, R. Dujarric de la Rivière (*Review*), 832  
 America and Trade Prospects, Sir Josiah Stamp, 450  
 American : Aborigines : The, Their Origin and Antiquity, Edited by D. Jenness (*Review*), 756 ; Association for the Advancement of Science, Ninety-fifth Meeting, 967 ; Indian Land-Tenure, 246 ; Institute of Electrical Engineers, 210 ; Stratosphere Ascent of July 29, 1934, Capt. A. W. Stevens, 707  
 Amides and Cyanic Derivatives, Neuro-muscular Action of, R. Bonnet, 75  
 Aminaux et chez les végétaux, La fécondation chez les, Dr. H. Coupin (*Review*), 309  
 Amines, Detection of certain Volatile, with the view of the Investigation of Biological Processes, A. Wacek and H. Löffler, 155  
 Aminoacids : Action of the Lung on, L. Binet and D. Bargeton, 1019 ; *in vitro*, Photosynthesis of, Prof. N. R. Dhar and S. K. Mukherjee, 499  
 2-Aminocyclanols, Deamination of, Passage from one ring to another by the, M. Godchot and M. Mousseron, 154  
 Ammonia, Synthesis of : by Collision between Positive Ions, F. Fedorov, I. Motchan, S. Rosinskij and A. Schechter, 583 ; Under very High Pressures, above 1,000 kgm. cm.<sup>2</sup>, J. Basset, 390  
 Ammonium : Bromide : at -40° C., Transformation of, J. Weigle and H. Saini, 674 ; Low Temperature Modification of, Crystal Structure of the, Dr. J. A. A. Katelaar, 250 ; Chloride at -30° C., Transformation of, J. Weigle and F. Huber, 674 ; Phosphates, Dissociation of the, A. de Passillé, 470  
 Amorphous Silica, X-Ray Diffraction Studies of the Crystallisation of, F. P. Dwyer and D. P. Mellor, 76  
 Amphibian Organisation Centre, Active Principle of the, C. H. Waddington, Dr. J. Needham, W. W. Nowinski, Miss D. M. Needham and R. Lemberg, 103  
*Amphioxus*, Nephridia of, Prof. E. S. Goodrich, 540  
 Amphoteric Ions, Structure of, W. Kuhn and H. Martin, 1017  
 'Anabiosis' in Vertebrates and Insects at a Temperature below Zero, N. Kalabuchov, 40  
 Anæsthesia, Society for the Study of, Foundation in Paris of a, 137  
 Analytical Balance, "New Empire", Baird & Tatlock (London), Ltd., 376  
 Anaphylaxy in Therapeutics, C. Richet, 638  
 Ancestry of the Long-lived, The, Prof. R. Pearl and Ruth De Witt Pearl (*Review*), 886  
 Ancient Monuments of Great Britain, 1933, 93  
 Anemone, Fish and, Partnership between, H. A. F. Gohar, 291  
 Anhydrous Hydrogen Cyanide, Electrical Conductivity of Salts in, Prof. J. E. Coates and E. G. Taylor, 141  
 Animal : Behaviour, Interpretation of, Dr. E. S. Russell, and others, 996 ; Biology, Principles of, Prof. A. F. Shull, with the collaboration of Prof. G. R. Larue and A. G. Ruthven. Fourth edition (*Review*), 440 ; Fodder, Cultivation of, 703 ; Oils and Fats, Unsaturated Acids in, J. B. Brown and C. C. Sheldon, 817 ; Physiology, A Lecture on, [1834], 505 ; Surfaces in the Ultra-red Region of the Spectrum, Reflective Power of, F. Rücker, 300 ; World, Exploring the, C. Elton (*Review*), 271 ; Worship in Bengal, Dr. Sunder Lal Hora, 106  
 Animals : and their Environment (*Review*), 271 ; Ecology of, C. Elton (*Review*), 271 ; Psychological Needs in, Prof. D. Katz, 744  
 Animalium Cavernarum Catalogus, B. Wolff, 284  
 Annihilation Radiation from Paraffin Bombarded with Neutrons, H. J. Walke, 495  
*Anopheles* Larvæ in the Waters of Sewers, Development of, V. Puntoni, 392  
 Antarctic : Exploration, 246 ; Nudibranchs, Dr. N. H. Odhner, 1013  
 Anterior Pituitary, Bio-Assay of the Gonadokinetic Principle of the, S. Honikman, H. A. Shapiro and H. Zwarenstein, 947  
 Anthozoa of the North Sea and Baltic, F. Pax, 576  
 Anthropological and Ethnological Sciences, International Congress of : 173 ; 222 ; election of Prof. T. Thomsen as president for 1938, 223 ; 567  
 Anthropology and the African, Rev. E. W. Smith, 413  
 Anthropometry, Standardisation in, 21  
 Ants, Army, Raiding and other Outstanding Phenomena in the Behaviour of, T. C. Schneirla, 472  
 Anti-Diphtheritic Serum Treatment, Value of, Sir Leonard Rogers, 845  
 Antigens and Antibodies, Chemistry of, Dr. J. R. Marrack, 468  
 Antimony Cations, New Specific Reaction for, G. Gutzeit, R. Weibel and R. Dückert, 507  
 Antipyrine-iodide Reagent, Use of the, in Analysis with the Spot Test, G. Gutzeit and R. Weibel, 227  
 Antiquities, Preservation of, Dr. H. J. Plenderleith (*Review*), 516  
 Apple Trees, Root Systems of, W. S. Rogers and M. C. Vyvyan, 424  
 Apprenticeship and the Irish Apprenticeship Act, R. R. Butler, 72  
 Arc Discharge, L. S. Ornstein and H. Brinkman, 501  
 Archimedes, Axioms of, and of Cantor, P. Bernays and G. Hertz, 674  
 Architecture, Exhibition of, 967  
 Archæocyathina, Lower Cambrian, of South Australia, R. and W. R. Bedford, 107  
 Archæological : Exploration in the East, 77 ; Finds from Egypt and Samaria, 451  
 Arctic : Annals of the, Dr. H. R. Mill (*Review*), 884 ; Expedition, New, 132  
 Aristotle : Fundamentals of the History of His Development, Prof. W. Jaeger. Translated by R. Robinson (*Review*), 991  
 Armaments, Science and, Dr. H. Levinstein, 964  
 Armourers and Brasiers' Company's Research Fellowship in Aeronautics, award of the, to W. F. Hilton, 137  
 Aromatic : Esters, Action of Sulphuric Acid, cold or at a Moderate Temperature, on the, J. B. Senderens, 75 ; Nitroketones, Method of Preparing, S. Berlingozzi, 299  
 "Arrowsmith", A Crystallographic (*Review*), 890  
 Arsenic, Pure, Method of Preparation of, A. de Passillé, 39  
 Arsines, Secondary and Tertiary, Some Hydroxy Salts of, G. J. Burrows, 983  
 Art, Scientific Research on Works of, 172  
 Aryan Doctrine, The, 229  
*Ascaris*, Respiration in, Y. Toryu, 903  
 Ascorbic Acid : Dietary, Human Daily Requirements of, Prof. G. Göthlin, 569 ; (Vitamin C) : 724 ; and Toxic Effects, Mlle. Edna Harde, 674 ; Synthesis of, by means of Tissues *in vitro*, Dr. B. C. Guha and A. R. Ghosh, 739  
 Asia, Central, Climatic Changes in, H. de Terra and G. E. Hutchinson, 741  
 Association, A Theory of, L. W. O. Martin, 983  
 Astronomical : Objectives, Compensation of Double Refraction in, A. Couder, 298 ; Society of the Pacific, Leaflets of the, 768 ; Spectrography, Central Wavelength in, P. Rossier, 227  
 Astrophysics at the Royal College of Science : Tribute to Prof. A. Fowler, Prof. H. Dingle, 634  
 Asymmetric Synthesis and Asymmetric Induction, Dr. P. D. Ritchie (*Review*), 991  
 Atlantic Liners, Increasing the Speed of, 529  
 Atmosphere, Upper : Exploring the, Dorothy Fisk (*Review*), 3 ; Layers of the, Luminescence of the, J. Cabannes, 946  
 Atmospheric : Extinction in the Ultra-violet and the Visible Spectrum, Comparison of the, P. Rossier, 431 ; Ions, a Method for Counting, and Determining their Mobility, J. J. Nolan, 982 ; Ozone : A. J. Higgs, 293 ; in High Latitudes, Vertical Distribution of, A. R. Meetham and G. M. B. Dobson, 822 ; Pollution, 224  
 Atmospheric, Nature of, G. H. Munro and Dr. H. C. Webster, 880, 901  
 Atom, The Mysteries of the, Prof. H. A. Wilson (*Review*), 895

- Atomic : Constants Deduced from Secondary Cathode Ray Measurements, Prof. H. R. Robinson, 179; Radius of Fluorine, C. H. Douglas Clark, 99; Scattering Factor of Copper for X-Rays, Effect of Dispersion and of Lattice Distortion on the, G. W. Brindley and F. W. Spiers, 850, 854; Theory, Dr. J. Tutin, 23; Prof. R. H. Fowler, 24
- Augusta Treverorum, Excavations at, 806
- Auriga, Double Stars, Spectrum and Orbit of the, R. Tremblot, 154
- Aurora : Bands at 4450 and 4180 Å. in the Spectra of the Night Sky and of the, H. Hamada, 851, 854; Borealis : of November 3, 1834, 709; Seen at Woolwich [1834], 981
- Australia : and New Zealand, Research in, G. V. Jacks, 51; Commonwealth of, Official Year Book of the, No. 26, 1933, E. T. McPhee (*Review*), 49; Monthly Precipitation-Evaporation Ratio in, as Determined by Saturation Deficit, J. Davidson, 747; Northern, Monsoonal Rain in, Foreshadowing of, H. M. Treloar, 816
- Australian : Cestodaria, T. H. Johnston, 391; Orchids : A Review of the genus *Cymbidium* in Australia, H. M. R. Rupp, 391; Oyster, The, T. C. Roughley, 66; Soils, Microbiology of, H. L. Jensen (1), 471; Sponges, M. Burton, 31; Timbers, Properties of, H. E. Dadswell (1), 354; Wool and Capt. J. MacArthur, 692
- Autobiography : Experiment in, Discoveries and Conclusions of a very Ordinary Brain (since 1866), H. G. Wells : Vol. 1 (*Review*), 553; Vol. 2 (*Review*), 882
- Automobile Industry, Research in the, Sir Herbert Austin, 657
- Avebury, Excavations at, H. St. George Gray, 806
- Avena* : Effect of Intensity and Wave-length on the Response of, to Light, C. Haig, 472; The Spectral Sensibility of, C. Haig, 824
- Azide Group, Structure of the, Sir William Bragg, 138
- $\beta$  Lyrae, Effects of Polarisation in the Spectrum of, Dr. Y. Öhman, 534
- B. typhi murium*, a new Culture Medium specially favourable to the Development and Maintenance of the Virulence of, Mlle. Mathilde Zirnelt, 582
- Babylonian Mathematics, 902
- Bacillus* : *cysticus fragilis*, A new Micro-organism Pathogenic to Man, A. Liengme and Nicole, 639; *mycoides*, Fl., Action of Metals at a distance on the Structure and Development of, E. A. Stern and A. S. Krivskij, 507
- Bacterial Suspensions, Iso-electric Points of, G. Yamaha and S. Abe, 328
- Bacteriology : and Immunology (*Review*), 752; and Sanitary Science : for students in Pharmacy, Chemistry and Applied Sciences, Prof. L. Gershenfeld, Second edition (*Review*), 752; for Medical students and Practitioners, Dr. A. D. Gardner (*Review*), 752
- Bacteriophage, Studies on the, F. Wyss-Chodat, 639
- Baptism and the Gypsies, 902
- Barium Sulphate, Radiferous, Fractional Precipitation of, Mme. Branca Edmée Marques, 39
- Barley for Brewing, Culture of, Dr. E. S. Beaven (Horace Brown memorial lecture), 292
- Barton, Sir John, death of, [1834], 297
- Battersea Polytechnic, Report for 1933-34, 785
- Battery-Electric Cars, 657
- Beagle* : Leaves the Chonos Archipelago, The, 946; Sails northward, The, 1018
- Beams, Vibration of, and the Whirling of Shafts, Approximate Determination of the, H. H. Jeffcott, 154; 465
- Bed-Bug, Control of the, 209
- Beech, Bark Disease of, J. Ehrlich, 630
- Bee-Keeping in the U.S.S.R., Distribution of, as Related to Climate, A. Gubin, 639
- Bees : Brood Diseases of, Sir John Russell, and others, 979; Pollen Constancy of, W. H. Brittain and Dorothy E. Newton, 31; Sparrows and, Sister Veronica, 420
- Behaviour, Study of, Dr. E. S. Russell, 368; 835
- Beilby : Layer, The, Prof. G. I. Finch, A. G. Quarrell and J. S. Roebuck, 221; Memorial Fund, awards from, to Dr. W. Hume-Rothery and Dr. E. A. Rudge, 765
- Beit : Fellowships for Scientific Research, award of, 136; Memorial Fellowships for Medical Research, award of, 136; Lord Macmillan appointed a trustee of the, 531
- Benzene : Deuterium into, Direct Introduction of, Dr. J. Horiuti and Prof. M. Polanyi; Prof. C. K. Ingold, C. G. Raisin and C. L. Wilson, 847, 854; Direct Introduction of Deuterium into, with Heterogeneous Catalysis, Prof. C. K. Ingold, C. G. Raisin and C. L. Wilson, 734; Electrochemical Chlorination of, Mechanism of the, W. Jeunehomme, 910; Vapour : Magnetic Properties of, Dr. R. Jaanus and Dr. J. Shur, 101; Rotational Raman Scattering in, Dr. S. C. Sirkar, 850, 854
- p*-Benzoquinone Crystal, Orientation of Molecules in the, by X-Ray Analysis, Dr. J. M. Robertson, 138
- Berkshire, Excavations in, H. J. E. Peake, 316
- Berthierite from Kisbánya, Carpathians, V. Zsivny and L. Zombory, 114
- Beryllium : Minerals (Euclase and Phenakite) from Africa, Dr. L. J. Spencer, 114; Tartrates, Polarimetric Study of, J. L. Delsal, 190
- Berzelius, Jöns Jacob, Autobiographical Notes, Translated by Prof. O. Larsell (*Review*), 892
- Biacene, Extinction of the Fluorescence of a Solution of, in *p*-Dichlorobenzene at  $-180^{\circ}$  C., Mlle. B. Twarowska, 431
- Binary : Azotropes, Degree of Dehydration of, Prof. W. Swietoslawski, 262; Mixtures, Critical Opalescence of, A. Rousset, 787
- Biochemical Society, Calcutta, 770
- Biochemistry : An Introduction to, Dr. W. R. Fearon (*Review*), 273; and the Manufacture of Fine Chemicals, Dr. F. H. Carr, 112; Annual Review of, Edited by J. M. Luck, Vol. 3 (*Review*), 555; Fundamentals of, in Relation to Human Physiology, Dr. T. R. Parsons, Fourth edition (*Review*), 162; Morphology and, Dr. J. Needham, 275; Organic and, Prof. R. H. A. Plimmer, Fifth edition (*Review*), 162; Progress in (*Review*), 555; Progressive, A. L. Bacharach (*Review*), 162
- Biological Powders, Sterilisation of, A. J. J. Vande Velde (5), 787
- Biologia Generale, I Grandi Problemi della, C. Acqua (*Review*), 236
- Biologie und Medizin, Oberflächenspannung in der, Dr. F. Heróik (*Review*), 235
- Biology : Human, and Politics, Prof. J. B. S. Haldane (Norman Lockyer lecture), 865; Social, Problems of, 393; The A B C of, Prof. C. M. Yonge (*Review*), 399
- Biplane, 'Focus' of a, G. A. Crocco, 639
- Bird : Exhibition and Study (*Review*), 719; -Lover, Autobiography of a, F. M. Chapman (*Review*), 719; Migration : and Light Periodicity, L. J. Cole, 256; and the Red Sea, Dr. C. Crossland, 574; Name this E. F. Daghish (*Review*), 273; Observatories, Pioneer, 1000; of Providence, Extinction of the, G. Whitley, 464; Population Studies, J. M. Winterbottom (5), 335; Station, a Scottish, 1000
- Birds : British, New, 696; Habitat Selection in, D. Lack, 152; New British, 658; of Eastern China, A. Handbook of the, (Chihli, Shantung, Kiangsu, Anhwei, Kiangsi, Chekiang, Fohkien and Kwangtung Provinces), J. D. D. LaTouche, Vol. 2, Parts 3, 4 and 5 (*Review*), 646; of the Indian Empire, The Nidification of, E. C. Stuart Baker, Vol. 3 (*Review*), 684; of Tropical West Africa : The, with Special Reference to those of the Gambia, Sierra Leone, the Gold Coast and Nigeria, D. A. Bannerman, Vol. 3 (*Review*), 9; Blood of, A New Parasite in the, I. F. de Mello and M. Raimundo, 741; Nest Mortality of, S. Baron, 384; of the Philippine Islands : The, with Notes on the Mammal Fauna, Hon. Masauji Hachisuka, Part 2 (*Review*), 438; Our Garden : their Food, Habits and Appearances, H. M. Batten (*Review*), 893; Useful, 492

- Birmingham University: Conferment of honorary doctorates; P. Cloake appointed joint professor of Medicine, J. M. L. Burtenshaw lecturer in Bacteriology and T. G. Hunter assistant lecturer in Oil Engineering, 37; Gift to, by A. E. Hills, 281; Sir Charles Hyde, 945
- Bismuth Crystals, Mechanical Twinning in, Dr. W. F. Berg, 143; Oxyhalides, Crystal-structure of, F. A. Bannister, 856
- Birth Control To-day: a Practical Handbook for those who want to be their own masters in this Vital Matter, Dr. Marie Stopes (*Review*), 516
- Black Sea Fishes, Biology of some, I. J. Syrovatskii, 432
- Blair, Robert, fellowships, award of, to P. D. Holder and D. M. Tombs, 189
- Blasteme, Regenerating, Histolytic Properties of the, V. N. Orechovitch and N. V. Bromley, 507
- Bloch Theory, application of the, to the Study of Alloys and of the Properties of Bismuth, H. Jones, 786
- Blood Albumin, Autoclave Splitting of, with 2 per cent Phosphoric Acid, V. Sadikov and D. Maliuga (1), 639; Groups at Geneva, Proportion of the, A. Liengme and Goudet, 639; Lowering of the Alkaline Reserve and the Movement of the Chlorine in the, in the Course of Hyperthermia Produced by Short Waves, L. Binet, M. Laudat and J. Auclair, 506; Physiology and Pathology of, Prof. L. S. P. Davidson and others, 705
- Blowfly Attack of Sheep, Sheep Sweat a Factor in, F. G. Holdaway and C. R. Mulhearn, 813
- Blue-green Algae, Causes of Colour Change in, M. C. Sargent, 471
- Bone: Glue, New Uses for, 530; Study, Clearing and Dyeing Fish for, Miss Gloria Hollister, 779
- Boolean Algebras and their Application to Topology, M. H. Stone, 264
- Boots Pure Drug Company's Medical Products, 567
- Boric Acid, Dissociation Constant of, B. B. Owen, 541
- Boron: and Silicon, Hydrides of, Prof. A. Stock (*Review*), 267; Electrical Resistance of, Effect of Temperature and of Visible and Infra-Red Radiations on the, R. Freymann and A. Stieber, 982
- Botanical: and Horticultural Shows, 333; Congress, Sixth International, 320
- Botany: Everyday, L. J. F. Brimble (*Review*), 918; General, A Textbook of, for Colleges and Universities, Prof. R. M. Holman and Prof. W. W. Robbins. Third edition (*Review*), 344; The Human Outlook in (*Review*), 918
- Bottle Makers: Wine Makers and, A Parable, Prof. V. Karapetoff, 625
- Boulder Dam, Cooling of, 248
- Boussingault and Agricultural Science, 995
- Brahmins of Behar, Bajra Kumar Chatterjee, 855
- $\alpha$ -Brass, Crystal Lattice of, Distortion of the, W. A. Wood, 572
- Brass Ingots, The Casting of, R. Genders and G. L. Bailey (*Review*), 556
- Brazil Nut, Dissemination of the, Dr. C. Estevão, 376
- Breddin Hill Camp, Montgomeryshire, Excavation at, 353
- Bridgman Effect, J. E. Verschaffelt, 787
- Bristol University, Dr. McGregor Skene appointed Melville Wills professor of Botany, 981
- British: Association: Aberdeen Meeting of the, 110; 132; 258; 274; 448; Lt.-Col. E. W. Watt and Prof. H. M. Macdonald, 144; at Edinburgh [1834], 389; Prof. W. W. Watts president-elect for 1935, 410; Norwich meeting, 842; Mathematical Tables, 414; Report of the Seismological Committee, 415; Prof. E. H. Neville, 778; Coal Measures, Fossil Insect from the, Dr. H. Bolton, 183; Columbian Indians, Blood-Groups of, Prof. R. R. Gates and Dr. G. E. Darby, 539; Drug Houses, Ltd., Injections for Parenteral Medication, 530; Medical Products of, 137; Fish Fauna, the Changing, Dr. E. B. Worthington, 26; Hydro-Electric Development, 1016; Isles, Averages of Temperatures for the, 57; Museum (Natural History). Catalogue of the Books, Manuscripts, Maps and Drawings in the, Vol. 7: Supplement J—O. (*Review*), 10; Guides to the Palaeontological Collections, 57; Acquisitions of the, 175; 695; 843; Exhibition of Drawings and Maps Commemorating Admiral Phillip, 696; Collections, Additions to, 807; Neolithic Man: The Skeleton of, including a Comparison with that of other Pre-historic Periods and More Modern Times, Dr. J. Cameron; Dr. F. G. Parsons (*Review*), 604; Pharmaceutical Codex, 259
- Brittle-Stars, Palaeozoic, of Victoria, R. B. Withers and R. A. Keble, 675
- Broadcast Reception, Interference with, 96
- Broadcasting: British Empire, C. M. Benham and P. H. Spagnoletti, 57; Union, International, 19
- Bromine, Migration of, during the Side-Chain Chlorination of Bromotoluenes, F. Asinger, 155
- Brood Diseases of Bees, Sir John Russell and others, 979
- Brownian Movement: Action of the Magnetic Field on the, J. Métadier, 1019; Theory of the, Y. Krutkov, 788
- Brussels, University of, Centenary of the, 943
- Budgerigars in Bush and Aviary, N. W. Cayley (*Review*), 684
- Building: Research Board, Report of the, 1933, 859; Trades Exhibition, 467; Trades, Scientific Research in the, 354
- Bumble Bees and Their Ways, Prof. O. E. Plath (*Review*), 614
- Bunsen Burner, a New Modified, Amal, Ltd., 844
- Bureau d'Études géologiques et Minières coloniales, Publications du. Les ressources minérales de la France d'outre-mer. 1: Le charbon. 2: Le fer, le manganèse, le chrome, le nickel, l'étain, le tungstène, le graphite, le glucinium, le molybdène, le cobalt, le titane, le vanadium (*Review*), 10
- Burg, Johann Tobias, Death of, [1834], 821
- Butterflies: of the Malay Peninsula, The, Dr. A. S. Corbet and H. M. Pendlebury (*Review*), 164; Wing Pattern in, Prof. B. N. Schwanwitsch and G. N. Sokolov, 420
- Byzantine Civilisation, S. Runciman (*Review*), 795
- Cacao, Vegetative Propagation of, E. E. Pyke, 107
- Cadmium, Carbon Nickel and, Constitution of, Dr. F. W. Aston, 178
- Cæsium Atoms in an Electric Field, Series of, Ny Tsi-Zé, and Choong Shin-Piaw, 1010
- Caisson Disease, Whales and, J. A. Campbell, 629
- Calanus finmarchicus*, Biology of, Dr. A. G. Nicholls; Miss S. M. Marshall, 292
- Calcul Symbolique, Le, P. Humbert, 541
- Calculating Machine for Simultaneous Equations, Dr. V. Bush and Dr. J. B. Wilbur, 877
- Calculus, Elementary, C. V. Durell and A. Robson. 2 Vols. (*Review*), 616
- Caledonian Horticultural Society, 261
- California, Geology of, R. D. Reed (*Review*), 48
- Californian Indians, Early Records of, J. P. Harrington, 740
- Calythrix*, Essential Oils of the Genus, A. R. Penfold and F. R. Morrison, 75; *tetragona*, var. 'A', Essential Oil of, A. R. Penfold, G. R. Ramage and J. L. Simonsen, 984
- Cambrian of Shropshire, The, Drs. E. S. Cobbold and R. W. Pocock, 185
- Cambridge Lake Rudolf Rift Valley Expedition, 281
- Cambridge: Philosophical Society, Election of officers, 808; University, award of the Harkness scholarship to J. K. S. St. Joseph, the Wiltshire prize to S. O. Agrell, and Frank Smart prizes to G. C. Evans and A. L. Hodgkin; D. P. Kings elected Charles Kingsley bye-fellow at Magdalene College; Dr. M. L. Oliphant and O. A. Trowell elected fellows of St. John's College, 37; award of the Michael Foster studentship to C. M. Fletcher; award of the Wrenbury scholarship to R. B. Bryce; A. Marriage elected to a minor research studentship, R. M. Barrer to a Denman Baynes studentship, B. M. Crowther to a Denman Baynes studentship and I. Kemp to a research studentship, 152; award of the E. G. Fearnside's scholarship to J. B. Harman, 189; resignation of

- Dr. C. G. Lamb; R. D. Davies appointed demonstrator in Engineering; A. M. Turing and K. C. Dixon Harold Fry students, and J. W. I. Pringle a Martin Thackeray student; Dr. L. Borinski elected a research student and W. E. Bennett and D. P. R. Petrie Dominion and Colonial exhibitors, 224; New Science Buildings, 563; award of the Gedge prize to J. S. Turner; Dr. F. Kidd appointed superintendent of the Low Temperature Research Station; M. Black elected a fellow of Trinity College, 637; New University Buildings at, New University Library, 649; New Department of Zoology, 650; J. S. Turner appointed University Demonstrator in Botany; L. J. Audus appointed Frank Smart University student in Botany; E. B. Verney elected a professorial fellow of Downing College, Cambridge, 672; Prof. R. H. Tawney appointed Alfred Marshall lecturer for 1934-35; Dr. T. S. Hele appointed assessor to the regius professor of Physic, 708; Scott Polar Research Institute, 729; H. J. Bhabha and C. G. Pendse elected Isaac Newton students, 821; J. T. Saunders proposed as secretary general of the faculties; Dr. A. N. Drury elected a supernumerary fellow of Trinity Hall, 861; award of the Arnold Gerstenberg studentship to R. C. Oldfield; F. Goldby appointed university lecturer in Anatomy, and H. W. Hull university demonstrator in Anatomy, 908; W. S. Mansfield appointed director of the University Farm; Dr. W. B. Lewis elected an unofficial (Drosier) fellow of Gonville and Caius College, 945; Sir Daniel Hall appointed Rede lecturer for 1935; Dr. M. E. Adair elected a John Lucas Walker student, 1018
- Campbell, J. F., 1822-85, and His Refracting Quadrant, Dr. R. T. Gunther, 251
- Camphor in Sulphuric Acid Solution, Rotatory Dispersion in the Ultra-Violet of, J. Lecompte and J. Perrichon, 1019
- d-Camphor, Inversion of, Asahina and Ishidate, 745
- Canada, Royal Society of, Annual Meeting of the, presentation of the Flavelle gold medal to Prof. L. V. King, the Lorne Pierce medal to F. P. Grove and the Tyrrel medal to J. C. Webster, 205
- Canary Islands, Structure of the, considered in Relation with the Problem of Atlantis, G. Denizot, 471
- Cancer Campaign: British Empire, Eleventh Annual Report, 55; Grant to, by the Bernhard Baron Charitable Trust, 60; Causation of, Dr. W. von Brehmer; V. Schilling, 411; Radium and, a Monograph, Dr. H. S. Souttar (*Review*), 791; Therapy, Atom in, the Significant Rôle of the, Prof. G. L. Clark (*Review*), 791
- Cane Molasses, Effect of, on Swamp Soil, T. B. Baskaran and others, 976
- Cantharidine, New Reaction of, G. Denigès, 39
- Carbohydrate: Acetates, X-Ray Examination of, G. J. Leuck and H. Mark, 817; Supply in Legume Symbiosis, Importance of, Dr. F. E. Allison, 144
- Carbon: Adsorption by, of Binary Mixtures in Aqueous Solution, R. Amiot, 710; Assimilation, Chemical Aspects of, Prof. N. R. Dhar, 331; Crystallised, Preparation of, under very High Pressure, J. Basset, 334; Dioxide, Characters presented by Green Plants which develop in Air enriched with, M. Molliard and A. Crépin, 982; Nickel and Cadmium, Constitution of, Dr. F. W. Aston, 178; Suboxide Gas, Ultra-Violet Absorption Spectrum of, R. M. Badger and R. C. Barton, 263; Tetrachloride, The Chlorine-Chlorine Distance in, Dr. V. E. Cosslett and Dr. H. G. de Laszlo, 63
- Carbonaceous Minerals: Graphical Classification of, the Mineral Oils, Prof. H. Briggs, 115
- Carbonyl Group of Aldehydes and Ketones compared with Carbon Monoxide, V. Henri, 863
- Carboxyl Group, Structure of the, L. Pauling and L. O. Brockway, (1); L. Pauling and J. Sperman (2), 547
- Carcinoma: Carbohydrate Metabolism of, R. Wilhelm, 392; of the Human Breast, a Spectrographic Study of the Occurrence of Chromium and Molybdenum in, A. Dingwall and H. T. Beans, 711
- Cardiff: Engineering Exhibition, 842; University College, Anonymous Gift to, 637; E. E. Edwards, appointed adviser in Agricultural Zoology; Dr. Dorothy Strangeways assistant lecturer in Histology; Dr. R. W. Haines assistant lecturer in Anatomy; and C. W. Startup assistant lecturer in Physiology. Award of the Dr. Price prize to Dr. H. V. Jones, 545
- Carnegie Trust for the Universities of Scotland: Sir Arthur Rose appointed chairman, 176; thirty-second annual report, 297
- Carotene, Isomers of, Dr. Smith, 147
- Carotenoids and the Vitamin A Cycle in Vision, G. Wald, 65
- Cashew 'Apple', Invert Sugar from the, M. Srinivasan, 903
- Cass, Sir John, Technical Institute, Extension of the, 493
- Catalase Reaction, Inhibitors of, Prof. D. Keilin and E. F. Hartree, 933, 938
- Catalysts: Active Spots of, Nature of the, A. V. Frost and M. I. Shapiro, 507; Particles of, Limiting Dimensions for, N. Dankov and A. Kotchetkov, 583
- Cathode Ray Oscillograph, Use of the, for the Study of the Magnetisation of Ferromagnetic Substances, P. Bricout and R. Salomon, 582
- Cattle Diseases and Milk Production, Report of Committee on, 94
- Caucasus, Archæology of the, Sir Flinders Petrie, 182
- Cauliflowers in Victoria, Australia, (*Gloeosporium concentricum*, (Grev.) Berk. and Br., A Disease of, Miss F. J. Halsey, 432
- Caves, Scottish, Chronology of, H. Maxwell, 316
- Caviar for the Community, On, (*Review*), 3
- Celestial Phenomenon seen at Liverpool [1834], 709
- Cell, Bursting of, by Polarised Sunlight, Dr. Elizabeth Sidney Semmens, 813
- Cells of Micro-Organisms of the same Species, Causes of the Individual Resistance of, Submitted to the Action of the Ultra-Violet Rays, J. Beauverie, 863
- Cellular Respiration, Mechanisms of, Prof. D. Keilin, (Croonian Lecture), 980
- Cellulolytic Bacterium of the Stomach, Rôle of a, J. Pochon, 947
- Celts, Historic Sequence of the, 858
- Centrifugal Fields, Intense, Possibility of Sedimentation Measurements in, Prof. The Svedberg, G. Boestad and Inga-Britta Eriksson-Quensel, 98
- Centrifuge, Use of the, in Determining the Density of Small Crystals, J. D. Bernal and Miss D. Crowfoot, 809
- Cephalaspids of Great Britain, The, Dr. E. A. Stensiö (*Review*), 200
- Cepheid Variables, Temperature and Radius in the, Relation between, A. E. H. Bleksley, 661
- Ceralumin C, J. Stone and Co., Ltd., 248
- Cerebral Cortex, Electrical Changes in the, Prof. E. D. Adrian and B. H. C. Matthews, 901
- Cerium: Atom inside the Metallic Lattice, State of the, R. Jaanus and V. Drozdzhina, 639; Silicide and Lanthanum Silicide, Preparation of, by Igneous Electrolysis, M. Dodero, 638
- Cerous Salts in Solution, Paramagnetic Properties of, C. Haenny and G. Dupouy, 863
- Chad Basin: Geology and Water Supply, Dr. Raeburn and B. Jones, 293
- Chaetomium*, Sexuality in Certain Species of the Genus, C. Sibilis, 40
- Chandler Medal of Columbia University, award of the, to Prof. J. G. Lipman, 376
- Cheese, Maturation of, E. Parisi and G. De Vito (1), 983
- Chelonians, Carapace in, Reduction of, P. E. P. Deramyalaga, 423
- Chemical: Analysis, Use of Phosphomolybdic Acid in, J. W. Illingworth and J. A. Santos, 971, 974; Apparatus, etc., Catalogue of, F. E. Becker and Co., 320; Engineering (*Review*), 793; Industry, Progress of, Dr. J. T. Dunn, 92; Groups of Chemists in the, H. Housley, 860; Training for Administration in the, H. Lewis, 860; Investigations, 'Streaking' in, E. Schaily and F. Nagl (6), 392; Linkage, Prof. R. F. Hunter and Prof. R. Samuel, 632; 971, 974; The Writer of the Note, 971, 974; Reactivity and Absorption of



- Light, Prof. N. R. Dhar and P. N. Bhargava, 848, 854; Systems, Study of, by Variation of Weight with regularly Varying Temperature, M. Guichard, 334; Thermodynamics, The Fundamentals of, Dr. J. A. V. Butler. Part 2: Thermodynamical Functions and their Applications (*Review*), 615
- Chemicals, Fine, Manufacture of, Biochemistry and the, Dr. F. H. Carr, 112
- Chemie-Ingenieur : Der, ein Handbuch der physikalischen Arbeitsmethoden in chemischen und verwandten Industriebetrieben. Herausgegeben von A. Eucken und M. Jakob. Band 1: Physikalische Arbeitsprozesse des Betriebes. Teil 3: Thermisch-mechanische Materialtrennung. Herausgegeben von A. Eucken. Teil 4: Elektrische und magnetische Materialtrennung, Materialvereinigung. Herausgegeben von A. Eucken. Band 2: Physikalische Kontrolle und Regulierung des Betriebes. Teil 3: Messung von Zustandsgrößen im Betriebe. Herausgegeben von Jakob (*Review*), 793
- Chemische Unterrichtsversuche, Prof. H. Rheinboldt (*Review*), 516
- Chemist and Warfare, The, J. D. Pratt, 563
- Chemistry: An Introduction to, Prof. F. B. Kenrick (*Review*), 887; An Unorthodox, Dr. E. J. Holmyard (*Review*), 887; Covalent Link in, Some Physical Properties of the, Dr. N. V. Sidgwick (*Review*), 267; Crystal, Prof. T. M. Lowry (*Review*), 827; Enzyme, Progress in (*Review*), 307; in Commerce, Newnes', Advisory Editor: M. D. Curwen. Part 1 (*Review*), 795; in Industry, Dr. F. H. Carr, 598; Inorganic and Theoretical, A Comprehensive Treatise on, Dr. J. W. Mellor. Vol. 13 (*Review*), 236; in Space, Prof. T. M. Lowry (*Review*), 717; Organic, Conception of 'Synthesis' in, Prof. L. Ruzicka; The Writer of the Note, 700; or Chemistry of the Carbon Compounds, V. von Richter. Edited by Prof. R. Anschütz and Dr. F. Reindel. Vol. 1: Chemistry of the Aliphatic Series. Translated by E. N. Allott (*Review*), 615; Pharmaceutical, Bentley and Driver's Text-Book of, Revised by Dr. J. E. Driver. Second edition (*Review*), 955; Physical Methods in, Prof. T. M. Lowry, 366; Physiological, Introduction to, Prof. M. Bodansky. Third edition (*Review*), 647; Polarimetric Methods in, Prof. T. M. Lowry, 920; 958; Tannin, Dr. D. Jordan Lloyd (*Review*), 611
- Chemists for Administration, Training, 860
- Chimie, Maison de la, Paris, 868
- Chimneys and Chimney-Sweeping, 74
- Chimpanzee: Races of the, E. Schwarz, 106; Twins, Dr. R. M. Yerkes, 21
- Chimpanzees, Relational Learning in, Dr. R. M. Yerkes, 184
- China, Eastern, Birds of, (*Review*), 646
- Chinese: Mitten Crab, Dr. W. Wolterstorff; Y. T. Mao, 17; Palaeontology and Archaeology, Pioneering in, Sir G. Elliot Smith (*Review*), 121
- Chlorates, Action of Sulphur on, T. Taradoire, 673
- Chlorination of Water Supplies, Prof. P. S. Lelean, 56
- Chlorophyll, Spectrum of, Dr. J. A. Prins, 457
- Chlorosis in Deciduous Fruit Trees, W. E. Isaac, 391
- Chlorosulphonic Acid, Action of, on Naphthalene, G. Walter, 300
- Christian Myth and Ritual: a Historical Study, Prof. E. O. James (*Review*), 305
- Chromosome: Behaviour in Terms of Protein Pattern, Dr. D. M. Wrinch, 978; Numbers, Symbols for, Prof. R. R. Gates, 1011; X-, Sex-factors in the, Distribution of, Dobzhansky and Schultz, 465
- Chromosomes: Finer Structure of, Prof. R. R. Gates, 839; in the Salivary Glands of Fruit-Fly Larvæ, Dr. C. B. Bridges, 839
- Chromosphere, Height of the, in 1933 and Course of the Solar Cycle, G. Abetti, 391
- Chronica Botanica*, Impending Publication of, 493
- Chrysanthemum Blooms, Early, K. Post, 146
- Chrysanthemum*, Polyploidy in, Shimotomai, 295
- Ciliates from Bermuda Sea Urchins, Miriam S. Lucas, 575
- Cinema Museum, A, Advocated, 224
- Cinnamic Acid, Perkin's Synthesis of, F. Böck, G. Lock and K. Schmidt, 392
- Cities and Larger Villages, Relation of, to Changes in Rural Trade and Social Areas in Wayne County, New York, H. C. Hoffsommer, 454
- Citizenship as an Objective of University Education, Prof. Ashbaugh, 429
- Civil: Engineers, Institution of, Awards of the, 658; List Pensions, 94
- Clavelina*, the Ascidian, in the Pacific, Asajiro Oka, 666
- Clays: The Chemistry and Physics of, and other Ceramic Materials, A. B. Searle. Second edition (*Review*), 201
- 'Cleg', Life-history and Structure of the, Dr. A. E. Cameron, 903
- Climate and Health, Dr. S. W. Smith, 174
- Climatic Factors, Single Value, J. A. Prescott, 747
- Clinical Medicine and Science, Sir Frederick Gowland Hopkins, 867
- Coagulation, Reversible, in Living Tissue, W. D. Bancroft and J. E. Rutzler, Jr. (12), 911
- Coal: and Oil, Evolution of, Prof. H. Briggs, 385; and Oil, Products of the Natural Development of, Prof. H. Briggs, 115; Fluorine in, Dr. R. Lessing, 699; from the Lancashire Coalfield, 68; Hydrogenation of, in Australia, 212; Hydrogenation of, in Germany, F. Rosendahl, 504; Measures of the Donetz Basin, Distribution of Organic Remains in the Roofing of, I. E. Fimov, 583; Mining in Great Britain, Sir Richard Redmayne, 731; Scientific Research and New Uses for, Sir Richard Redmayne, 784; Solid Products of the Carbonisation of, 744; Utilisation of, Prof. W. A. Bone (Watt Anniversary lecture); W. R. Gordon, 212
- Codling Moth, Parasites of the, H. T. Rosenberg, 780
- Coffee in 1931 and 1932: Economic and Technical Aspects, Dr. W. Bally, 1013
- Colchester, Antiquities from, Exhibition of, 928
- Cold: Sensation of, Physiological Basis of the, J. M. O'Connor, M. Moriarty and O. Fitzgerald, 910; Drawn Wires, Crystal re-orientation of, due to re-heating, G. S. Farnham and H. O'Neill, 632; Spring Harbor, Genetics at, Dr. C. B. Davenport, 328
- Collieries, Electrification of, 58
- Colloidal: Electrolytes, Faraday Society Discussion on, 96; Electrolytes, Prof. H. Freundlich and others, 578
- Colloids: Molecular Weights of, Determination of the, Prof. H. Staudinger, 428; the Lyophilic (their Theory and Practice), Prof. M. H. Fischer and Marian O. Hooker (*Review*), 990
- Colonial Office Appointments: 60; 624; 808; 931
- Colorado Beetle, The, J. C. F. Fryer, 94
- Colour Vision, Normal and Abnormal: Prof. H. E. Roaf, 371; 442; The Theory of, Dr. F. W. Edridge-Green, 777
- Colouring Matters, Certain, Superficial Properties of, E. Vellinger and R. Delion, 191
- Combustion: from Heracleitos to Lavoisier, J. C. Gregory (*Review*), 892; Products from the Cylinder of the Petrol Engine (1), A. C. G. Egerton and F. Ll. Smith, 786; (2) A. C. G. Egerton, F. Ll. Smith and A. R. Ubbelohde, 786; (3), A. R. Ubbelohde and A. C. G. Egerton, 786
- Comet Racing Monoplane, 452
- Conchophthirius lamellidens* Ghosh, Lunar Periodicity in the Conjugation of, Dr. Harendranath Ray and Mukunda Chakraverty, 663
- Congrès Préhistorique de France, 96
- Conjugate Functions for Engineers, Prof. Miles Walker (*Review*), 164
- Continents, History of the, Distribution of Marine Animals and the, Prof. J. Versluys, 706
- Contraception, Clinical, Dr. Gladys M. Cox (*Review*), 643
- Cooking, Scientific Aspects of, 53
- Copenhagen, Electrification of the Suburban Railways of, 317

- Copper: Cold-working of, W. A. Wood, 576; Hydride, Spectrum of, Activated States in the, A. Heimer and T. Heimer, 462; in Rocks, Determination of Small Amounts of, A. W. Groves, 114; Nitrate, Perchlorate and Chlorate with Ethylenediamine, Preparation and Explosion Temperature of Some Complex Compounds of, J. Amiel, 390; Sulphate, Action of Aqueous Solutions of, on Cupric Oxide, O. Binder, 227
- 'Coral Rock', Coastal Erosion of, W. A. MacFadyen, 105
- Corn-Bunting, Habits of the, Lieut.-Col. and Mrs. B. H. Ryves, 106
- CORRESPONDENCE
- Acetaldehyde, The Thermal Decomposition of, Prof. M. W. Travers, 569
- Acetylene, 'Heavy', Vibration Spectra and Force Constants of, Dr. G. B. B. M. Sutherland, 775
- Acrolein, Spectrum of, Dr. H. W. Thompson and J. W. Linnett, 937, 938; Thermal Decomposition of, Dr. H. W. Thompson and J. J. Frewing, 900, 901
- Adsorption, Activated, An Equation for the Kinetics of, Prof. S. Roginsky, 935, 938
- Air: Refractivity of the, Sunspot Number and the, N. Dneprovsky, 853, 854; Waves of Unknown Origin, Dr. H. Mary Browning and Dr. F. J. W. Whipple, 532
- Alcohols, C-OH Bond and Molecular Structure in, Energy of the, Y. Hukamoto, 538
- Allium Schoenoprasum*, Distribution of Chromosome Numbers in a Progeny of Triploid, A. Levan, 254
- Aluminised Surfaces, Reflecting Power of, B. K. Johnson, 216
- Alumina, Free, in Soils, Prof. F. Hardy, 326
- Aluminium: Coating of Gratings, C. P. Butler and Prof. F. J. M. Stratton, 810; Hydride, A New Band System of, W. Holst, 63; Further Band Systems of, W. Holst, 322
- Alums, Crystal Structure of the, C. A. Beevers and H. Lipson, 327
- Amino Acids *in Vitro*, Photosynthesis of, Prof. N. R. Dhar and S. K. Mukherjee, 499
- Ammonium Bromide, Low Temperature Modification of, Crystal Structure of the, Dr. J. A. A. Ketelaar, 250
- Amphibian Organisation Centre, Active Principle of the, C. H. Waddington, Dr. J. Needham, W. W. Nowinski, Miss D. M. Needham and R. Lemberg, 103
- Anemone, Fish and, Partnership between, H. A. F. Gohar, 291
- Anhydrous Hydrogen Cyanide, Electrical Conductivity of Salts in, Prof. J. E. Coates and E. G. Taylor, 141
- Annihilation Radiation from Paraffin Bombarded with Neutrons, H. J. Walke, 495
- Ascorbic Acid: Dietary Human Daily Requirements of, Prof. G. Göthlin, 569; (Vitamin C), Synthesis of, by Means of Tissues *in Vitro*, Dr. B. C. Guha and A. R. Ghosh, 739
- Atmospherics, Nature of, G. H. Munro and Dr. H. C. Webster, 896, 901
- Atomic: Constants Deduced from Secondary Cathode Ray Measurements, Prof. H. R. Robinson, 179; Radius of Fluorine, C. H. Douglas Clark, 99; Scattering Factor of Copper for X-Rays, Effect of Dispersion and of Lattice Distortion on the, G. W. Brindley and F. W. Spiers, 850, 854; Theory, Dr. J. Tutin, 23; Prof. R. H. Fowler, 24
- Aurora; Spectra of the Night Sky and of the, Bands at 4450 and 4180 Å. in the, H. Hamada, 851, 854
- Australian Oyster, The, T. C. Roughley, 66
- Azide Group, Structure of the, Sir William Bragg, 138
- $\beta$ -Lyrae, Effects of Polarisation in the Spectrum of, Dr. Y. Öhman, 534
- Bees, Sparrows and, Sister Veronica, 420
- Benzene: Deuterium into, Direct Introduction of, Dr. J. Horiuti and Prof. M. Polanyi; Prof. C. K. Ingold, C. G. Raisin and C. L. Wilson, 847, 854; Direct Introduction of Deuterium into, without Heterogeneous Catalysis, Prof. C. K. Ingold, C. G. Raisin and C. L. Wilson, 734; Vapour, Magnetic Properties of, Dr. R. Jaanus and Dr. J. Shur, 101; Rotational Raman Scattering in, Dr. S. C. Sirkar, 850, 854
- p*-Benzoquinone Crystal, Orientation of Molecules in the, by X-Ray Analysis, Dr. J. Monteath Robertson, 138
- Bird Migration and the Red Sea, Dr. C. Crossland, 574
- Bismuth Crystals, Mechanical Twinning in, Dr. W. F. Berg, 143
- Blowfly attack of Sheep, Sheep Sweat a Factor in, F. G. Holdaway and C. R. Mulhearn, 813
- Bottle Makers: Wine Makers and, A Parable, Prof. V. Karapetoff, 625
- $\alpha$ -Brass, Distortion of the Crystal Lattice of, W. A. Wood, 572
- British: Association: Aberdeen Meeting, 1934, Lieut.-Col. E. W. Watt and Prof. H. M. Macdonald, 144; Mathematical Tables, Prof. E. H. Neville, 778; Coal Measures, Fossil Insect from the, Dr. H. Bolton, 183; Fish Fauna, The Changing, Dr. E. B. Worthington, 26
- Butterflies, Wing Pattern in, Prof. B. N. Schwanwitsch and G. N. Sokolov, 420
- Cadmium, Carbon, Nickel and, Constitution of, Dr. F. W. Aston, 178
- Cæsium Atoms in an Electric Field, Series of, Ny Tsi-Zé and Choong Shin-Piaw, 1010
- Caisson Disease, Whales and, J. A. Campbell, 629; R. W. Gray, 853
- Campbell, J. F., 1822-85, and His Refracting Quadrant, Dr. R. T. Gunther, 251
- Carbohydrate Supply in Legume Symbiosis, Importance of, Dr. F. E. Allison, 144
- Carbon: Nickel and Cadmium, Constitution of, Dr. F. W. Aston, 178; Tetrachloride, The Chlorine-Chlorine Distance in, Dr. V. E. Cosslett and Dr. H. G. de Laszlo, 63
- Catalase Reaction, Inhibitors of, Prof. D. Keilin and E. F. Hartree, 933, 938
- Carotenoids and the Vitamin A Cycle in Vision, G. Wald, 65
- Caucasus, Archæology of the, Sir Flinders Petrie, 182
- Cell, Bursting of, by Polarised Sunlight, Dr. Elizabeth Sidney Semmens, 813
- Centrifugal Fields, Intense, Possibility of Sedimentation Measurements in, Prof. The Svedberg, G. Boestad and Inga-Britta Eriksson-Quensel, 98
- Centrifuge, Use of the, in Determining the Density of Small Crystals, J. D. Bernal and Miss D. Crowfoot, 809
- Cepheid Variables, Temperature and Radius in the, Relation between, A. E. H. Bleksley, 661
- Cerebral Cortex, Electrical Changes in the, Prof. E. D. Adrian and B. H. C. Matthews, 901
- Chemical: Analysis, Use of Phosphomolybdic Acid in, J. W. Illingworth and J. A. Santos, 971, 974; Linkage, Prof. R. F. Hunter and Prof. R. Samuel; The Writer of the Note, 971, 974; Reactivity and Absorption of Light, Prof. N. R. Dhar and P. N. Bhargava, 848, 854
- Chemistry, Organic, Conception of 'Synthesis' in, Prof. L. Ruzicka, 700
- Chlorophyll, Spectrum of, Dr. J. A. Prins, 457
- Chromosome Numbers, Symbols for, Prof. R. R. Gates, 1011
- Coal, Fluorine in, Dr. R. Lessing, 699
- Colour-Vision, The Theory of, Dr. F. W. Edridge-Green, 777
- Conchophthirius lamellidens* Ghosh, Lunar Periodicity in the Conjugation of, Dr. Harendranath Ray and Mukunda Chakraverty, 663
- Copper Hydride, Spectrum of, Activated States in the, A. Heimer and T. Heimer, 462
- 'Coral Rock', Coastal Erosion of, W. A. MacFadyen, 105
- Cosmic: Corpuscles, Origin of the, Dr. L. G. H. Huxley, 418; Radiation in a Wilson Chamber at the Hafelekar Observatory (2,300 m.) near Innsbruck, Effects of, Dr. F. Rieder and Prof. V. F. Hess, 772; Ray Bursts, Magnitude of, Prof. A. H. Compton, 1006, 1011; Rays and the Earth's Potential, Dr. L. G. H. Huxley, 571; Composition of, Prof. A. H. Compton and Dr. H. A. Bethe, 734; Possible Action of, on Living Organisms, Prof. R. B. Engelstad and N. H. Moxnes, 898, 901;

- Rock Salt Absorption of, Dr. S. Ziemecki, 773; Ultra-Radiation, Electric Deflection of, Dr. E. Lenz, 809; in the Stratosphere, Intensity of the, with the Tube-Counter, Prof. E. Regener and G. Pfozter, 325
- Crosse: Andrew, Electrical Pioneer, J. Alexander, 105
- Crystal: Lattice of  $\alpha$ -Brass, Distortion of the, W. A. Wood, 572; Structure of  $\text{Hg}(\text{NH}_3)_2\text{Cl}_2$ , Dr. J. M. Bijvoet and Miss C. H. MacGillavry, 849
- Crystallisation: of Metals from Sparse Assemblages, Prof. E. N. da C. Andrade and J. G. Martindale, 321; Water of, Heavy Water and, Dr. J. Newton Friend, 463
- Crystals, Density of Small, Use of the Centrifuge in Determining the, J. D. Bernal and Miss D. Crowfoot, 809
- Current Generated by a Rectifier Photoelectric Cell, Measurement of the, Dr. H. H. Poole and Dr. W. R. G. Atkins, 810
- Dead Sea Water, Density of, R. J. Clark and F. L. Warren, 29
- Decahydro- and Tetrahydro- Naphthalene, Raman Spectra of, Dr. S. K. Mukerji, 811
- Denitrification in Sunlight, Prof. N. R. Dhar, 572
- Deuterium: in the Hydrogen of Normal Water, Preparation of Protium Oxide and Determination of the Proportion of, H. Whitaker, Prof. R. Whytlaw-Gray, E. H. Ingold and Prof. C. K. Ingold, 661; into Benzene, Direct Introduction of, Dr. J. Horiuti and Prof. M. Polanyi; Prof. C. K. Ingold, C. G. Raisin and C. L. Wilson, 847, 854; without Heterogeneous Catalysis, Prof. C. K. Ingold, C. G. Raisin and C. L. Wilson, 734
- Dialeurodes dissimilis* Quaint. and Baker (Homoptera, Aleurodidae), Respiratory System of the White-Fly, M. L. Roonwal, 218
- Dibenzyl Molecule, Shape of the, Dr. J. M. Robertson, 381
- Dielectric Potentials of Physiologically Active Substances, Prof. B. Kamienski, 776
- Diplogen in Water during very Slow Evaporation, Increase of the Percentage of, Dr. T. Tucholski, 29
- Diplon, Proton and, Ratio of the Magnetic Moments of, F. Kalckar and E. Teller, 180
- Dipole Moments in Solution, Determination of, Dr. F. Fairbrother, 458
- Dividing and Non-Dividing Cells, Sensitivity of, to Radiation, W. H. Love; Dr. J. C. Mottram, 252; F. G. Spear, A. Glücksmann, A. F. W. Hughes and C. W. Wilson, 460
- Drosophila melanogaster*, causes of Suppression of Crossing-over in Males of, Prof. H. Friesen, 326
- 'Dry Ice' in the Machine Shop, T. H. Beard, 853
- Earth's: Central Core, State of the, Dr. H. Jeffreys, 324; Potential, Cosmic Rays and the, Dr. L. G. H. Huxley, 571
- Elgrass (*Zostera marina*), Wasting Disease of, Dr. H. E. Petersen, 143
- Electric: Arcs with Fused Metals and Salts as Electrodes, M. Pierucci and L. B. Silva, 495; Impedance of Suspensions of Yeast Cells, Dr. H. Fricke and H. J. Curtis, 102; Power, Pit-Head Generation of, Prof. F. G. Baily, 776
- Electrical Properties of Materials at High Radio Frequencies, Dr. J. S. McPetrie, 897, 901
- Electrons, Slow, Effect of Temperature on Diffraction of, and its Application, W. E. Laschkarew and G. A. Kuzmin, 62
- Enoplometopus occidentalis*, Randall, the Lobster, in South Africa, K. H. Barnard, 665
- Enteropneust: The Burrow of an, C. J. van der Horst, 852; in the Clyde Sea-Area, R. Elmhirst, 183
- Ethylene, Production of, by Some Ripening Fruits, R. Gane, 1008, 1011
- Everest Climbing Expedition and Oxygen, The 1933, Sir Leonard Hill, 969
- Fermi-Dirac Statistics: Metallic State and the, A Magnetic Study of the, S. Freed and H. G. Thode, 774; Supraconductivity and, J. A. Kok, 532; Effect, Chemical Separation of the Radioactive Element from its Bombarded Isotope in the, Dr. L. Szilard and T. A. Chalmers, 462; Experiments on the, M. Danysz, J. Rotblat, Prof. L. Wertenstein and M. Żyw, 970, 974
- Fermi's Element 93, Dr. A. V. Grosse and M. S. Agruss, 773
- Ferromagnetic Substance Above its Curie Point, Gyromagnetic Effect for a, Dr. W. Sucksmith, 936, 938
- Ferrous Chloride, Anomaly in the Specific Heat of, at the Curie Point, O. N. Trapeznikowa and Prof. L. W. Shubnikow, 378
- Field Theory, The New, B. Hoffmann, 322
- Fish: and Anemone, Partnership between, H. A. F. Gohar, 291; Liver Oils Rich in Vitamin A, Dr. J. A. Lovern, 422
- Flame Gases, Spectra and Latent Energy in, Prof. W. T. David, 663
- Flavines, Vitamin B<sub>2</sub> and, Non-Identity of, Prof. C. A. Elvehjem and C. J. Koehn, Jr., 1007
- Fluoride as an Impurity in Sodium Phosphate, Prof. A. Harden, 101
- Fluorine: Atomic Radius of, C. H. Douglas Clark, 99; in Coal, Dr. R. Lessing, 699
- Fossil: Elephant in Palestine, Discovery of a, Dorothea M. A. Bate, 219; Insect from the British Coal Measures, Dr. H. Bolton, 183
- Freshwater Research in New Zealand, D. F. Hobbs, 853
- Fungi, Physiological Studies of, Prof. A. H. R. Buller; J. Ramsbottom, 291
- Gas: Circulating Pump, A Modification of the, Fazal-uddin and Sher Singh Mangat, 104; Reactions, Cause of Changes in Rate of Some, Prof. M. W. Travers, R. V. Seddon and P. F. Gay, 662
- Gases: Diffusion of, through Metals, Dr. C. J. Smithells and C. E. Ransley, 814; Flame, Spectra and Latent Energy in, A. Egerton and A. R. Ubbelohde; Prof. W. T. David, 848, 854; Ionisation of, by Atom Beams, A. Rostagni, 626
- Gastric Secretion, Modes of Stimulation of the, Prof. B. P. Babkin, 1005, 1011
- Genital Tract of the Female, Effect of the Male Sex Hormone on the, Dr. S. Skowron, 627
- Geometrical Isomerism, Steric Hindrance and, Prof. P. Ramaswami Ayyar, 535
- Glutathione and Vitamin C in the Crystalline Lens: E. I. Evans, 180; T. W. Birch and Dr. W. J. Dann, 383
- Gluten, Solubility of, Dr. W. H. Cook and R. C. Rose, 380
- Gnetales, Systematic Position of the, The Mañle Reaction and the, Prof. R. C. McLean and Miss Myfanwy Evans, 936, 938
- Golden Eagle's Flight, Speed of a, Dr. F. F. Darling, 325
- Golgi Apparatus, Use of the Ultra-Centrifuge for Studying the, Dr. H. W. Beams, J. A. Mulyil and Prof. J. B. Gatenby, 810
- Gratings, Aluminium Coating of, C. P. Butler and Prof. F. J. M. Stratton, 810
- (Gurwitsch), Rays, Physico-Chemical Test for Mitogenic, Dr. M. Heinemann, 701
- Habits, Inheritance of: C. J. Bond; Prof. J. B. S. Haldane, 28; S. Maulik, 253
- Hall Effect, Supraconductivity and the, Dr. B. Lasarew, 139
- Heat Flow during Surface Colour Formation, Dr. F. H. Constable, 100
- 'Heavy': Acetylene, Vibration Spectra and Force Constants of, Dr. G. B. B. M. Sutherland, 775; into Light Water, Diffusion of, W. J. C. Orr and Dr. D. W. Thomson, 776; Water, Alleged Influence of, on Mould Growth, Dr. R. Klar, 104; Alleged Stimulation of Moulds by Paraffin in, T. C. Barnes, 573; and Water of Crystallisation, Dr. J. Newton Friend, 463; Concentration of by Spontaneous Evaporation, E. D. Hughes, Prof. C. K. Ingold and Dr. C. L. Wilson, 142; Gaseous, Refractive Index of, C. Cuthbertson, 251; in the Animal Body, E. J. McDougall, Prof. F. Verzár, H. Erlenmeyer and H. Gaertner, 1006, 1011; Ionic Product of, B. Topley and W. F. K. Wynne-Jones, 574; Paraffin in, Alleged Stimulation of Moulds by, S. L. Meyer, 665; Some Experiments on, Prof. H. Erlenmeyer and H. Gärtner, 327
- Helium Lines in Spectra of B Stars, Analysis of Profiles of, Prof. J. S. Foster and Dr. A. V. Douglas, 417

- Hens, Broodiness in, Hormonal Interruption of, Dr. K. Wodzicki, 383
- Hg(NH<sub>3</sub>)<sub>2</sub>Cl<sub>2</sub>, The Crystal Structure of, Dr. J. M. Bijvoet and Miss C. H. MacGillavry, 849
- (*Heterodera schachtii*), Hatching Experiments on the Potato Eelworm, J. Carroll and E. McMahon, 66
- Hindu-Arabic Numerals, introduction of, into Western Europe, H. P. Vowles, 1008
- Hive-Bees do not Necessarily Sacrifice their Lives when they Sting, Dr. J. G. Myers, 290
- Hornbills, Breeding Habits of, R. E. Moreau, 899
- Horsetails, Transpiration Currents in, Prof. R. C. McLean, 66
- Human Body, Elimination of Water from the, Prof. G. Hevesy and E. Hofer, 879, 901
- Hydrogen: Catalytic Interchange of, between Water and Ethylene and between Water and Benzene, Dr. J. Horiuti and Prof. M. Polanyi, 377; Isotopes, Interferometer Patterns of the, Prof. J. K. Robertson, 378
- Hygroscopic Materials, Carbon-Coated, Humidity-Resistance Relations in, Dr. L. A. Welo, 936, 938
- Ice: -Cap of Polar Seas, Vibrations of the, I. Fakidov, 536; Ordinary and 'Heavy', Cell Dimensions of, D. H. Megaw, 900, 901
- Indian Ocean, The Ridge in the, between Chagos Is. and Socotra, Dr. A. V. Tåning; Dr. H. Pettersson, 536
- Infant Self-Help, Prof. H. E. Armstrong, 291
- Inland Water Supply: The Government and, Vice-Admiral Sir Percy Douglas, 219; A. Chorlton, 326; Prof. W. S. Boulton, 777; Survey, Capt. W. N. McClean, 814
- Insect Mortality, Relative Toxicity at High Percentages of, Prof. H. H. Shepard, 323
- Insulin: Action of Phenyl Isocyanate on, Dr. S. J. Hopkins and Dr. A. Wormall, 290; in Peripheral Metabolism, Prof. N. B. Laughton and Prof. A. B. Macallum, 325
- Intellectual Liberty, Science and, Prof. R. Woltereck, 27
- Iodine, Nuclear Spin of, Dr. S. Tolansky, 851, 854
- Ionic Product of Heavy Water, B. Topley and W. F. K. Wynne-Jones, 574
- Ionosphere, Structure of the, Prof. J. Hollingworth, 462
- Ionospheric Investigations, T. R. Gilliland, 379
- J-type, The, and the S-type among Mathematicians, Prof. G. H. Hardy, 250
- Jeans, Sir James, The Philosophy of, Dr. H. Jeffreys; H. D., 499; Dr. N. R. Campbell, 571; H. D., 629
- "Johannes Schmidt" Ridge in the Indian Ocean, The, Dr. H. Pettersson, 29
- Kinetic Measurements with the Pulfrich-Stufen-photometer, Dr. A. Wassermann, 101
- L Absorption Spectra in the Very Soft X-Ray Region, V. H. Sanner, 100
- Language Distribution of Scientific Periodicals, Sir Charles S. Sherrington, 625
- Lapis Lazuli, Specific Gravity of, B. W. Anderson and C. J. Payne, 627
- Least Squares Solutions, Accuracy of, T. E. Sterne, 421
- Legume Symbiosis, Carbohydrate Supply in, Importance of, Dr. F. E. Allison, 144
- Liesegang Phenomenon, Mechanisms of the, E. C. Baughan, 778
- Life, Activities of, and the Second Law of Thermodynamics, Prof. F. G. Donnan and E. A. Guggenheim, 255
- Light, Absorption of, Chemical Reactivity and, Prof. N. R. Dhar, P. N. Bhargava, 848, 854; in Gases, Absorption of, Prof. R. W. Ditchburn and Dr. H. J. J. Braddick, 935, 938; Velocity of, Prof. R. T. Birge, 771
- Lightning: Discharge, Development of the, Dr. B. F. J. Schonland, H. Collens and Dr. D. J. Malan, 177; Flash as Source of an Atmospheric, The, Prof. E. V. Appleton and F. W. Chapman, 968, 974
- Lipolysis as a Source of Mitogenetic Radiation, A. D. Braun, 536
- Lobster, the, *Enoplometopus occidentalis*, Randall, in South Africa, K. H. Barnard, 665
- Locusts, Stridulating Organ of, Phylogenesis of the, Dr. F. Zeuner, 460
- Long-Wave Transmission in Summer, Difficulty of, Dr. S. C. Bagehi, 701
- Madder, A New Glycoside from, R. Hill, 628
- Magnetic Field, Nature of a, Prof. W. Cramp, 139
- Magnetron Oscillations: E. C. S. Megaw, 324; of a New Type, Dr. K. Posthumus, 179; 699
- Male Sex Hormone, Effect of the, on the Genital Tract of the Female, Dr. S. Skowron, 627
- Manganese Deficiency of Plants, Relationship of Soils to, G. W. Leeper, 972, 974
- Maùle Reaction, The, and the Systematic Position of the Gnetales, Prof. R. C. McLean and Miss Myfanwy Evans, 936, 938
- Menispermaceæ, Chromosome Numbers in, Prof. A. C. Joshi, 29
- Mercuric Sulphide, Absorption Spectrum of, Prof. P. K. Sen-Gupta, 498
- Mercury, Collecting Spilled, Dr. C. V. Boys, 29
- Metallic State and the Fermi-Dirac Statistics, A Magnetic Study of the, S. Freed and H. G. Thode, 774
- Metals: Crystallisation of, from Sparse Assemblages, Prof. E. N. da C. Andrade and J. G. Martindale, 321; Diffusion of Gases through, Dr. C. J. Smithells and C. E. Ransley, 814; Oxide Films on, Orientation of, Dr. R. F. Mehl, E. L. McCandless and F. N. Rhines, 1009, 1011
- Metastable Molecules in Active Nitrogen, Direct Proof of the Existence of, Prof. J. Kaplan, 289
- Micro-Organisms of Plant Growth, Dr. H. Nicol; W. B. Mercer, 218
- Milk, Reducing Substance (Vitamin C?) in, Effect of Light on the, R. G. Booth and Dr. S. K. Kon, 536
- Mitogenetic Radiation, Lipolysis as a Source of, A. D. Braun, 536; (Gurwitsch) Rays, Physico-Chemical Test for, Dr. M. Heinemann, 701
- Mould Growth, Alleged Influence of Heavy Water on, Dr. R. Klar, 104
- Moulds, Alleged Stimulation of, by Paraffin in Heavy Water: T. C. Barnes, 573; S. L. Meyer, 665
- Mouse: the Membrana Granulosa of the, P. G. 'Espinasse, 182; (*Mus musculus*), Action of Estrin on the Coagulating Glands and on Certain Vestigial Structures in the Mouse (*Mus musculus*), Dr. H. Burrows, 570
- Muscle: Anaerobic Recovery in, Chemistry of, Prof. J. K. Parnas and P. Ostern, 627; Chemical Changes in, Linkage of, Prof. J. K. Parnas, P. Ostern and T. Mann, 1007, 1011
- Museum of Practical Geology, The, Dr. F. J. North, 419
- Musk, Lost Fragrance of, E. Hardy, 327
- Neutron: and the Proton, Binding Energies of the, Prof. L. Strum, 497; Bombardment, Radioactivity Induced by, T. Bjerger and C. H. Westcott, 286; mass of the, Prof. W. D. Harkins and Dr. D. M. Gans, 968, 974; Nuclear Magnetic Moments and the Properties of the, Prof. I. Tamm, 380
- Neutrons and Protons, Interaction of, Prof. I. Tamm, 1010, 1011; Elements Bombarded with, Secondary Emission from, Dr. Z. Ollano; M. L. Oliphant, 735; from Beryllium, Liberation of, by X-Rays: Radioactivity induced by Means of Electron Tubes, A. Brasch, F. Lange and A. Waly, Dr. T. E. Banks, T. A. Chalmers, Dr. L. Szilard and Prof. F. L. Hopwood, 880, 901; Liberated from Beryllium by Gamma Rays: Detection of, a New Technique for Inducing Radioactivity, Dr. L. Szilard and T. A. Chalmers, 494; of Different Energies, Radioactivity Induced by Bombardment with, T. Bjerger and C. H. Westcott, 177; Spontaneous Emission of, by Artificially Produced Radioactive Bodies, M. Goldhaber, 25; from Radioactive Isotopes, H. J. Walke, 215
- New Zealand, Freshwater Research in, D. F. Hobbs, 853
- Nickel: and Cadmium, Carbon, Constitution of, Dr. F. W. Aston, 178; Hydride, Spectrum of, A. G. Gaydon and Dr. R. W. B. Pearce, 287
- Night: Clouds, Luminous, Prof. C. Störmer, 219; Sky, Bands at 4450 and 4180 Å. in the Spectra of the, and of the Aurora, H. Hamada, 851, 854

- Nitrogen : A New Band System in, Prof. J. Kaplan, 538 ;  
Afterglow, New Features of the, H. A. Jones and Prof.  
A. C. Grubb, 140 ; Molecule Situation of the ( $^3\Sigma$ )  
Level in the, E. T. S. Appleyard, N. Thompson and S.  
E. Williams, 322 ; Prof. L. Vegard, 697
- Nitro Group, Structure of the, H. O. Jenkins, 217
- Nitrosulphuric Acid, Raman Spectrum of, W. R.  
Angus and A. H. Leckie, 572
- Nitrous Oxide, Absorption Spectrum of, and Energy of  
Dissociation of Nitrogen, L. Henry, 498
- Noise, Traffic, P. J. H. Unna, 937
- Nomina Nuda*, Publication of, Sir Sidney F. Harmer,  
973
- Nuclear : Spins, Negative, and a Proposed Negative  
Proton, Dr. S. Tolansky, 26 ; Structure and Excited  
Radioactivity, G. Guében, 626
- Estrin, Action of, on the Coagulating Glands and on  
Certain Vestigial Structures in the Mouse (*Mus muscu-  
lus*), Dr. H. Burrows, 570 ; Group, Synthesis in the,  
Dr. J. C. Bardhan, 217 ; Specific Action of, P. G.  
'Espinasse, 738
- Opossum, Female, Unique Structure in the Adrenal of the,  
G. Bourne, 664
- Organic Vapours, Magnetic Properties of, S. Rama-  
chandra Rao and P. S. Varadachari, 812
- Orthogonal Matrix Transforming Spearman's Two-Factor  
Equations into Thomson's Sampling Equations in the  
Theory of Ability, The, Prof. G. H. Thomson, 700
- Oscillations with Hollow Quartz Cylinders cut along the  
Optical Axis, Ny Tsi-Zé and Tsieng Ling-Chao, 214
- Oxide Films on Metals, Orientation of, Dr. R. F. Mehl,  
E. L. McCandless and F. N. Rhines, 1009, 1011
- Oxygen : Absorption Spectrum of, at High Pressures and  
the Existence of  $O_4$  Molecules, H. Salow and Dr. W.  
Steiner, 463 ; Preparation from Sodium Peroxide :  
a Dangerous Experiment, Dr. J. Newton Friend and S.  
Marks, 778 ; G. H. Cheesman and D. R. Duncan, 971 ;  
The 1933 Everest Climbing Expedition and, Sir Leonard  
Hill, 969
- Oyster, The Australian, T. C. Roughley, 66
- Paraffin : in Heavy Water, Alleged Stimulation of  
Moulds by, T. C. Barnes, 573 ; Wax, Cyclic Components  
of, J. Müller and Dr. S. Pilat, 459
- Paschen Series of Hydrogen in the Infra-Red Solar Spec-  
trum, Photographic Intensity Measurements of Lines of  
the, Dr. A. H. Rosenthal, 533
- Peace, The Scientific Approach to, Dr. C. B. O. Mohr and  
Dr. Nora Wooster, 854
- Periodic Functions Related to Periodical Physical Pheno-  
mena, Asymptotic Developments of, Dr. S. C. Bagechi,  
216
- Phenyl Isocyanate on Insulin, Action of, Dr. S. J. Hopkins  
and Dr. A. Wornall, 290
- Phosphomolybdic Acid in Chemical Analysis, Use of, J.  
W. Illingworth and J. A. Santos, 971, 974
- Photo-Cell, Galvanometer Amplification by, Prof. A. V.  
Hill, 289
- Photographic Desensitisers and Oxygen, Marietta Blau  
and Hertha Wambacher, 538
- Photosynthesis, Kinetics of : Dr. R. Emerson and L.  
Green, 289 ; Prof. E. C. C. Baly, 933, 938
- Physiologically Active Substances, Electric Potentials of,  
Prof. B. Kamienski, 776
- Plane Polished Surfaces, Microchemical Analysis of, by  
Means of Monochromatic X-Ray Images, Dr. L. v.  
Hámos, 181
- Planets, Giant, The Atmospheres of the, Dr. R. Wildt,  
418
- Planning, Production and, Sir Richard Paget, Bt., 140 ;  
The Writer of the Article, 141
- Plant Growth, Micro-Organisms and, Dr. H. Nicol ; W.  
B. Mercer, 218
- Plants, Growth of, Effect of Yeast Extract on the, B.  
Viswa Nath and M. Suryanarayana, 27
- Polarity, Induced, A General Equation for, Dr. W.  
A. Waters, 178
- Porcellana* Larvae, Phototropism in, G. E. H. Foxon, 104
- Positron Radioactivity, Induced, Prof. F. H. Newman  
and H. J. Walke, 288
- Positrons and Electrons, Limits of the Energy Spectra of,  
from Artificial Radio-Elements, A. J. Alichanow, A. J.  
Alichanian and B. S. Dželepov, 254
- Potassium : Induced Radioactivity of, M. Zyw, 64 ; Radio-  
activity of, Prof. G. Hevesy, M. Pahl and R. Hosemann,  
377 ; Resonance Lines of, Hyperfine Structure of the,  
D. A. Jackson and H. Kuhn, 25
- Potato : Eelworm (*Heterodera schachtii*), Hatching Experi-  
ments on the, J. Carroll and E. McMahon, 66 ; Epidemic  
in Great Britain, A New, Dr. R. N. Salaman and Cecilia  
O'Connor, 932, 938 ; Wart Disease, Infectivity of  
Summer Sporangia of, in Incipient Infections on  
varieties Immune in the Field, Mary D. Glynnne, 253
- Production and Planning, Sir Richard Paget, Bt., 140 ;  
The Writer of the Article, 141
- Protein, Titration of, with Trichloroacetic Acid, Dr. R. K.  
Schofield and L. W. Samuel, 665
- Protium Oxide, Preparation of, and Determination of the  
Proportion of Deuterium in the Hydrogen of Normal  
Water, H. Whitaker, Prof. R. Whytlaw-Gray, E. H.  
Ingold and Prof. C. K. Ingold, 661
- Proton : and Diplon, Ratio of the Magnetic Moments of,  
F. Kalcker and E. Teller, 180 ; Neutron and the,  
Binding Energies of the, Prof. L. Strum, 497 ; Proposed  
Negative, Negative Nuclear Spins and a, Dr. S. Tolans-  
ky, 26
- Protons : Neutrons and, Interaction of, Prof. I. Tamm,  
1010, 1011 ; through Matter, Passage of Very Fast,  
H. J. Bhabha, 934
- Psychical Research, Science and, Prof. J. S. Huxley, Dr.  
F. C. S. Schiller and Prof. E. W. MacBride, 458
- Psychology, Social, Power in, H. G. Wells ; Prof. H.  
Levy, 972
- Pulfrich-Stufen-Photometer, Kinetic Measurements with  
the, Dr. A. Wassermann, 101
- Quartz in the Infra-Red Refractive Indices of, Corrections  
to the, Dr. D. G. Drummond, 937
- Radioactivity : Excited, Nuclear Structure and, G.  
Guében, 626 ; Induced, Prof. F. H. Newman and H.  
J. Walke, 537 ; and Transmutation, Prof. F. H. New-  
man and H. J. Walke, 64 ; by Bombardment with Neu-  
trons of Different Energies, T. Bjerger and C. H. West-  
cott, 177 ; by Means of Electron Tubes, Liberation of  
Neutrons from Beryllium by X-Rays : A. Brasch, F.  
Lange and A. Waly ; Dr. T. E. Banks, T. A. Chalmers, Dr.  
L. Szilard and Prof. F. L. Hopwood, 880, 901 ; of  
Potassium, M. Zyw, 64
- Radium D,  $\beta$ -Rays of, H. O. W. Richardson and Mrs.  
Alice Leigh-Smith, 772
- Raman : Scattering, Rotational, in Benzene Vapour,  
Dr. S. C. Sirkar, 850, 854 ; Spectra of Decahydro- and  
Tetrahydro-Naphthalene, Dr. S. K. Mukerji, 811 ;  
Spectrum of Nitrosulphuric Acid, W. R. Angus and  
A. H. Leckie, 572
- Rapidly Changing Systems, Spectrophotometry of, Dr.  
E. R. Holiday and F. Campbell Smith, 102
- Rat, Female, Peculiar Behaviour in a, Dr. A. M. Hain,  
778
- Rats, Young, Dietary Depigmentation of, Dr. F. J.  
Gorter, 382
- Reactions in Solution, Velocity of, Dr. A. E. Bradfield,  
421
- Rectifier Photoelectric Cell, Measurement of the Current  
Generated by a, Dr. H. H. Poole and Dr. W. R. G.  
Atkins, 810
- Red : Sea, Bird Migration and the, Dr. C. Crossland, 574 ;  
'Water-Bloom' in Iceland Seas, Prof. O. Paulsen, 974  
(*Rhineodon typus*) in South Africa, Second Occurrence of  
the Whale-Shark, K. H. Barnard, 66
- Rhizoctonia lamellifera*, Small, Parasitism of, J. C. Hopkins,  
812
- Rock Salt Absorption of Cosmic Rays, Dr. S. Ziemecki,  
773
- Salmacis bicolor*, Agassiz, Development of, Prof. R. Gopala  
Aiyar, 899
- Salts in Anhydrous Hydrogen Cyanide, Electrical Con-  
ductivity of, Prof. J. E. Coates and E. G. Taylor, 141
- Schumann Ultra-violet Photodissociation of Molecules in  
the, Prof. A. Terenin and H. Neujmin, 255

- Science : and Intellectual Liberty, Prof. R. Woltreck, 27; and Psychological Research, Prof. J. S. Huxley, Dr. F. C. S. Schiller and Prof. E. W. MacBride, 458; at the Universities : Prof. J. B. S. Haldane, 571; H. T. Tizard, 629
- Scientific Periodicals, Language Distribution of, Sir Charles S. Sherrington, 625
- Secondary Emission from Elements Bombarded with Neutrons, Dr. Z. Ollano; M. L. Oliphant, 735
- Sedimentation Measurements in Intense Centrifugal Fields, Possibility of, Prof. The Svedberg, G. Boestad and Inga-Britta Eriksson-Quensel, 98
- Seeds, Longevity of, Sir Daniel Hall, 932
- Selenium, Anomalous Diamagnetism of, S. S. Dharmatti, 497
- Serum, The pH of, Inactivated by Heat, Dr. P. Lecomte du Nôuy, 628
- Shear Waves through the Earth's Core, L. Bastings, 216
- Sheep Sweat a Factor in Blowfly Attack of Sheep, F. G. Holdaway and C. R. Mulhearn, 813
- Silica : Fused, X-Irradiation of, F. Twyman and F. Brech, 180; Infra-Red Spectra of, Dr. D. G. Drummond, 739
- Sky Light during the Total Solar Eclipses of August 31, 1932, and February 14, 1934, Polarisation and Spectrum of the, Dr. W. M. Cohn, 99
- Social : Psychology, Power in, H. G. Wells; Prof. H. Levy, 972; Research, The Need for, A. Blair, 898
- Sodium : Hydride, Isotope Effect in the Band Spectrum of, Dr. E. Olsson, 697; Peroxide : Oxygen Preparation from : A Dangerous Experiment, Dr. J. Newton Friend and S. Marks, 778; G. H. Cheesman and D. R. Duncan, 971; Phosphate, Fluoride as an Impurity in, Prof. A. Harden, 101
- Soils, Relationship of, to Manganese Deficiency of Plants, G. W. Leeper, 972, 974
- Solar Spectrum, Light of very Short Wave-length (2100 Å.) in the, Prof. E. Meyer, M. Schein and B. Stoll, 535
- Solid State, Complexity of the, Prof. A. Smits and N. F. Moerman, 698
- Spark : Discharge, Development of the, Dr. T. E. Allibone and Dr. B. F. J. Schonland, 736; Investigation by the Wilson Chamber, Prof. U. Nakaya and F. Yamasaki, 496
- Sparrows and Bees, Sister Veronica, 420
- Spearman's Two-factor Equations, The Orthogonal Matrix Transforming, into Thomson's Sampling Equations in the Theory of Ability, Prof. G. H. Thomson, 700
- Spectra and Latent Energy in Flame Gases, A. Egerton and A. R. Ubbelohde; Prof. W. T. David, 848, 854
- Spectrophotometry of Rapidly Changing Systems, Dr. E. R. Holiday and F. Campbell Smith, 102
- Star in Hercules, The New, Prof. F. J. M. Stratton, 974
- Starlings to Swallows, Hostility of, L. A. Waddell, 219
- Steric Hindrance and Geometrical Isomerism, Prof. P. Ramaswami Ayyar, 535
- Stratosphere, Ultra-violet Solar Spectrum and Ozone in the, Prof. E. Regener and V. H. Regener, 380
- S-type, The *J*-type and the, among Mathematicians, Prof. G. H. Hardy, 250
- Sucrose and *Iso*-Sucrose, Isomerism of, Sir James Irvine and D. Routledge, 143
- Sulphur, Elementary, Microchemical Detection of, Prof. A. Schönberg, 628
- Sunlight, Denitrification in, Prof. N. R. Dhar, 572
- Sunspot Number and the Refractivity of the Air, N. Dneprovsky, 853, 854
- Supraconducting Lead, Dependence of Magnetic Induction on the Magnetic Field in, G. N. Rjabimin and L. W. Shubnikow, 286
- Supraconductivity : and Fermi-Dirac Statistics, J. A. Kok, 532; and the Hall Effect, Dr. B. Lasarew, 139
- Supraconductors, Experiments on, T. C. Keeley, K. Mendelssohn and J. R. Moore, 773
- Surface Colour Formation, Heat Flow during, Dr. F. H. Constable, 100
- Sycamore Maple : in A.D. 1300, The, Dr. R. T. Gunther; Dr. J. Burt Davy, 215; in Britain, An Early Record of the, Dr. J. Burt Davy, 61
- Telegraph Repeater employing Carrier Currents, New Type of, S. P. Chakravarti, 537
- Tellurium : Conductivity of, C. H. Cartwright and M. Haberfeld, 287; Second Spark Spectrum of, S. G. Krishnamurthy, 255
- Tetrahydro-Naphthalene, Raman Spectra of Decahydro- and, Dr. S. K. Mukerji, 811
- Theodolite Axes, Design of : Prof. A. F. C. Pollard, 420; F. S. Richards; Prof. A. F. C. Pollard, 973, 974
- Thermodynamics, Second Law of, Activities of Life and the, Prof. F. G. Donnan and E. A. Guggenheim, 255
- Thiocamphor and other Cyclic Thioketones, Synthesis of, Sir P. C. Rây, 1010
- Thionine (Lauth's Violet), Acceleration of Respiration of Normal and Tumour Tissue by, Dr. F. Dickens, 382
- Thomson's Sampling Equations in the Theory of Ability, The Orthogonal Matrix Transforming Spearman's Two-factor Equations into, Prof. G. H. Thomson, 700
- Ticks, The Sucking Apparatus in, S. K. Sen, 664
- Tin, Magnetism of, Dr. S. Ramachandra Rao, 288
- Traffic Noise : P. J. H. Unna, 937; Reduction of, Sir Herbert Maxwell, Bt., 701
- Transmutation, Induced Radioactivity and, Prof. F. H. Newman and H. J. Walke, 64
- Tumour and Kidney Respiration, Effect of 2 : 6-Dichlorophenol-Indophenol on, Dr. K. A. C. Elliott, 254
- Ultra : -Centrifuge, Use of the, for Studying the Golgi Apparatus, Dr. H. W. Beams, J. A. Muliylil and Prof. J. B. Gatenby, 810; -sonic Flame, A High-frequency Water Jet, and, J. J. Hopfield, 737; -Violet Light, Measurement of, Dr. J. R. Baker, 139; Seeing in the, Dr. W. de Groot, 494; Vision in the : C. F. Goodeve, 416; Prof. C. Fabry, 736; Dr. H. Schober, 898
- Universities, Science at the : Prof. J. B. S. Haldane, 571; H. T. Tizard, 629
- Urea-Urease System, Mitogenetic Radiation of the, E. G. Prokofiewa, 574
- Urobilinogen, Dr. R. Lemberg, 422
- Vasine, Constitution of, Miss T. M. Reynolds and Prof. R. Robinson, 142
- Vertebrae, Different Forms of, Causes of Formation of, Prof. Himadri Kumar Mookerjee, 182
- Vibration Spectra and Force Constants of 'Heavy' Acetylene, Dr. G. B. B. M. Sutherland, 775
- Viols, Wood used in, Structure of the, Dr. K. Lark-Horovitz and W. I. Caldwell, 23
- Vision in the Ultra-Violet, C. F. Goodeve, 416; Prof. C. Fabry, 736; Dr. H. Schober, 898
- Vitamin : A Cycle in Vision, Carotenoids and the, G. Wald, 65; B<sub>1</sub>, Chemical Constitution of, as Deduced from Ultra-violet Absorption Spectra, F. F. Heyroth and J. R. Loofbourow, 461; B<sub>2</sub> and Flavines, Non-Identity of, Prof. C. A. Elvehjem and C. J. Koehn, Jr., 1007; (C) : Synthesis of Ascorbic Acid, by means of Tissues *in Vitro*, Dr. B. C. Guha and A. R. Ghosh, 739; Glutathione and, in the Crystalline Lens : E. I. Evans, 180; T. W. Birch and Dr. W. J. Dann, 383; Synthesis of, by the Infant, P. Rohmer, Miss Ursula Sanders and N. Bezssonoff, 142; (C ?) in Milk, Reducing Substance, Effect of Light on the, R. G. Booth and Dr. S. K. Kon, 536; E, Absorption Spectrum of, A. J. P. Martin, T. Moore, Marion Schmidt and Dr. F. P. Bowden, 214
- 'Water : -Bloom', Red, in Iceland Seas, Prof. O. Paulsen, 974; in South African Seas, T. J. Hart, 459; From the Human Body, Elimination of, Prof. G. Hevesy and E. Hofer, 879, 901; Heavy : in the Animal Body, E. J. McDougall, Prof. F. Verzár, H. Erlenmeyer and H. Gaertner, 1006, 1011; into Light, Diffusion of, W. J. C. Orr and Dr. D. W. Thomson, 776; Some Experiments on, Prof. H. Erlenmeyer and H. Gärtner, 327; Jet, A High-frequency, and Ultrasonic Flame, J. J. Hopfield, 737; Supply, Inland, Prof. W. S. Boulton, 777; Survey, Inland, Capt. W. N. McClean, 814
- Wever and Bray Phenomenon, Origin of the, C. S. Hallpike, 419
- Whale-Shark (*Rhineodon typus*) in South Africa, Second Occurrence of the, K. H. Barnard, 66

- Whales and Caisson Disease: J. A. Campbell, 629; R. W. Gray, 853
- Wine Makers and Bottle Makers: A Parable, Prof. V. Karapetoff, 625
- Wireless Echoes from Regions Above the *F* Layers, Prof. H. R. Mimno, 63
- Wood used in Violins, Structure of the, Dr. K. Lark-Horovitz and W. I. Caldwell, 23
- X-Ray: Emission, Fluorescent Yield of, Prof. G. Hevesy and H. Lay, 98; Region, very soft, *L* Absorption Spectra in the, V. H. Sanner, 100
- X-Rays, Atomic Scattering Factor of Copper for, Effect of Dispersion and of Lattice Distortion on the, G. W. Brindley and F. W. Spiers, 850, 854
- Yeast: Cells, Suspensions of, Electric Impedance of, Dr. H. Fricke and H. J. Curtis, 102; Extract, Effect of, on the Growth of Plants, B. Viswa Nath and M. Suryanarayana, 27
- Zostera* in American Waters, Wasting Disease of, C. E. Renn, 416; (*marina*): Eelgrass, Wasting Disease of, Dr. H. E. Petersen, 143; The Fungus of, T. G. Tutin, 573; Wasting Disease of, Dr. Kathleen B. Blackburn, 738
- Cosmic: Corpuscles, Origin of the, Dr. L. G. H. Huxley, 418; Radiation in a Wilson Chamber, Effects of, at the Hafelekar Observatory (2,300 m.) near Innsbruck, Dr. F. Rieder and Prof. V. F. Hess, 772; Ray Bursts, Magnitude of, Prof. A. H. Compton, 1006, 1011; Rays and the Earth's Potential, Dr. L. G. H. Huxley, 571; Automatic Wilson Chamber for, Prof. P. M. S. Blackett, 742; Composition of, Prof. A. H. Compton and Dr. H. A. Bethe, 734; Investigation of, by Sounding Balloons, Dr. A. H. Compton, 657; Possible Action of, on Living Organisms, Prof. A. B. Engelstad and N. H. Moxnes, 898, 901; Rock Salt Absorption of, Dr. S. Ziemecki, 773; Ultra-Radiation: Electric Deflection of, Dr. E. Lenz, 809; in Northern Sweden, A. Corlin, 530; in the Stratosphere with the Tube-Counter, Intensity of the, Prof. E. Regener and G. Pfozter, 325
- Cosmological Models, Effect of Inhomogeneity on, R. C. Tolman, 263
- Cotton: Hybrids, Chromosomes of, Dr. A. Skovsted, 221; Leaf-shape Inheritance in, Dr. J. B. Hutchinson, 631; Plant, Translocation in the, 544
- Counter Attack from the East: the Philosophy of Radhakrishnan, Prof. C. E. M. Joad (*Review*), 832
- Crab Fauna of California, Affinities of, S. A. Glassell, 500
- Craspedacusta*, The Freshwater Medusa, Dr. E. Dejdjar, 630
- Cross, Dorothy Temple, Fellowships in Tuberculosis, Awards of, 59
- Crosse: Andrew, Electrical Pioneer, J. Alexander, 105
- Crustacean Chromatophore Activator, Production of the, B. Kropp and W. J. Crozier, 711
- Crustal Movements in South Africa, Dr. A. L. du Toit, 107
- Cryptanthemis Slateri* (Orchidaceae), Habit, Character and Floral Structure of, H. M. R. Rupp, 471
- Crystal: Chemistry, Prof. T. M. Lowry (*Review*), 827; Lattice of  $\alpha$ -Brass, Distortion of the, W. A. Wood, 572; Structure of  $\text{Hg}(\text{NH}_3)_2\text{Cl}_2$ , Dr. J. M. Bijvoet and Miss C. H. MacGillavry, 849
- Crystalline State, The, Edited by Sir William Bragg and Prof. W. L. Bragg. Vol. 1: A General Survey (*Review*), 303
- Crystallisation: of Metals from Sparse Assemblages, Prof. E. N. da C. Andrade and J. G. Martindale, 321; Water of, Heavy Water and, Dr. J. Newton Friend, 463
- Crystallised Vitamins  $B_1$  and  $B_2$ , Action of, on a Micro-organism, W. H. Schopfer, 227
- Crystals: Principal Refractive Indices of, Use of the Prism for Determining the, A. Cavinato, (2), 711; Small, Density of, Use of the Centrifuge in Determining the, J. D. Bernal and Miss D. Crowfoot, 809
- Culter recurviceps*, Rich. (Pisces, Cyprinidae), L. S. Berg, 507
- Cunard White Star Liner *Queen Mary*, 488
- Cupric Sulphide in Thin Layers, Influence of Temperature on the Electrical Conductivity of, H. Devaux and J. Cayrel, 946
- Cuprous Oxide, Photoelectric Effect in, Spectral Distribution of the, Mme. Anne Joffé and A. Joffé, 638
- Curie Ferromagnetic Point for Thin Layers of Nickel, Electrolytically Deposited, S. Procopin and T. Farcas, 154
- Current Generated by a Rectifier Photoelectric Cell, Measurement of the, Dr. H. H. Poole and Dr. W. R. G. Atkins, 810
- Curry's, Dr., Weather Prophet, 452
- Cyclohexane Series, Transpositions in the, M. Tiffeneau and Mlle. B. Tchoubar, 470
- Cyclostomes, Dr. M. Holly, 702
- Cyprus, Ancient Monuments of, Sir Charles Peers, 730
- Cytological Technique, Dr. J. R. Baker (*Review*), 477
- Cytology, Methods in, Prof. J. B. Gatenby (*Review*), 477
- Cytophaga Winogradskii* n.sp., Spontaneous Cultures of the Cellulositic Aerobe, O. Verona, 639
- Dairying, National Institute for Research in, Annual Report for 1933, 967
- Darwin: at Valparaiso, 113; in the Andes, 225; in the Island of Chiloe, 786; Major R. W. G. Hingston (*Review*), 124
- Darwinol, Identity of, with *d*-Myrtenol, A. R. Penfold, G. R. Ramage and J. L. Simonsen, 546
- Datura*: Genetics of, Blakeslee and others, 667; *stramonium*, Comparative Anatomy of Extra-chromosomal Types in, E. W. Sinnott, Helen Houghtaling and A. F. Blakeslee, 708
- Dead Sea Water, Density of, R. J. Clark and F. L. Warren, 29
- Deciduous Fruit, Studies in, I. Donen, 638
- Decimal Association, Sir Isidore Salmon elected president of the, 967
- Decision, The Hour of. Part 1: Germany and World-Historical Evolution, O. Spengler. Translated by C. F. Atkinson (*Review*), 516
- Deep Level Mining on the Witwatersrand Gold Mines with Special Reference to Rock Bursts, Some Aspects of, 453
- De la Beche's "Researches in Theoretical Geology", 930
- Denitrification in Sunlight, Prof. N. R. Dhar, 572
- Deserts, The Role of the, A. J. McInerney (*Review*), 556
- Design: The Great, Order and Progress in Nature, Edited by Frances Mason (*Review*), 614
- Deuterium: in the Hydrogen of Normal Water, Preparation of Protium Oxide and Determination of the Proportion of, H. Whitaker, Prof. R. Whytlaw-Gray, E. H. Ingold and Prof. C. K. Ingold, 661; into Benzene, Direct Introduction of, without Heterogeneous Catalysis, Prof. C. K. Ingold, C. G. Raisin and C. L. Wilson, 734; Dr. J. Horiuti and Prof. M. Polanyi, 847; ou Hydrogène Lourde, le, un Nouveau corps simple: Prof. E. Darmois, 56
- Deuton Nucleus, Determination of Spin and Statistics of the, from Thermal Data, F. Patat and H. Hoch, 156
- Dialeurodes dissimilis* Quaint. and Baker (Homoptera, Aleurodidae), Respiratory System of the White-Fly, M. L. Roonwal, 218
- Diamond, Two Types of, Sir Robert Robertson, Dr. J. J. Fox and Dr. A. E. Martin, 485
- Diastylis bradyi*, Feeding Mechanism of the Cumacean Crustacean, R. Dennell, 226
- Dibenzyl Molecule, Shape of the, Dr. J. M. Robertson, 381
- Dichloroethylene, Raman Observations on, O. Paulsen, 392
- Dictionary of Organic Compounds. Vol. 1. Editor-in-Chief: Prof. I. M. Heilbron (*Review*), 751
- Dielectric: Constant, Some Negative Results on the, J. Weigle and R. Luthi, 674; Potentials of Physiologically Active Substances, Prof. B. Kamienski, 776

- Dielectrics, Ramaswamy,<sup>†</sup> Narayanaswami and Mowdwalla, 816
- Differential Equations: Prof. H. B. Phillips. Third edition (*Review*), 684; Numerical Solution of, D. R. Hartree, 108
- Diflavones, Synthesis of, J. Algar and K. J. Hanway, 262
- Digitalis*, Cytogenetics of, B. H. Buxton and S. O. S. Dark, 424
- Dimetaphosphoric Acid, A. Travers and Yu Kwong Chu, 191
- Dimethylalanine, Action of Nitrous Acids on, J. C. Earle and A. W. Mackney: (2), 76; (3), 747
- Dinosaur Discovery in Wyoming, Dr. B. Brown, 492
- Dinosaurs: The, a Short History of a Great Group of Extinct Reptiles, Dr. W. E. Swinton (*Review*), 613
- Dip and Strike Problems Mathematically Surveyed, Dr. K. M. Earle (*Review*), 684
- Diphtheria, Active Immunization Against, Surg.-Capts. Dudley and May and Surg.-Comdr. O'Flynn, 220
- Diplogen in Water during very Slow Evaporation, Increase of the Percentage of, Dr. T. Tucholski, 29
- Diplon: Disintegration of the, by  $\gamma$ -Rays, A 'Nuclear Photo-effect': Dr. J. Chadwick and M. Goldhaber, 237; Proton and, Ratio of the Magnetic Moments of, F. Kalckar and E. Teller, 180
- Dipole Moments in Solution, Determination of, Dr. F. Fairbrother, 458
- Disease Resistance in Plants, Mechanism of, Prof. W. Brown, 903
- Distilling Water for Ships, 506
- Disulphur Decafluoride, K. G. Denbigh and Prof. R. W. Whytlaw-Gray, 781
- Dividing and Non-Dividing Cells, Sensitivity of, to Radiation, W. H. Love; Dr. J. C. Mottram, 252; F. G. Spear, A. Glücksmann, A. F. W. Hughes and C. W. Wilson, 460
- Doctors: Great, a Biographical History of Medicine, Dr. H. E. Sigerist. Translated by Eden and Cedar Paul (*Review*), 394
- Dogs, Food Conditioned Reflexes in, Effect of Simultaneous Cutting of Both Jugular Sympathetic Nerves upon, E. Asratjan, 192
- Domestic Animals, British Breed Standards of, 375
- Douglas, David, 1798-1834, 38
- Draper on Capillary Attraction, 298
- Decahydro- and Tetrahydro-Naphthalene, Raman Spectra of, Dr. S. K. Mukerji, 811
- Droitwich Broadcasting Station, N. Ashbridge, 412
- Drosophila*: Ganglion Cells of, Dr. Kaufmann, 839; Heat Induced Mutations in, H. H. Plough and P. T. Ives, 472; *melanogaster*: Causes of Suppression of Crossing-Over in Males of, Prof. H. Friesen, 326; Nature of the Action of Chemical Agents on Mutational Process in, M. Lobashov and F. Smirnov (2), 823; X-Chromosome of, Biological Action of Small Deficiencies of, M. Demerec, 548
- Drought: Cartographic Study of, W. R. Baldwin-Wiseman, 38; Lessons of the, Sir E. Hilton Young, 171
- Drummond, Thomas, Botanical Collections made by, 746
- 'Dry Ice' in the Machine Shop: W. H. Swanger, 529; T. H. Beard, 853
- Dublin and Kingstown Railway, 545; 945
- Duck, Domestic, Presence of the Right Oviduct in the, K. Wodzicki, 823
- Ducks: and Geese, Keeping and Breeding, Bulletin on, 22; Hybrid, S. C. Ball, 902
- Dudley, Dud, and the Coal-Iron Industry, R. A. Mott, 842
- Dufay Colour Process, F. F. Renwick, 769
- Dundonald's Rotary Steam Engine, 946
- Duralumin, Fatigue Strength of, Influence of Pickling on the, H. Sutton and W. J. Taylor, 632
- Durham University, Conferment of an Honorary Doctorate on Prof. A. Fowler, 37
- Dutch East Indies, Annelids of the, H. Augener, 816
- E* Factor in Leguminous Seeds, V. Zagami, 192
- Early: British Camp, 208; Man in East Africa: Further Investigation, 730
- Earth: Central Core of the, Prof. A. Imamura; L. Bastings, 257; Internal Heat of the, 746; -Sounds in the East Indies, Capt. P. Jansen, 769
- Earthquake: Areas, Re-Surveys in, Prof. A. Imamura, 146; Dhubri, of July 3, 1930, E. R. Gee, 576; in Panama, July 18, 135; in Scotland, on August 16, 282; Noto (Japan), of 1933, T. Suzuki, 32; Resistance Structures, Dynamics of, J. J. Creskoff (*Review*), 479; Seawaves, The Sanriku (Japan), of 1933, Dr. C. Davison; Imamura and Kawase; Prof. N. Miyabe; K. Musya, 820; South Atlantic, of June 27, 1929, Comdr. T. M. Chaplin, 501; Texas, of August 16, 1931, Prof. P. Byerly, 741
- Earthquakes: Italian, Hourly Frequency of, G. Agamenone, 711; of December 15, 963; Periodicity of, Prof. V. Conrad; Father Luis Rodès, 631; Tokyo, Seismometric Reports on, 329
- Earth's: Central Core, State of the, Dr. H. Jeffreys, 324; Crust, Speculative Borings in the, 529; Magnetic Field, Diurnal and Secular Variations of the, at Cape Town, A. Ogg, E. N. Grindley and B. Gotsman, 638; Potential, Cosmic Rays and the, Dr. L. G. H. Huxley, 571; Surface, Electrical Constants of the, Determination of the, at Wave-lengths of 1.5 and 0.46 m., J. S. McPetrie, 74
- Earthworm, Nerve Cells of, F. Ogawa, 666
- East: London College: High-Voltage Laboratory at, 581; Incorporated and Name Changed to that of Queen Mary College, 873; Malling Research Station, Annual Report for 1933, 1002
- Echinoderms, New, from Puerto Rico, A. H. Clark, 976
- Ecological Studies in Victoria, R. T. Patton (3), 675
- Ecology, Field Studies in, Dr. R. Bracher (*Review*), 955
- Economic: Change, Need for a Technique of, N. F. Hall, 579; Crisis, Some Reflections on the, Lord Bledisloe, 92; Planning, Prof. D. H. Macgregor and others, 503; and Agricultural Production, 713; Statistics in, 245
- Education: Bilingual Problem in, Dr. M. E. Bickersteth, 779; Public, in Great Britain [1834], 673; the Challenge to, Dr. N. Murray Butler, 981
- Educational Machine, Dr. J. Murray, 528
- Edinburgh: Geological Society: Centenary of the, 281; 412; University: Conferment of Honorary Doctorates, 37; Award of the Cameron Prize to Sir E. Sharpey-Schafer, 152; Romanes Lecture, 285; Jubilee of the Students' Representative Council, 861; Conferment of Doctorates, 981
- Egypt, Upper, the 'Isolated Basins' Electricity Scheme, C. S. Ickringill and H. Peters, 528
- Eelgrass (*Zostera marina*), Wasting Disease of, Dr. H. E. Petersen, 143
- Eels, New Congrid, E. D. Reid, 903
- Elcot Park Garden: Heating Hot-houses, 153
- Electric: Arcs with Fused Metals and Salts as Electrodes, M. Pieurucci and L. B. Silva, 495; Battery Utilising the Energy of Oxidation of Alcohol, V. Karpen, 787; Currents, Large, Effects Produced by, 490; Grid System, Developing the, 354; Impedance of Suspensions of Yeast Cells, Dr. H. Fricke and H. J. Curtis, 102; Power: Cheap, Sources of, Prof. F. G. Baily, 369; 445; 558; for Manufacturers, Bulk Supply of, 767; Pit-Head Generation of: 558; Prof. F. G. Baily, 776; Shut-down in London, 208; 245; Waves Chemically Recorded, Diffraction of, W. Arkadiew, 863; in Insulators, Dr. W. Ziegler, 425
- Electrical: Accidents in 1933, 1001; Communication: Prof. A. L. Albert (*Review*), 619; Principles of the Art of (*Review*), 916; Signals and Speech in, J. Mills (*Review*), 916; Conceptions of To-day, Dr. C. R. Gibson (*Review*), 3; Double Refraction of some Optically Active Liquids, Dispersion and Thermal Variation of the, M. Schwob, 262; Engineers, Institution of, Award of Scholarships to F. C. Williams, S. I. Hollingworth, S. G. Bittles, E. Bradshaw and W. B. Hutchison, 189; Equipment of Buildings,



- Regulations for the, 567; Phenomena in Metals, The Thermodynamics of, Prof. P. W. Bridgman (*Review*), 619; Properties of Materials at High Radio Frequencies, Dr. J. S. McPetrie, 897, 901; Resistance: New Comparisons of National Standards of, A. Pérard and M. Romanowski; P. Janet, 582; of a Rod of Impure Zirconium Oxide in Air, Influence of Pressure on the, J. Basset, 298; Warming of Large Buildings, R. Grierson and D. Betts, 908
- Electricity: A Guide to, for Home and School, Dr. C. F. Smith (*Review*), 619; Development in France, Sir Robert Cahill, 659; by Torsion in Quartz, Laws of the Production of (Strephoelectricity), E. P. Tawil, 910; Measuring, 189; on Board Ship, C. W. Saunders, H. W. Wilson and Dr. R. G. Jakeman, 930; Supply, Standardisation of, L. Romero, 58
- Electroacoustical Reproducers, D. A. Oliver (*Review*), 119
- Electrolytes, Passage of Current in, without Electrolysis, V. Karren, 546
- Electromagnetic: Theory, Modern (*Review*), 610; Waves: in Anisotropic Media, Groups of, G. Peretti, 583; Long, Velocity of Propagation of, Influences of Magnetic Disturbances on the, N. Stoyko, 863
- Electromagnetism, Prof. H. M. Macdonald (*Review*), 610
- Electron: Configurations  $p^2s$ ,  $p^4s$ , R. Schlapp, 115; in Industry, C. C. Paterson, 805; Scattering by Atomic Electrons, A. L. Hughes and R. G. Hergensother, 541
- Electrons: Capture of, by Positive Ions, R. A. Smith, 1014; Diffraction of, by India-rubber, J. J. Trillat and H. Motz, 226; Positive, Some Properties of, J. Thibaud, 257; Slow, Effect of Temperature on Diffraction of, and its Application, W. E. Laschkarew and G. A. Kuzmin, 62
- Elektrizität, Theorie der, Prof. R. Becker. Neubearbeitung des Werkes von M. Abraham. Band 1 u. 2 (*Review*), 84
- Element 93: a Correction, Dr. O. Koblic, 282
- Elements and Isotopes, Dr. F. W. Aston, 731
- Elephantichthys*, the 'Elephant Fish', Prof. Hubbs and Dr. L. P. Schultz, 666
- Elinvar Hairsprings in Watches, R. E. Gould, 318
- Eliot, Charles W., Dr. J. B. Conant, 545
- Elk or Moose (*Alces*, Gray), Geographical Distribution and Systematics of the, K. K. Flebov, 335
- Elliptic Equations with Partial Derivatives, with  $n$  Independent Variables, R. Caccioppoli, 40
- Elms, British, Classification of, Dr. Helen Bancroft, 501
- Emotional Responses, Central Nervous Mechanism for, C. W. Brown and F. M. Henry (2), 472
- Empire: Hardwoods, Grading Rules and Standard Sizes for, 247; Social Hygiene Year-Book, 1934. First Annual Edition (*Review*), 617
- Emulsions: Formation of, Prof. G. I. Taylor, 904; Technical Aspects of, Dr. W. Clayton and others, 944
- Energy Conservation, Possible Failure of, R. C. Tolman, 548
- Engato the Lion Cub, J. H. Driberg (*Review*), 755
- Engineer, The, and Modern Civilisation, Sir Frank Smith (Gustave Canet Lecture), 126; 167
- Engineering: Radiography, V. E. Pullin (*Review*), 618; University Degrees in, 732
- Engineers, Junior Institution of, Jubilee of the, 36
- England-Melbourne Air Race, Official Times, 728
- English: Channel, the Relief of the Edge of the Continental Plateau to the West of the Entrance to the, E. le Danois and L. Beaugé, 638; Dictionary of Organic Compounds, An, Prof. J. Read (*Review*), 751
- Enoplometopus occidentalis*, Randall, the Lobster, in South Africa, K. H. Barnard, 665
- Enteropneust, The Burrow of an, Dr. C. J. van der Horst, 852
- Enteropneusts in the Clyde Sea-Area, R. Elmhirst, 183
- Zoological Society, The [1834], 153; 862
- Enzymforschung, Ergebnisse der, Herausgegeben von F. F. Nord und R. Weidenhagen. Band 3 (*Review*), 307
- Enzymic Scission of the Nuclear Acid of Yeast, Contardi and Ravazzoni, 857
- Eocene Primate from California, A Second, C. Stock, 263
- Epidemiology of the Nosu, Western Szechwan, China, 294
- Erinnerungen: Bekenntnisse und Betrachtungen, G. Haberlandt (*Review*), 955
- Eskimo Studies, Offer of Prize for, 845
- Estuarine Crabs, Bionomics of Two, Dr. Sunder Lal Hora, 220
- Ethane Oxidation, Kinetics of, Effect of Nitrogen Peroxide on the, A. I. Serbinov and M. B. Neuman, 546
- Ether Drift, The Problem of, Dr. C. V. Drysdale, 796; 833
- Ethylene: a Combustible Liquid Obtained starting with, K. Smolenski and S. Kowalewski, 674; Production of, by some Ripening Fruits, R. Gane, 1008, 1011
- Euchæto norvegica*, Researches on, A. P. Orr; Dr. A. G. Nicholls, 424
- Eugenic Organisations, International Federation of, Eleventh Assembly of the, 426
- Evaporation, Measuring Rate of, Dr. J. S. Owens, 330
- Everest Climbing Expedition, The, 1933, and Oxygen, Sir Leonard Hill, 969
- Everglades National Park, U.S.A., 21
- Evolutionary Tendencies (*Review*), 161
- Experimentalphysik, Handbuch der. Herausgegeben von W. Wien und F. Harms. Unter Mitarbeit von H. Lenz. Band 12: Elektrochemie. Teil 2. Herausgegeben von K. Fajans und E. Schwartz. Elektromotorische Kräfte, von Prof. C. Drucker und Prof. C. Tubandt; Polarisationserscheinungen, von Prof. R. Kremann; Elektrochemie der Phasengrenzen, von Prof. E. Lange und Dr. F. O. Koenig (*Review*), 831
- Extinction, Photometric Method of, Accuracy of the, E. Brumberg and S. Vavilov, 1020
- Extra-Sensory Perception, Dr. J. B. Rhine (*Review*), 308
- Eyesight with Yellow Light, 1000
- Faraday, T. Martin (*Review*), 616
- Faraday's Experiments on Self-Induction, 581
- Farm, Change in the, T. Hennell (*Review*), 159
- Farming, The Science of (*Review*), 830
- Fat Estimations by the Gerber Method, Influence of the Stage of Lactation on, J. Lyons and M. O'Shea, 334
- Fatty: Acids, Substituted, Esterification Velocities of, A. Kailan and L. Jungermann, 156; Oil Production, Prof. J. Reilly and D. F. Kelly, 334
- Fear: and the Anthropologists, A. M. Hocart (*Review*), 475; of the Dead in Primitive Religion, The, Sir James George Frazer (*Review*), 475
- Felspars in Thin Sections, The Determination of the, Dr. K. Chudoba. Translated by Dr. W. Q. Kennedy (*Review*), 616
- Fen District, Drainage of the, 525
- Fenland Research Committee, Appeal for Funds, 284
- Fermi: -Dirac Statistics: A Magnetic Study of the Metallic State and the, S. Freed and H. G. Thode, 774; Supra-Conductivity and, J. A. Kok, 532; Effect: Chemical Separation of the Radioactive Element from its Bombarded Isotope in the, Dr. L. Szilard and T. A. Chalmers, 462; Experiments on the, M. Danysz, J. Rothblat, Prof. L. Wertenstein and M. Żyw, 970, 974
- Fermi's: Differential Equation, C. Miranda, 817; Element 93, Dr. A. V. Grosse and M. S. Agruss, 773
- Ferret, Development of the, W. J. Hamilton (1), 226
- Ferro-: Cyanides, Insoluble, Precipitation of, R. Pâris, 863; Magnetic Substance Above its Curie Point, Gyromagnetic Effect for a, Dr. W. Sucksmith, 936, 938
- Ferrous Chloride, Anomaly in the Specific Heat of, at the Curie Point, O. N. Trapeznikowa and Dr. L. W. Shubnikow, 378
- Fibres: Identification of, Fluorescence Microscopy and its Application to the, 635; Under the Microscope (*Review*), 122
- Fick, Adolf, Prize, Award of the, to H. Spemann, 878
- Field: Museum of Chicago, 455; of High Frequency, F. Pirrone, 40; Rogers, Gold Medal of the Royal Sanitary Institute, Award of the, to Imperial Chemical Industries, Ltd., 60; Theory, The New, B. Hoffmann, 322

- Film, Thin, Spectrometer Determination of the Metrical Thickness and Dispersive Power of a, O. Darbyshire, 74
- Finavon Hill, Excavation at, 353
- Finite Differences, The Calculus of, Prof. L. M. Milne-Thomson (*Review*), 231
- Finsbury and the Central, Beginnings of, Prof. H. E. Armstrong, 807
- Fireball of October 11, 1934, 1004
- Fireblight of Pears and other Plants, Dr. K. M. Curtis, 576
- Firedamp Recorder, Automatic, H. Lloyd, 492
- Fish : and Anemone, Partnership between, H. A. F. Gohar, 291; Eggs and Larvæ from the Java Sea, Dr. H. C. Delsman, 702; Fats, Dr. J. A. Lovern, 799; Fauna, British, the Changing, Dr. E. B. Worthington, 26; of Beartooth Butte, Wyoming, W. L. Bryant, 256; Liver Oils Rich in Vitamin A, Dr. J. A. Lovern, 422; New to the British Fauna, A. Prof. W. M. Tattersall, 145; Showers of, Dr. Sunder Lal Hora; S. N. Sen, 454; Size-Limits for, and Regulations of the Meshes of Fishing Nets, 594
- Fisheries : British, Legislative Control of, 692; Scottish, in 1933, 580
- Fishes : Burmese, Dr. Sunder Lal Hora and Dev Dev Mukerji, 855; Deep Sea, Some New, A. E. Parr, 30; From the Irish Atlantic Slope, New or Rare, A. Frazer-Brunner, 910
- Five Days Week, A Review of the Experimental Working of the, by Boots Pure Drug Coy. at Nottingham, Sir Richard A. S. Redmayne, 927
- Flame Gases, Spectra and Latent Energy in, Prof. W. T. David, 663
- Flavines, Vitamin B<sub>2</sub> and, Non-Identity of, Prof. C. A. Elvehjem and C. J. Koehn, Jr., 1007
- Flax in Water and Soil Cultures, Development of, Effect of Boron Upon the, M. Shkolnik, 335
- Flechten : Die, eine Einführung in ihre allgemeine Kenntnis, Prof. F. Tobler (*Review*), 721
- Fleming's, Sir Ambrose, Reminiscences (*Review*), 881
- Flesh Foods, Chemistry of, and their Losses on Cooking, R. A. McCance and H. L. Shipp, 53
- Flight Course, Graphical Determination of a, W. C. Rockefeller, 146
- Flora of Syria, Palestine and Sinai, Dr. G. E. Post. Second edition, extensively revised and enlarged by J. E. Dinsmore. Vol. 2 (*Review*), 440
- Flower and Fruit Formation, Acceleration of : R. Harder and I. Störmer, 385; Prof. W. Schoeller and Dr. H. Goebel, 257
- Flowering Plants, The Families of, 2 : Monocotyledons; arranged according to a New System based on their probable Phylogeny, J. Hutchinson (*Review*), 550
- Flowers, Temperature of, L. Blaringhem, 582
- Fluid Motion (*Review*), 398
- Fluorescence : Microscopy and its Application to the Identification of Fibres, 635; of some Pure Substances, E. Canals and P. Peyrot, 154
- Fluoride as an Impurity in Sodium Phosphate, Prof. A. Harden, 101
- Fluorine : Atomic Radius of, C. H. Douglas Clark, 99; in Coal, Dr. R. Lessing, 699
- Fog : A. McAdie (*Review*), 896; Peril to Fishermen Lessened, 623
- Folk-Play : The, (*Review*), 605; The English, Sir E. K. Chambers (*Review*), 605
- Food : Investigation Board, Report of the, for the year 1933, 480; Reflex, Influence of an Unconditioned, upon the corresponding Conditioned Reflexes, E. Hasratian, 263; Storage and Transport, Sir Frank Smith (Hardy Memorial lecture), 411; Supplies, Science and, 798; Transport and Storage of, 480
- Foraminifera : A Manual of, Prof. J. J. Galloway (*Review*), 43; Proliferating Nomenclature of, E. Heron-Allen (*Review*), 43; Recent and Fossil, W. A. Macfadgen; A. Earland, 67
- Forbes, J. D. : and Airy, 909; and his Researches on Heat, 1018; and Quetelet, 862
- Force and the Future, Lord Davies, 282
- Forest ; Biology, Some Aspects of, Prof. A. W. Borthwick, 372; Fires, 454; Policy in New Zealand, 1015
- Forestry : Commissioners, Fourteenth Annual Report of the, 284; for Woodmen, C. O. Hanson. Third edition (*Review*), 400; in Trinidad and Tobago, 658
- Forests, Italian, The Fascist Government and the Restoration of, Prof. A. Pavari, 528
- Formaldehyde, Formation of, in the Oxidation of Ethyl Alcohol, M. Flanzy, 39
- Forthcoming Books of Science, 620
- Fossil : Elephant in Palestine, Discovery of a, Dorothea M. A. Bate, 219; Insect from the British Coal Measures, Dr. H. Bolton, 183
- Fossils and Men, Prof. H. L. Hawkins, 186
- Foundry : Education, National Scheme of, J. G. Pearce, 72; Work and Metallurgy, Edited by R. T. Rolfe. 6 vols. (*Review*), 513
- Fowler, Prof. A., Tribute to, Prof. H. Dingle, 634
- Freedom of the Individual and the Advance of Civilisation, Dr. H. W. Chase, 389
- Freshwater : Alga : of Africa, Florence Rich (11), 747; of the United States, The, Prof. G. M. Smith (*Review*), 201; Biological Problems of, Prof. F. E. Fritsch, 672; Biology, Problems of, Prof. F. E. Fritsch and others, 467; Research in New Zealand, D. F. Hobbs, 853
- Frogs and Toads : Handbook of, the Frogs and Toads of the United States and Canada, Anna Allen Wright and Prof. A. H. Wright (*Review*), 123
- Frost Injury on Forest Trees, Experimented Production and the Diagnosis of, W. R. Day and T. R. Peace, 293
- Froude, William, and Experimental Tanks, 111
- Fruits : Life-duration of, Drs. F. Kidd and C. West, 798; Respiration of, Dr. F. Kidd, 766
- Fuel Research, Sir Harry McGowan, 805
- Fundamentalism, A New, J. M. Henry (*Review*), 81
- Fundulus, Early Developing Stages of, Jane M. Oppenheimer, 912
- Fungi : Physiological Studies of : Prof. A. H. R. Buller; J. Ramsbottom, 291; J. Ramsbottom (*Review*), 80; Researches on, Prof. A. H. R. Buller. Vol. 5 (*Review*), 80
- Fungus and other Diseases of Crops, 1928-1932, Dr. G. H. Pethybridge, W. C. Moore and Dr. A. Smith, 424
- Funktionentafeln : mit Formeln und Kurven (Tables of Functions : with Formulae and Curves), Prof. E. Jahnke und Prof. F. Emde. Zweite Auflage (*Review*), 476
- Future, The Birth of the, R. Calder (*Review*), 195
- γ-Radiation from excited Xenon Nuclei, Detection of a, Elisabeth Kara-Michailova and H. Pettersson, 547
- Galactic : Rotation, Origin of the, Dr. G. Strömberg, 632; System, Dimensions of the, Dr. J. S. Plaskett and Dr. J. A. Pearce, 577
- Game Birds, Experimental Hand-rearing of, 930
- Gape-worm in Chickens, P. A. Clapham, 256
- Garden in the Veld, A. R. E. Boddam-Whetham (*Review*), 309
- Garton Foundation studentship in Social Sciences, award of the, to V. K. Ranga V. Rao, 189
- "Gas !" : The Story of the Special Brigade, Major-Gen. C. H. Foulkes (*Review*), 952; Circulating Pump, A Modification of the, Fazal-ud-Din and Sher Singh Mangat, 104; Manufacture of, edited by H. Hollings. Vol. 1 : Water Gas, Dr. R. H. Griffith, with a section on Temperature Measurement, H. C. Exell (*Review*), 619; Reactions, Cause of Changes in rate of some, Prof. M. W. Travers, R. V. Seddon and P. F. Gay, 662
- Gasentladungen, Physik der, Einführung in der, Prof. R. Seeliger. Zweite Auflage (*Review*), 123
- Gaseous Mixtures, Detonation Limits of some, P. Laffitte and J. Breton, 334
- Gases : and Ores during Iron Smelting, Interactions of, 312; Flame, Spectra and Latent Energy in, A. Eger-ton and A. R. Ubbelohde; Prof. W. T. David, 848, 854; Ionisation of, by Atom Beams, A. Rostagni, 626; Ignition Temperatures of, Dr. H. F. Coward, 742;

- Specific Heat of, at High Temperatures, Determination of the, by the Sound Velocity Method, C. G. Sherratt and E. Griffiths, 822; through Metals, Diffusion of, Dr. C. J. Smithells and C. E. Ransley, 814
- Gastric Secretion, Modes of Stimulation of the, Prof. B. P. Babkin, 1005, 1011
- Gastropods, American Fresh-water, Variation in, J. L. Bailey, Jr., Prof. R. Pearl and C. P. Winsor, 67
- Gasworks Practice, The New Modern. Being the third edition of "Modern Gasworks Practice", A. Meade. Vol. 1: Design and Construction of Gasworks, Carbonisation Plant, Mechanical Handling of Materials, A. Meade (*Review*), 400
- Gelatine, Flat Sheets of, Qualitative Chemical Observations in, Mlle. Suzanne Veil, 673
- Generalised Function Theory, V. Volterra, 293
- Genetic Evolutionary Processes, E. B. Babcock, 911
- Genital Tract of the Female, Effect of the Male Sex Hormone on the, Dr. S. Skowron, 627
- Geochemistry of Living Matter, B. P. Uvarov, 11
- Géodésie, *Traité de*, Capt. P. Tardi. Fasc. 1 et 2 (*Review*), 757
- Geography: Co-operative Research in, with an African example, Prof. A. G. Ogilvie, 368; Economic and Social, Profs. E. Huntington, F. E. Williams and S. van Valkenburg (*Review*), 987; in Relation to the Social Sciences, I. Bowman (*Review*), 894; Late Tudor and Early Stuart, 1583-1650: A Sequel to Tudor Geography, 1485-1583, Prof. E. G. R. Taylor (*Review*), 125; of Human Endeavour, Sir John Russell (*Review*), 987
- Geoid, Continental Undulations of the, R. A. Hirvonen, 221
- Geological: Society of London, election of Prof. C. J. Wiman and Prof. F. Slavik as foreign members, and Prof. P. E. Eskala, Prof. G. Stefanini and Prof. F. Roman as foreign correspondents, 878; Survey of Great Britain and the Museum of Practical Geology: Summary of Progress of the, 1931, Parts 1 and 2; 1932, Parts 1 and 2; (Summary of Progress) for the year 1933, Part 1, 129; Time, Measurement of, Miss Edith Kroupa, 530
- Geology: A Textbook of, Part 2: Historical Geology, Prof. C. Schuchert and Prof. C. O. Dunbar. Third edition (*Review*), 829; Historical: Prof. R. C. Moore (*Review*), 829; The Principles of, from the Regional point of view, Prof. R. M. Field (*Review*), 829; in Great Britain, 782; Museum of Practical, 129
- Geometrical Isomerism, Steric Hindrance and, Prof. P. Ramaswami Ayyar, 535
- Geometry: Analytic, Prof. F. S. Nowlan. Second edition (*Review*), 684; Analytical, Prof. V. Poor (*Review*), 616; Principles of, Prof. H. F. Baker. Vol. 6: Introduction to the Theory of Algebraic Surfaces and Higher Loci (*Review*), 437
- Geomorphologie, Prof. F. Machatschek. Zweite Auflage (*Review*), 555
- Geophysics, Applied, in the Search for Minerals, Prof. A. S. Eve and Prof. D. A. Keys. Second edition (*Review*), 618
- German: Association of Men of Science and Physicians: Forthcoming Meeting, 22; Ninety-third Meeting, 489; Nationalism, The New, and Education, Prof. I. L. Kandel, 469; Society of the History of Medicine, Natural Sciences and Technique, award of the Karl Sudhoff medal to Prof. T. Györy, 967; Universities, Reforms in, 505
- Germany: Long Heads and Broad Heads in, Prof. Kruse, 804; New, Road Construction in, Prof. K. Krüger, 247; Poland and, 245
- Glacier Survey, Recent, Dr. A. E. H. Tutton, 992
- Glaciologiques, *Études*, 1920-1930, Ministère de l'Agriculture: Direction des Eaux et du rural. Tome 7, P. Mougou, 992
- Glass: Antique, Iridescence of, M. Guillot, 191; Corrosion Figures of, J. Herbert, 471; Early, H. G. Beck, 384; Electrical Properties of, J. T. Littleton and G. W. Morey (*Review*), 236; Optical, Specification of, Chance Bros. & Co., Ltd., 425
- Glasshouse Plants, Researches on, Dr. W. F. Bewley, and others, 388
- Gliding: Performances, Recent, and their Meteorological Conditions, Sir Gilbert Walker, 347; Record, New, H. Dittmar, 176; State Help for, 19
- Gluten, Solubility of, Dr. W. H. Cook and R. C. Rose, 380
- Glutathione and Vitamin C in the Crystalline Lens, Everette I. Evans, 180; T. W. Birch and Dr. W. J. Dann, 383
- Gmelins Handbuch der anorganischen Chemie: Achte Auflage. System-Nummer 59: Eisen. Teil A, Lief. 5 (*Review*), 399; System-Nummer 8: Jod. Lief. 2 (*Review*), 440
- Gnetales, Systematic Position of the, the Matile Reaction and the, Prof. R. C. McLean and Miss Myfanwy Evans, 936, 938
- Gobies, Some American, I. Ginsburg, 67
- Gold: Coast, 'Little People' of the, M. J. Field, 1012; Mining, Early, in South America, 390
- Golden Eagle's Flight, Speed of a, Dr. F. F. Darling, 326
- Golgi Apparatus, Use of the Ultra-Centrifuge for Studying the, Dr. H. W. Beams, J. A. Muliyl and Prof. J. B. Gatenby, 810
- Göttingen Magnetic Observatory, 225
- Government Laboratory, Work of the, for year ended March 31, 1934, 599
- Governments, Future of, N. M. Butler, 694
- Grain, Embryos of, Outside the Seeds, Action of certain salts on the Germination of, G. Dragone-Testi, 983
- Grand Chaco, Periodic Destruction of the Fauna of the Rivers of the, by Variations of Salinity, J. Vellard, 39
- Graphical Representation, New Form of, Prof. H. T. H. Piaggio (*Review*), 476
- Graphs, Production of, W. A. Young; M. E. J. Gheury de Bray; A. F. Dufton, 528
- Graptolite Fauna in the Neighbourhood of Goni, Sardinia, M. Gortani, 711
- Grasses, Roots of, Anatomical Study of the, A. P. Goossens, 335
- Grasshoppers: Chromosome Division in, T. Ramachandra Rao, 702; Gull Destroy, F. Bradshaw, 566
- Grassland: and Forage Crops in Thuringia, Czechoslovakia and Hungary, 703; Research in Australia, 319; The Main Source of the Nation's True Wealth, Lord Bledisloe, 907
- Gratings, Aluminium Coating of, C. P. Butler and Prof. F. J. M. Stratton, 810
- Gravity Observations in Malaya, the Dutch Indies, Cambodia and Cochin China, P. Lejay, 470
- Great: Barrier Reef, Microplankton and Hydrography of the, Miss S. M. Marshall; A. P. Orr and F. S. Moorhouse, 636; Britain, Large Scale Plans of, 870
- Greek Geography, E. H. Warrington (*Review*), 617
- Greenkeeping Research, Board of, Report for 1933, 1003
- Green Krypton Line 5570, Hyperfine Structure of the, M. Romanova and A. Ferchmin, 191
- Greenland: Ice Sheet, Exploration of the, M. Lindsay, and others, 490; Meteorology of, S. T. A. Mirrlees, 704; North-East, Archaeology in, Dr. S. Richter, 779
- Green: Plant, The: and its Messages to Mankind, Sir Frederick Keeble, 688; as Agricultural Engineer, Sir Frederick Keeble (Thomas Hawksley lecture), 688; Sand of the Paris Region, Impoverishment of the Stratum of, P. Lemoine, R. Humery and R. Soyer, 75
- Gresham Chair of Physic, 581
- Grosshirnhemisphären, Vorlesungen über die Arbeit der, Prof. I. P. Pawlow. Autorisierte übersetzung aus dem Russischen von Prof. G. Volborth (*Review*), 792
- Growth: from the Viewpoint of Statistical Interpretation, H. C. Sherman and H. L. Campbell, 711; Hormone: Inhibition of the Development of Lateral Buds by, F. Skoog and K. V. Thimann, 824; of Plants, J. Bonner (5), 548; Motion of, N. C. Wetzel (8), 264
- Guinea Worm in China, H. F. Hsü and J. Y. C. Watt, 68
- (Gurwitsch) Rays, Mitogenetic, Physico-chemical Test for, Dr. M. Heinemann, 701
- Guttapercha, Structure of, Studied by Electron Rays, G. Bruni and G. Natta, 228

- Guy's Hospital Medical School, New Unit for Scientific Research Work in Clinical Medicine; Dr. R. T. Grant appointed director, 565
- Gypsies, Baptism and the, 902
- Gyromagnetic Measurements and their Significance, Dr. L. F. Bates, 50
- H-Rays, Photographic Detection of, Physical and Chemical Investigations on the, Marietta Blau and Hertha Wambacher, 392
- Habitat, Economy and Society: A Geographical Introduction to Ethnology, Prof. C. D. Forde (*Review*), 613
- Habits, Inheritance of: C. J. Bond; Prof. J. B. S. Haldane, 28; S. Maulik, 253
- Hæmptota pluvialis*, L. (Tabanidæ), Life-history and Structure of, A. E. Cameron, 226
- Hafelekar (2,300 metres), Wilson Chamber Studies on the Ultra-radiation on the, F. Rieder, 947
- Hair Colour of Mammals, Test for the possible effects of Visual Stimuli upon the, F. B. Sumner, 548
- Hall Effect, Supraconductivity and the, Dr. B. Lasarew, 139
- Halley at Greenwich, 746
- Halley's Comet, 545
- Halogen Compounds of Non-Metals, Structures of, Zappi and Cortelezzi, 386
- Hancock's Steam Carriages, 637
- Hannah Dairy Research Institute, Fifth Annual Report, 1003
- Harding, Karl Ludwig, 1775-1834, 74
- Harvey and Literature, Prof. D. F. Fraser-Harris, 95
- Hawaiian Oribatoidea, Some, A. P. Jacot, 464
- Haworthia cymbiformis*, Body of Oleaginous Appearance in the Epidermal Cells of the Leaves of, N. Soster, 639
- Headlight Beams in Fog, White and Coloured, Dr. W. S. Stiles, 768
- Health, Ministry of, Fifteenth Annual Report of the, 283
- Heat: Prof. J. M. Cork (*Review*), 8; A Textbook on, Dr. A. W. Barton (*Review*), 8; Flow during Surface Colour Formation, Dr. F. H. Constable, 100; (Matriculation Standard), R. W. Hutchinson (*Review*), 8; Nocturnal Radiation of, during the Polar Night 1932-33 on the Island of Jan Mayen, Measurements of the, H. Tollner and F. Kopf, 547; Power Engineering, Elements of, Prof. W. N. Barnard, Prof. F. O. Ellenwood and Dr. C. F. Hirshfeld. Part 2: Steam-generating Apparatus and Prime Movers, Fuels, Combustion and Heat Transmission. Part 3: Auxiliary Equipment, Plant Ensemble, Air Conditioning and Refrigeration (*Review*), 620; Studies in, N. M. Bligh (*Review*), 8
- 'Heavy': Acetylene, Vibration Spectra and Force Constants of, Dr. G. B. B. M. Sutherland, 775; Hydrogen: L. Farkas, 742; and Heavy Oxygen, W. H. Claussen and J. H. Hildebrand, and others, 501; Experiments with, A. and L. Farkas, 857; into Light Water, Diffusion of, W. J. C. Orr and Dr. D. W. Thomson, 776; Water: Alleged Influence of, on Mould Growth, Dr. R. Klar, 104; Alleged Stimulation of Moulds by Paraffin in: T. C. Barnes, 573; S. L. Meyer, 665; and Water of Crystallisation, Dr. J. Newton Friend, 463; be looked for from the Geochemical point of view? Should, W. Vernadsky, 787; Concentration of, by Spontaneous Evaporation, E. D. Hughes, Prof. C. K. Ingold and Dr. C. L. Wilson, 142; (D<sub>2</sub>O), Velocity in, of the Ester Hydrolysis Catalysed by Hydrogen Ions, K. Schwarz, 156; Gaseous, Refractive Index of, C. Cuthbertson, 251; H<sub>2</sub>O, Separating, from Ordinary Water H<sub>2</sub>O, G. Bruni and M. Strada, 471; in Chemistry, Prof. M. Polanyi, 843; in the Animal Body, E. J. McDougall, Prof. F. Verzár, H. Erlenmeyer and H. Gaertner, 1006, 1011; Ionic Product of, B. Topley and W. F. K. Wynne-Jones, 574; Micromethod for the Determination of, P. Goldfinger and L. Scheepers, 116; Physical and Chemical Properties of, 504; Some Experiments on, Prof. H. Erlenmeyer and H. Gärtner, 327
- Hedendaagse Natuurkunde, Grondbeginselen van de, Dr. J. A. Prins (*Review*), 164
- Helium Lines in Spectra of B Stars, Analysis of Profiles of, Prof. J. S. Foster and Dr. A. V. Douglas, 417
- Hemp, Sex in, Diagnosis of, O. Walther and M. Lilienstern, 155
- Hens, Broodiness in, Hormonal Interruption of, Dr. K. Wodzicki, 383
- Heredity: and Disease in Man, Dr. L. S. Penrose, 630; and the Social Problem Group, E. J. Lidbetter. Vol. 1 (*Review*), 917
- Hermit Crab, Evolution of the, Prof. C. Pérez, 106 (*Heterodera schachtii*), Potato Eelworm, Hatching Experiments on the, J. Carroll and E. McMahon, 66
- Hg(NH<sub>3</sub>)<sub>2</sub>Cl<sub>2</sub>, The Crystal Structure of, Dr. J. M. Bijvoet and Miss C. H. MacGillavry, 849
- High: Gods in North America: Upton Lectures in Religion, Manchester College, Oxford, 1932, Prof. W. Schmidt (*Review*), 305; Frequency, Field of, Investigations in the, F. Pirrone, 192
- Highway Engineering: A Textbook for students of Civil Engineering, J. H. Bateman. Second edition (*Review*), 754
- Hindu-Arabic Numerals into Western Europe, Introduction of, H. P. Vowles, 1008
- Histology: Essentials of, Descriptive and Practical, for the use of students, Sir E. Sharpey-Schafer. Thirteenth edition, edited by Dr. H. M. Carleton (*Review*), 648
- History and Medicine (*Review*), 394
- Histozyeme, Mechanism of the Action of, F. P. Mazza and L. Pannain, 40
- Hive-Bees: do not necessarily Sacrifice their Lives when they Sting, Dr. J. G. Myers, 290; Sting of, Z. B. H. Garrett, 452
- Holism in International Affairs, Gen. J. C. Smuts, 1001
- Holland's Oxy-Hydrogen Microscope, 786
- Homogeneous Conductor, Distribution of the Continuous Current in a, Subjected to the Influence of a Permanent Magnetic Field, L. Lombardi and E. Bottani (2), 823
- Hong Kong, Littoral Fauna of, Prof. Mörtensen, and others, 328
- Hooton Pagnell: the Agricultural Evolution of a Yorkshire Village, Dr. A. G. Ruston and D. Witney (*Review*), 887
- Horizon, Thermal Radiation and Restriction of, F. Lauscher, 948
- Hornbills, Breeding Habits of, R. E. Moreau, 899
- Horsetails, Transpiration Current in, Prof. R. C. McLean, 66
- Howard's Quicksilver Boiler, 190
- Human: Biology and Politics, Prof. J. B. S. Haldane (Norman Lockyer lecture), 865; Body, Elimination of Water from the, Prof. G. Hevesy and E. Hofer, 879
- Huxley, Prof. E. W. MacBride (*Review*), 124
- Hydraulic Power Generation, Elements of, A. M. Greene, Jr. (*Review*), 479
- Hydraulics: Applied, A Textbook of, Prof. H. Addison (*Review*), 441; Studies on Reduced Models in, Use of Different Vertical and Horizontal Scales in, C. Camichel, E. Fischer and L. Escande, 673
- Hydrazines, Oxidation of, by Iodine, M. Gonze, 787
- Hydrocarbons, Heats of Combustion of, F. D. Rossini, 541
- Hydro-: and Aeromechanics: Applied, based on lectures by Prof. L. Prandtl, Dr. O. G. Tietjens, translated by Prof. J. P. Den Hartog (*Review*), 398; Fundamentals of, based on lectures by Prof. L. Prandtl, Dr. O. G. Tietjens, translated by Dr. L. Rosenhead (*Review*), 398; -Electric Development in Great Britain, A. S. Valentine and E. M. Bergstrom, 1016
- Hydrogen: Arsenide, Magnetic Rotatory Power of, and of Hydrogen Phosphide, R. de Malleman and P. Gabiano, 673; Atomic Weight of, Isotopic Ratio of Oxygen and the, H. Muckenthaler, 977; Catalytic Interchange of, between Water and Ethylene and between Water and Benzene, Dr. J. Horiuti and Prof. M. Polanyi, 377; Heavy: L. Farkas, 742; and Heavy

- Water, H. S. Taylor, 388; Rideal, Hughes, Yudkin and Kemp, 389; Experiments with: A. Farkas, L. Farkas, and P. Harteck, 32; A. and L. Farkas, 857; in a Vacuum, Formation of, V. Posejpal, 390; into Neutron possible? Is the Transmutation of, D. D. Ivanenko, 431; Isotopes, Interferometer Patterns of the, Prof. J. K. Robertson, 378; Peroxide, Applicability of, to the Treatment of Seed, J. Kisser and L. Portheim, 547
- Hydrogenation of Coal in Germany, F. Rosendahl, 504
- Hygrometric State round an Otto Wolff Standard Resistance of Lacquered wire, Attainment of a 50 per cent, exposed to Variations due to Inequalities of Atmospheric Moisture, M. Romanowski, 410
- Hygroscopic Materials, Carbon-coated, Humidity-resistance relations in, Dr. L. A. Welo, 936, 938
- Hypnosis, Sleep and, Dr. W. Brown; R. J. Bartlett, 980
- Hypotrochanteric Fossa in the Primate Femur, Dr. A. Hrdlička, 539
- Ice: Ordinary and 'Heavy', Cell Dimensions of, H. D. Megaw, 900, 901; -Cap of Polar Seas, Vibrations of the, I. Fakidov, 536
- Iceland and the Faroes, The Flora of, C. H. Ostenfeld and J. Grøntved (*Review*), 308
- Ichthyosaurus*, Thomas Hawkins's, 786
- Idiacanthus fasciola*, Life-history of, Dr. W. Beebe, 815
- Immunity, An Outline of, Prof. W. W. C. Topley (*Review*), 752
- Imperial: Academy of Sciences, Russia [1834], 430; Agricultural Bureaux, Fourth Annual Report, 877; Institute: Annual Report, 248; Sir Harry Lindsay appointed director of the, 531; Standard Yard, The, 185
- Inchkeith, Geology of, L. M. Davies, and others, 862
- Index Kewensis Plantarum Phanerogamarum, Supplementum, Anni MDCCCXXXVI usque ad finem Anni MDCCCXXXIX (*Review*), 919
- India: Ancient, Social Life in, Kalipada Mitra, 666; Caste in, Position of, 70; Education in, 1927-32, Sir G. Anderson, 297; Irrigation in, 1931-32, 967; Meteorology in: 763; J. H. Field, 491; Research and Industry in, 789; Southern, Metal Images from, T. B. Nayar, 575
- Indian: Association for the Cultivation of Science, election of officers, 137; Coleoptera, Immature Stages of (*Scolytidae*) (15), J. C. M. Gardner, 740; Iron, Ancient, S. C. Britton, 238; 277; Mathematical Society, The, 567; Ocean, The Ridge in the, between Chagos Is. and Socotra, Dr. Á. V. Tåning; Dr. H. Pettersson, 536; Oil Wells, Gas from, G. P. Kane, K. R. Krishnaswami and H. E. Watson, 108; South-west Monsoon, on the Physical Characteristics of Fronts during the, N. K. Sur, 764; Research Expedition, 176; South-west Monsoon, The, and the Structure of Depressions associated with it, K. R. Ramanathan and K. P. Ramakrishnan, 763
- Indium, Bibliography of, Potratz and Ekeley, 329
- Indo-Iranian Borderlands, Prehistory of, Sir Aurel Stein (*Huxley memorial lecture*), 666
- Indones, F. Pirrone, 40
- Industrial: and Agricultural Statistics, 245; and Social Interactions, 549; Civilisation, The Human Problems of an, Prof. E. Mayo (*Review*), 201; 549; Conditions in certain Depressed Areas, Reports of Investigations into the, 915; Health Research Board, Fourteenth Annual Report, 527; Information in Great Britain, O. W. Roskill, 542; Psychology; and its Social Significance, 985; National Institute of, Annual Report, 966; Recruitment and Leadership, some Problems of, R. Brightman, 860; Relations, Experimental Method in, M. H. Dubreuil, and others, 707
- Industries in Research, Co-operation of, 509
- Industry: Planning of, and Labour Supply, 915; Safety in, 244
- Infant Self-Help, Prof. H. E. Armstrong, 291
- Inheritance and Mental Deficiency, Dr. L. S. Penrose; D. Kennedy-Fraser, 1017
- Inland Water: Supply: A. Chorlton, 326; 641; Survey: The Government and, Vice-Admiral Sir Percy Douglas, 219; Prof. W. S. Boulton, 777; A. Chorlton, 728; Capt. W. N. McClean, 814; 913
- Insect: Chrysalis, Processes of Regeneration and their Limits in Experiments on the Centrifugation of the, C. Guareschi, 983; Immigration in Great Britain, Dr. C. B. Williams, 186; Mortality, Relative Toxicity at High Percentages of, Prof. H. H. Shepard, 323
- Insects, British, Generic Names of, 456
- Inshore: Fisheries, Preservation of, 296; Trawl Fisheries of Dorset and Devon, H. J. Buchanan-Wollaston, 296
- Instability, A Theorem on, N. Chetajev, 191
- Insulating Materials, Electrical Properties of, Prof. W. M. Thornton, 692
- Insulin: Action of Phenyl *Isocyanate* on, Dr. S. J. Hopkins and Dr. A. Wormald, 290; -Boots, Boots Pure Drug Co., Ltd., 249; Commercial, Burroughs Wellcome & Co., 733; in Peripheral Metabolism, Rôle of, Prof. N. B. Laughton and Prof. A. B. Macallum, 325; Limit of Resistance of the Pigeon to, D. Gigante, 823
- Intellectual Liberty, Science and, Prof. R. Woltereck, 27
- Interference Apparatus, New, Q. Majorana, 638
- Interferometry of Hirsch, A. Liengme and Mlle. Piquet, 639
- Internal Combustion: Engine, Valve Conditions in the, 259; Motors, Working Characteristics of, M. Serruys, 1019
- International: Academy of the History of Science, Q. Vetter elected president of the 1937 Congress, 671; Broadcasting Union, 19; Conference on Physics, 560; Congress: of Agriculture, Sixteenth, 71; on Theoretical Physics at Kharkov, 109; Council of Scientific Unions. Meeting at Brussels, 89; Federation of Eugenic Organisations, Eleventh Assembly of the, 426; Fellowships for Research, A List of. Second edition, 456; Union of Pure and Applied Physics, Prof. N. Bohr elected president, 560; Universities Conference at Oxford, 70; Prof. R. C. McLean appointed secretary of an International Conference Committee of, 71; Physiological Congress, Fifteenth, 415; Quarantine Directory (giving information on the equipment and organisation of the Public Health Services of the ports of different countries), (*Review*), 341; Scientific Radio Union, Fifth General Assembly; Prof. E. V. Appleton elected president, 502
- Interstellar Matter, E. G. Williams, 108
- Intra-Atomic Quantity, The, R. A. Watters, 877
- Invariant Theory of the Correlation, Prof. H. W. Turnbull, 862
- Inventions as a Stimulus to Economic Recovery, Sir James Henderson, 525
- Invertebrates and Unicellular Algæ, Origin and Nature of the association between, Prof. C. M. Yonge, 12
- Iodine: and Iodides at Ultra-pressures, Direct Oxidation of, J. Basset and M. Dodé, 747; Complex in Organic Solution, Existence of a Frequent Type of, A. Chretien and P. Laurent, 710; Liquid, Density of, T. Nayder, 191; Nuclear Spin of, Dr. S. Tolansky, 851, 854
- Ionic: Lattices, Fibrous Structure in, G. R. Levi and M. Tabet (2), 639; Product of Heavy Water, B. Topley and W. F. K. Wynne-Jones, 574
- Ionium, Degradation Constant of, Direct Determination of the, from the Number of  $\alpha$ -particles Emitted, F. Hergnegger, 547
- Ionosphere, Structure of the, Prof. J. Hollingworth, 462
- Ionospheric Investigations, T. R. Gilliland, 379
- Ions in Dielectric Liquids, Mobility of the, I. Adamczewski, 299
- Iraq: Archæology in, Dr. C. L. Woolley, 999; Oil reaches Haifa, 600
- Ireland: Archæological Investigations in, Dr. O'Neill Hencken, 928; Flora of, Dr. R. L. Praeger, 910; Northern, Later Stone Age in, C. B. Whelan, 702; Quaternary Research in, 317; Trees of, H. M. Fitzpatrick, 624

- Irish: Fungi New to the British Isles, A. E. Muskett, H. Cairns and E. N. Carrothers, 856; Hemiptera (Heteroptera, Cicadina), J. N. Halbert, 910; Radium Committee, Report for 1933, 531
- Iron: Age: Site, Kilpauk, Madras, M. D. Raghavan and T. G. Aravamuthan, 939; Finds in Berkshire, 244; Ancient Indian, S. C. Britton, 238, 277; and Steel Institute: Co-operation with Local Technical Societies, 732; Sir Harold Carpenter proposed for election as president; acceptance by the King of the Belgians of nomination as an honorary member, 415; and Tungsten, The Alloys of, J. L. Gregg (*Review*), 620; Shipbuilding, 582; Smelting, Interactions of Gases and Ores during, 312
- Isaria*, the Genus, T. Petch, 1013
- Isotopes: Dr. J. Mattauca, 466; Elements and, Dr. F. W. Aston, 731
- J-type, the, and the S-type among Mathematicians, Prof. G. H. Hardy, 250
- Jaina Temples, T. N. Ramachandran, 106
- Japan: Society of Chemical Industry, Dr. M. Mashino awarded the medal for "special merit in research", 97; Submarine Terraces around, H. Yabe and R. Tayama, 976
- Japanese: Mathematical Journals, 624; Typhoon of September 21, 489
- Jeans, Sir James, The Philosophy of: 337; Dr. H. Jeffreys; H. D., 499; 629; Dr. N. R. Campbell, 571
- Jenner, Edward, The Life of, M.D., F.R.S., Naturalist and Discoverer of Vaccination, Dr. F. D. Drewitt. Second edition (*Review*), 394
- Jerusalem, Hebrew University of, Friends of the, Annual Meeting, 113
- "Johannes Schmidt" Ridge in the Indian Ocean, The, Dr. H. Pettersson, 29
- John Randolph*, S.S., Launch of, 38
- Johnstone, James, Memorial Volume (*Review*), 753
- Junior: Institution of Engineers, Jubilee of the, 36; Instruction Centres, Function and Operation of, V. A. Bell, 72
- Kahoolawe, Hawaii, Archaeology of, 500
- Kent, Education in, 1928-1933, E. Salter Davies, 260
- Kent's Cavern, Torquay, 500
- Kenya: Forests of, 150; Natives of, Mental Capacity of the, Dr. H. L. Gordon, 585
- Keratin (1), the Lead Sulphide Reaction, E. Beutel and A. Kutzelnigg, 155
- Kharga Oasis, Finds in the, 135
- Kidston Collection of Fossil Plant Slides, Notes on the, Mary G. Calder (5), 115
- Kimberlite, Minerals of, Prof. S. J. Shand, 465
- Kinetic Measurements with the Pulfrich-Stufen-Photometer, Dr. A. Wassermann, 101
- Knowledge, The Agony of, Prof. H. E. Armstrong (*Review*), 195
- Korea, Ordovician Faunas of, T. Kobayashi, 1014
- Kosmologischen Probleme der Physik, Die, Prof. A. Haas (*Review*), 125
- Kristallchemie der anorganischen Verbindungen, M. C. Neuburger (*Review*), 827
- Laboratory: The, its Place in the Modern World, D. S. Murray (*Review*), 889
- Labour: and Leisure, Social Aspects of, 265; Supply, Planning of Industry and, 915
- L Absorption Spectra in the Very Soft X-Ray Region, V. H. Sanner, 100
- Lavorotatory Dibenzoylglycerine Aldehyde, Action of Phenylmagnesium Bromide on, M. Tiffeneau and Mlle. I. Neuberg, 227
- Lagone: a Tributary of Lake Tchad, by the Niger, Possibility of the Capture of the, J. Tilho, 822; Two Sketches Concerning the Final Capture of the, and Its Consequences for the Tchad Basin, J. Tilho, 946
- Lambs, Drought and Disease in, 375
- Lamellibranchs: Cruciform Muscle of, A. Graham, 226; 500
- Land Utilisation Survey, Third Annual Report, 248
- Länderkunde, Vergleichende, A. Hettner, Band 1: Die Erde, Land und Meer, Bau und Hauptformen des Festlandes. Band 2: Die Landoberfläche (*Review*), 479
- Langley, Samuel Pierpont (1834-1906), 240
- Language Distribution of Scientific Periodicals, Sir Charles Sherrington, 625
- Lapis Lazuli, Specific Gravity of, B. W. Anderson and C. J. Payne, 627
- Laundrywork, Modern Home, E. Henney and J. D. Byett (*Review*), 757
- Lawns: Experiments on, W. M. Findlay, 576; Research on, 59
- Lea Valley Mesoliths, H. Warren, J. G. D. Clarke, W. A. MacFadyen and H. and M. E. Godwin, 423
- Lead: Acetochloride, E. Grillot, 911; Oxychlorides, Laurionite, Paralaurionite and Fiedlerite, Form Relations of the, C. Palache, 114
- Least Squares Solutions, Accuracy of, T. E. Sterne, 421
- (*Lecanocrinus*), New Species of a Crinoid, and a Cephalopod (*Ophidioceras*), from the Silurian of Yass, F. Chapman, 675
- Leechbook: A, or Collection of Medical Recipes of the Fifteenth Century. Transcribed and edited with an Introduction, Notes and Appendix by W. R. Dawson (*Review*), 270
- Leeds: and Selby Railway, Opening of, [1834], 470; University: E. R. Flint elected professor of Clinical Surgery; H. W. Thompson appointed Advisory Entomologist, 113; Gift by Mrs. Bolton; K. Mitchell appointed assistant lecturer in Applied Mathematics, 152; Annual Report for 1932-33, 189; Dr. L. H. Stickland appointed Biochemist in the Cancer Research Laboratories, 672; Report of Department of Pathology and Bacteriology for 1933, 696
- Legendre Functions, Some Integrals, with Respect to their Degrees, of Associated, Prof. T. M. MacRobert, 226
- Legume Symbiosis, Carbohydrate Supply in, Importance of, Dr. F. E. Allison, 144
- Leicester Libraries, Guide to Works Dealing with Science in the, 176
- Leipzig International Industries Fair, 1935, 1004
- Leisure, Labour and, Social Aspects of, 265
- L'Électron Magnétique (Théorie de Dirac), Prof. L. de Broglie (*Review*), 757
- Lepidotrigla* and *Peristedion*, South African Species of the Triglid Genera: J. L. B. Smith, 582
- Lexicography, A Monument of, Dr. E. J. Holmyard (*Review*), 603
- Liberty, the Future of, Gen. J. C. Smuts, 654
- Lichens Found in Ireland, Chemical Constituents of, (1), T. J. Nolan, J. Keane, M. Cassidy and N. E. Dolan, 154; (2), T. J. Nolan, 154
- Liesegang Phenomenon, Mechanism of the, E. C. Baughan, 778
- Life: Activities of, and the Second Law of Thermodynamics, Prof. F. G. Donnan and E. A. Guggenheim, 255; in the Making, A. F. Guttmacher (*Review*), 615; Modern, The Scientific Basis of, 41; Philosophy of, F. S. Marvin (*Review*), 7
- Light: Absorption of, Chemical Reactivity and, Prof. N. R. Dhar and P. N. Bhargava, 848, 854; Development of Theories of, Prof. H. M. Macdonald, 366; in Gases, Absorption of, Prof. R. W. Ditchburn and Dr. H. J. J. Braddick, 935, 938; Propagation of, Mathematical Aspects of the, Prof. H. M. Macdonald, 482; Velocity of, Prof. R. T. Birge, 771
- Lighting, Modern Street, C. C. Paterson, 957
- Lightning: and Aircraft, Dr. G. C. Simpson (*Review*), 618; and High-Voltage Power Transmission Lines, E. F. Rendell and H. D. Gaff, 223; Discharge, Development of the, Dr. B. F. J. Schonland, H. Collens and Dr. D. J. Malan, 177; Flash, Current in a, Measurement of, Dr. H. Gruenewald and others, 541; as Source of an Atmospheric, Prof. E. V. Appleton and F. W. Chapman, 968, 974

- Lime, Influence of, on the Growth of Red Clover in an Acid Soil, M. J. Gorman and D. Slattery, 334
- Limnaea stagnalis*, Photic reactions of, H. Liche, 674
- Linnean Society of London, Annual Dinner, 656
- Lions: and Their Cubs (*Review*), 755; Wild and Friendly, E. F. V. Wells (*Review*), 755
- Lipolysis as a Source of Mitogenetic Radiation, A. D. Braun, 536
- Liquid Dielectrics, Dr. A. Gemant. English translation by V. Karapetoff (*Review*), 441
- Liquids: Dielectric Constant of, Influence of the Magnetic Field on the, A. Piekara and M. Schérer, 862; Magnetisation Coefficients and the Magnetic Susceptibilities of, a New Method of Absolute Measurement of the, G. Dupouy and C. Haenny, 822; Theory of, Dr. T. S. Wheeler, 667
- Lister Institute of Preventive Medicine, Fortieth Annual Report, 456
- Lithium and Cadmium, Alloys of, A. Baroni, 471
- Liver Rot and the Drought, 175
- Liverpool: and the Atlantic Ferry, P. Austin, 20; Geological Society, Seventy-fifth Anniversary, 966; University, impending resignation of Prof. L. R. Wilberforce; Dr. A. M. Blackman appointed Brunner professor of Egyptology, Prof. D. B. Blacklock professor of Tropical Hygiene, and Dr. T. Southwell lecturer in Parasitology; gift by H. L. Cohen, 113
- Lloyd's Register, Centenary of, 693
- Load-Dispatcher, The, Dr. Sleichner, 453
- Lobster, The, *Enoplometopus occidentalis*, Randall, in South Africa, K. H. Barnard, 665
- Local Colour: a Landscape Analysis for Sightseers, E. Vale (*Review*), 894
- Loch Ness "Monster", 242; Discussion on the, 765
- Locomotive Testing Station at Vitry-sur-Seine, H. N. Gresley, 526
- Locust Conference: Third International, B. P. Uvarov, 484; Proceedings of the, 876; Red-winged, Phases of the, A. P. G. Michelmores, and W. Allan, 30
- Locusts, Phylogenesis of the Stridulating Organ of, D. F. Zenner, 460
- Log Cabin to Royal Observatory, From, Prof. A. Ferguson, 520
- Logic in Practice, Prof. L. Susan Stebbing (*Review*), 344
- London: Clay Flora, The, Mrs. Eleanor Mary Reid and Miss Marjorie Elizabeth Jane Chandler; Prof. A. C. Seward (*Review*), 6; Hospital, Researches during 1933, 22; School of Hygiene and Tropical Medicine, conferment of title of Reader in Industrial Physiology on G. P. Crowden, 861; Dr. K. Mellanby appointed Wandsworth scholar at the, 733; University: Grants from the Kent County Council, and the Butchers Company, 37; Prof. H. E. Watson appointed Ramsay Memorial professor of Chemical Engineering at University College, Dr. A. B. Appleton professor of Anatomy at St. Thomas's Hospital Medical School, Dr. S. P. Bedson Goldsmith's Company's professor of Bacteriology at London Hospital Medical School, Prof. F. R. Fraser professor of Medicine at the British Postgraduate Medical School, Dr. J. Young professor of Obstetrics and Gynaecology at the British Postgraduate Medical School, and Prof. E. H. Kettle professor of Pathology at the British Postgraduate Medical School; title of emeritus professor conferred on Prof. W. Bulloch and on Prof. C. G. Seligman and that of assistant professor on Dr. A. Ferguson, 113; offer by the Carnegie Corporation of New York; Prof. J. H. Gaddum appointed professor of Pharmacology at University College; Dr. J. R. Marrack professor of Chemical Pathology at London Hospital Medical College; Dr. R. W. Firth reader in Anthropology at the London School of Economics; Dr. R. E. M. Wheeler honorary director of the Institute of Archaeology, 152; award of doctorates, 260; 297; Grants from the Surrey County Council and the Hertfordshire County Council; donation from the Turners Company, 672; Dr. L. J. Witts appointed professor of Medicine at St. Bartholomew's Hospital Medical College; Prof. G. Hadfield professor of Pathology at St. Bartholomew's Hospital Medical College; A. A. Miles reader in Bacteriology at the British Postgraduate Medical School; Dr. R. S. Aitken reader in Medicine at the British Postgraduate Medical School; Dr. J. C. Moir reader in Obstetrics and Gynaecology at the British Postgraduate Medical School; Dr. E. J. King reader in Pathological Chemistry at the British Postgraduate Medical School, 745; L. Rogers reader in Surgery at the British Postgraduate Medical School, 746; Grant from the Essex County Council; Donation from the Tallow Chandlers Company, 821; Conferment of title of emeritus professor on Prof. E. G. Coker; Prof. A. E. Jolliffe and N. Ashbridge appointed fellows of King's College, 1018
- Longevity and Eugenics, Problems of, (*Review*), 886
- Long-Wave Transmission in Summer, Difficulty of, Dr. S. C. Bagehi, 701
- Lorentz's Collected Papers (*Review*), 514
- Loud Speakers: Theory, Performance, Testing and Design, Dr. N. W. McLachlan (*Review*), 119
- Lucas, Keith (*Review*), 475
- Lucimetric Index, Measurement of the, of a given place by a Helio-chronometer, Bordier, 39
- Lucknow, University of, Botanical Work in the, 331
- Luminescence excited by Rolling Mercury in a Glass Bulb Containing Impure Neon under Low Pressure, G. Déjardin and Mlle. R. Schwegler, 982
- Lusakite, a Cobalt-bearing Silicate from Northern Rhodesia, A. C. Skerl and F. A. Bannister, 114
- Luxor, The Obelisk of, 73
- Macrolepidoptera and Their Parasites, J. V. Schaffner and C. L. Griswold, 1013
- Madder, A New Glycoside from, R. Hill, 628
- Madras Fisheries, Report for 1932-33, Dr. B. Sundara Raj, 575
- Magic, Rare Books on, 927
- Magnesium: Alloys, Oxidation of, at a High Temperature, R. Delavault, 116; Sulphate, Magnetic Susceptibility of some Hydrates of, and of Some Salts of the Magnesium Series, E. Duchemin, 638
- Magnetic: Field: Nature of a, Prof. W. Cramp, 139; Variable, Paramagnetic Rotation in a, G. Zanotelli, 639; Materials at Radio Frequencies, F. M. Colebrook, 428; Viscosity, Anomalous Case of, A. V. Mitkevich, 1020; Phenomenon of, A. V. Mitkevich, 191
- 'Magneto-Electric' Spark, the, 261
- Magnetron Oscillations: E. C. S. Megaw, 324; of a New Type, Dr. K. Posthumus, 179; 699
- Magnus Phenomenon, Modifications of the, Determined by the Structure of the Wind, A. Lefay, 390
- Maiden Castle: Excavations at, 244; Dr. R. E. M. Wheeler, 353
- Maison de la Chimie, Paris, opening of the, 600
- Male Sex Hormone: Prof. L. Ruzicka and others, 563; Effect of the, on the Genital Tract of the Female, Dr. S. Skowron, 627
- Malekula: a Vanishing People in the New Hebrides, A. B. Deacon. Edited by Camilla H. Wedgwood (*Review*), 396
- Mallomonas*, the Genus, Dr. W. Conrad, 975
- Malthus, Death of, December 29, 1934, 981
- Mammalogy, Economic, J. Henderson and E. L. Craig (*Review*), 614
- Man: Early Forerunners of, a Morphological Study of the Evolutionary Origin of the Primates, Prof. W. E. LeGros Clark (*Review*), 161; in the Nile Valley, 165; Experiments on, Prof. J. Barcroft (Stephen Paget Memorial lecture), 456; in America, Origin of (*Review*) 756; or Ape? Dr. P. Alsborg, 702; Science of, The Man of Science and the, Prof. J. L. Myres, 17; Synthetic Study of, 193
- Management, Training for, 414
- Manchester University: F. W. Priestley appointed lecturer in Veterinary Bacteriology, 708; Dr. R. W. Fairbrother lecturer in Bacteriology, Dr. J. C. Kerrin assistant

- director of the Routine Section of the Department of Bacteriology and Preventive Medicine, D. T. Robinson assistant lecturer in Bacteriology, and I. A. Cathie and J. Dawson demonstrators in Pathology, 709
- Mandrake, The Mystic, C. J. S. Thompson (*Review*), 891
- Mangaia, Social Grades in, Dr. P. Buck (Te Rangi Hiroa), 779
- Manganese: Absorption of, by Plants, C. Olsen, 465; Deficiency of Plants, Relationship of Soils to, G. W. Leeper, 972, 974, in Western Siberia, Geochemistry of, P. Lebedev, 639; Sulphate and its Hydrates, X-Ray Spectra of, F. Hammel, 430
- Mangarevan Expedition of the Bernice P. Bishop Museum, 876
- Manitoba, Mosasaurian Skeletons from, 318
- Man's Appendages, Ontogeny and Phylogeny of, C. B. Davenport, 548; Family Tree, The Construction of, Sir Arthur Keith (*Review*), 124; Line of Ascent (*Review*), 716; Place among the Anthropoids; three lectures on the Evolution of Man from the Lower Vertebrates, Prof. W. K. Gregory (*Review*), 716
- Map Projections, Dr. G. S. Adams, 68
- Maps and Survey, A. R. Hinks. Third edition (*Review*), 307
- Marconi's Wireless Pilot, Commdr. E. C. Shankland, 387
- Marine Animals, Distribution of, and the History of the Continents, Prof. J. Versluys, 706
- "Marmite," 623; Vitamin B<sub>1</sub> Content, A. R. Keast, 696; Marmite Food Extract Co., Ltd., 770
- Marsupial: Saber-tooth, a New, from the Pliocene of Argentina, and its Relationships to other South American Predacious Marsupials, Dr. E. S. Riggs, 762; Sabre-toothed Tiger from South America, A, 762
- Materia Medica, Progress in, C. H. Hampshire, 133
- Maternal Mortality, 965
- Mathematical: Functions, Higher, Tables of the, Computed and Compiled under the Direction of H. T. Davis. Vol. 1 (*Review*), 272; Tracts, French, 375
- Mathematics: History of, Outline of the, Prof. R. C. Archibald, Second edition, 902; Pure, An Elementary Treatise on, N. R. C. Dockeray (*Review*), 720
- Matlockite (PbFCl), Crystal Structure and Optical Properties of, F. A. Bannister, 114
- Matter: and its Architecture, Prof. P. Debye (*Review*), 303; Living, Geochemistry of, B. P. Uvarov, 11; Structure of (*Review*), 478
- Maudslay, Sons and Field and the Royal Navy, Eng.-Capt. E. C. Smith, 36
- Mäule Reaction, the, and the Systematic Position of the Gnetales, Prof. R. C. McLean and Miss Myfanwy Evans, 936, 938
- Meare Lake Village, Excavations of, 316
- Mechanics, Applied, International Congress for, 151
- Mechanics, Applied, Journal of*, forthcoming, 931
- Mechanisation in Industry, C. H. Bailey, 999
- Meconopsis*, the Genus, 31
- Medical: Library, How to Use a, L. T. Morton, 493; Practice, Future Changes in, Prof. A. J. Clark, 133; Research Council, Marquess of Linlithgow appointed a member of the, 493; Prof. A. J. Clark and Prof. J. C. G. Ledingham appointed members of the, 531; Industrial Health Research Board of the, F. J. Marquis and Prof. W. W. Jameson appointed members of the, 733
- Medicine: Congress, History of, 319; History and (*Review*), 394; in Italy, The Renaissance of, Prof. A. Castiglioni (Hideyo Noguchi lectures), (*Review*), 891; Preventive, The Rise of, Sir George Newman (*Review*), 394
- Mediterranean Flora, Northward Extension of, Prof. F. E. Weiss, 667
- Megaceros* in historical time, A. Bachofen, 547
- Melanesia, Secret Societies in (*Review*), 396
- Melbourne University, R. E. Priestley appointed Vice-Chancellor, 207
- Melchett Medal of the Institute of Fuel, presentation of the, to Dr. F. Bergius, 770
- Mellon Institute of Industrial Research, Dr. R. N. Wenzel appointed industrial fellow in the, 696
- Memoirs in Miniature: a Volume of Random Reminiscences, Dr. G. C. Williamson (*Review*), 515
- Mendeloeff Centenary and Scientific Progress in the U.S.S.R., 799; Periodic Law, Dr. G. Rudorf, 176
- Mendelian Equations, properties of, A. Serebrovskij, 263
- Menispermaceæ, Chromosome Numbers in, Prof. A. C. Joshi, 29
- Mercantile Marine Officers, Training of, 657
- Mercapto or Methyl-mercapto group, influence of the position of the, on the Colour of the Monosubstituted  $\alpha$ -naphtholazo Dyes, E. Jusa and G. Breuer, 156
- Mercuric Sulphide, Absorption Spectrum of, Prof. P. K. Sen-Gupta, 498
- Mercury: Collecting Spilled, Dr. C. V. Boys, 29; Ions, Fast, and the Excitation of X-Rays, D. H. Sloan and W. M. Coates, 941; Vapour, fluorescence of the Bands of, Re-emission in the, Mlle. A. Faterson, 299
- Mersey Road Tunnel, The, 88
- Merseyside, The Social Survey of, Edited by D. Caradog Jones. 3 Vols. (*Review*), 342
- Mesitylenes, Substituted, Dipole Moments of, F. Brown, J. M. A. de Bruyne and P. Gross, 185
- Metal Mirrors, Evaporated, R. C. Williams, 329
- Metallic State, A Magnetic Study of the, and the Fermi-Dirac Statistics, S. Freed and H. G. Thode, 774
- Metalochloroforms, Raman Spectra of the, in Relation with their Structure, H. Volkringer, A. Tchakirian, and Mme. Marie Freymann, 431
- Metallography, Practical Microscopical, Dr. R. H. Greaves and H. Wrighton. Second edition (*Review*), 513
- Metallurgical Analysis by the Spectrograph, D. M. Smith (*Review*), 199
- Metallurgy: and Foundry Practice (*Review*), 513; for Engineers, Elementary, G. F. C. Gordon (*Review*), 513
- Metals: and Alloys, Thermal and Electrical Conductivity of, R. W. Powell, 75; at a Distance, Biological Action of, G. A. Nadson and E. A. Stern, 335; V. Rivera, 392
- Metals: Bearing, D. J. Macnaughtan and others, 671; Crystallisation of, from Sparse Assemblages, Prof. E. N. da C. Andrade and J. G. Martindale, 321; Diffusion of Gases through, Dr. C. J. Smithells and C. E. Ransley, 814; Electrocrystallisation of, K. M. Gorbunova and Z. Adzhem-jan (4), 191; Institute of, Journal of the, Vols. 53 and 54 (*Review*), 721; Oxide Films on, Orientation of Dr. R. F. Mehl, E. L. McCandless and F. N. Rhines, 1009, 1011
- Metamorphism, R. Perrin, 155
- Metastable Molecules in Active Nitrogen, Direct Proof of the Existence of, Prof. J. Kaplan, 289
- Meteor: Daylight, 451; Great Siberian, Phenomena Related to the, F. J. W. Whipple, 38
- Meteoric Stone from Silverton, N.S.W., a New, Dr. L. J. Spencer, 115
- Meteorite, first Rhodesian, Gift of, to the British Museum, 469
- Meteorological Office, Annual Report for year ended March 31, 1934, 602; Records for 1834, 153; Tables [1834], 862
- Meteorology: in America [1834], 673; in India, 763
- Methyl Alcohol in the Foliar Organs of Plants, M. Flanzy, 191
- Methylbenzoyl-carbinol, Reciprocal Transpositions of, and of Phenylacetyl-carbinol, A. E. Favorsky and Mme. T. I. Ternikowa, 154
- Metropolitan Police College, Hendon, Dr. J. Davidson appointed officer in charge of the scientific laboratory of the, 808
- Mettur Dam and Reservoir, Inauguration of the, 316
- Mexique, La conquête spirituelle du, R. Ricard, 454
- Mice, Resistance of, to Irradiation, J. Davis, 940
- Micro-Organisms: and Plant Growth, Dr. H. Nicol; W. B. Mercer, 218; Nature of the Growth Factor of, W. H. Schopfer, 674; Preparation by Dialysis of the Growth Factor of, W. H. Schopfer, 674



- Micropyrotechny, Experiments in, A. Michel-Lévy and H. Muraour, 191
- Microscopes, Exhibition of, 929
- Microseisms, A World-wide Survey of, A. W. Lee, 1014
- Milk: Chemistry of, Prof. H. D. Kay and others, 669; Cryoscopy of, Prof. J. J. Ryan and G. T. Pyne, 334; 386; -Fed Calf, Derangement of the Digestive Processes in the, E. J. Sheehy, 154; Reducing Substance (Vitamin C?) in, Effect of Light on the, R. G. Booth and Dr. S. K. Kon, 536
- Mineral: Deposits, Prof. H. Louis (*Review*), 235; Names, Thirteenth List of New, Dr. L. J. Spencer, 115; Nutrition, Plant Growth in Sub-Tropical Soil as a Function of, A. I. Potapov, 546; as Factors Altering the Drought Resistance of Plants, Elements of, N. Udolskaja, 263; Periodicity of, within the Twenty-four Hours, N. Potapov and N. Stankov, 263; Oils, Autoxidation of, and Lubricating Value, R. O. King, 188; Oxidation of, by Atmospheric Oxygen at Moderate Temperatures, E. Vellinger and G. Muller, 262; Precipitations in Glasses, M. Billy and M. A. Foex, 299; World, Exploration of the, by X-rays, Prof. W. L. Bragg, 401
- Mineralogical: and Geochemical Prognoses, P. Murzajev, 263; Society, Election of Officers, 770
- Minerals and the Microscope, Dr. H. G. Smith. Third edition (*Review*), 273
- Mines: Research Board, Safety in, Twelfth Annual Report, 375; Secretary for, Annual Report for 1933, 565
- Mirror, the 200-inch, 877
- Mirrors, Prisms and Lenses: a Text-book of Geometrical Optics, Prof. J. P. C. Southall. Third edition (*Review*), 989
- Mitogenetic (Gurwitsch) Rays, Physico-Chemical Test for, Dr. M. Heinemann, 701; Radiation, Lipolysis as a Source of, A. D. Braun, 536
- Mitosis, Rôle of the 'Chromosome Sheath' in, and its Possible Relation to Phenomena of Mutation, C. W. Metz, 263
- Mitragyna*, Mitrinermine, New Alkaloid from, Raymond-Hamet and L. Millat, 638
- Modern Belief: Outline of, Modern Science, Modern Thought, Religious Thought, Edited by J. W. N. Sullivan and W. Grierson. Part I (*Review*), 795
- Molecular: Spectrum, a Simple and General Relation of the, with the Electrons and Rings of Electrons of the Constituent Atoms, Dr. H. Deslandres, 190; Volume, Theory of Apparent, O. Redlich and H. Klinger (3), 911
- Molten Rocks, Viscosity of, M. Volarovitch, 191
- Monarch*, Cable Repair, H. M. T. S., 527
- Monkey, New-born, Behaviour of the, 145
- Monocotyledons, Taxonomy and Phylogeny of (*Review*), 550
- Mont Blanc, Ascent of, [1834], 430
- Moon, Craters on the, Origin of the, F. Leitich, 904
- Morant, Sir Robert, a Great Public Servant, Dr. B. M. Allen (*Review*), 954
- Morphology and Biochemistry, Dr. J. Needham, 275
- Mortality, Influence of Temperature and Season on, L. Besson, 155
- Mosquito, Maritime, L. Legendre, 1019
- Motor-Cars, Self-Starters for, History of, 210
- Motor, Detonation in the, New Method for the Study of, Tchang Te-Lou, 946
- Mould Growth, Alleged Influence of Heavy Water on, Dr. R. Klar, 104
- Moulds, Alleged Stimulation of, by Paraffin in Heavy Water, T. C. Barnes, 573; S. L. Meyer, 665
- Mouse, House: A New Gene Affecting Behaviour and Skeleton in the, L. C. Dunn, 335; Linkage Studies of Brachyury (short tail) in the, F. H. Clark, 472; (*Mus musculus*), Action of Oestrin on the Coagulating Glands and on Certain Vestigial Structures in the, Dr. H. Burrows, 570; The Membrane Granulosa of the, P. G. Espinasse, 182
- Muckleford Fault in the Strangeways Area, Guildford [Australia], D. E. Thomas, 711
- Mucorineæ, Action of the Growth Factor in the, W. H. Schopfer, 227
- Mullus barnatus*, L., Characteristic Nitrogen Groupings in the Muscular Tissue of, G. Bini, 40
- Mummy Wheat, W. H. Parker, 730
- Murray, John, Expedition to the Arabian Sea, Lieut.-Col. R. B. Seymour Sewell, 685
- Muscle: Anaerobic Recovery in, Chemistry of, Prof. J. K. Parnas and P. Ostern, 627; Chemical Changes in, Linkage of, Prof. J. K. Parnas, P. Ostern and T. Mann, 1007, 1011; Extract (Lacarnol), Action of, and of Pancreatic Extract Deprived of Insulin (Padutine) on the Nervous System of the Frog, D. Zimmet and E. Frommel, 227; Proteins, Drs. T. Moran, G. A. Reay and E. C. Smith, 798; Working, Oxidation and Reduction Processes in a, A. Kharit and N. Khaustov (3), 263; (4), 432
- Museum of Practical Geology, The, Dr. F. J. North, 419
- Museums: A New Opportunity for, 166; Association, Annual Conference of the, Presidential Address by Dr. C. Fox who was re-elected president, 72; Functions of, Prof. J. R. Dymond, 18
- Mushroom Hotbeds, Fermentation of, E. B. Lambert and A. C. Davis, 703
- Musical Theory, Some Questions of, Dr. W. Perrett, 248
- Musk: Lost Fragrance of, 54; E. Hardy, 327
- Myth and Ritual, The Hidden Truth in, and in the Common Culture Pattern of Ancient Metrology, D. Davidson (*Review*), 956
- Nanda Deir, Exploration of, H. Ruttledge, 731
- National: Art Gallery and Museum, The Proper Functions and Scope of a, Lord Bledisloe, 18; Institute of Industrial Psychology, Research Work carried out by the, during the years 1921-1934, 985; Maritime Museum, 20; Museum, Recent acquisitions from Co. Donegal in the, S. P. O. Riordáin, 262; Physical Laboratory: Annual Visitation of the, 33; New Acoustics Laboratory at the, Dr. G. W. C. Kaye, 202; Planning: in Industry, H. Macmillan, 564; Physics in, Prof. K. T. Compton, 319
- Nations, Resources and Statistics of, 945
- Native Problem, The, and Research in Africa, Sir Ernest Graham-Little, 585
- Natur und Volk*, August, 660
- Naturalist on the Prowl, The, Miss Frances Pitt (*Review*), 648
- Naturwissenschaftlicher und medizinischer Betrachtung, Allgemeine Konstitutionslehre in, Prof. O. Naegeli. Zweite Auflage (*Review*), 309
- Naval: Architects, Institution of: awards of the, 469; award of the Vickers Armstrong scholarship to G. S. Milne, and of the Duke of Northumberland prize to W. P. Walker, 637; Construction, Progress in, Sir Arthur Johns (Andrew Laing lecture), 731
- Navy, Health of the, 1932, 21
- Nazi Philosophy and Truth, Dr. Frank, 564
- Nebulæ, Extra-galactic, Velocity-distance Relation for Isolated, E. Hubble and M. L. Humason, 472
- Negro Brains, Weight of, Prof. R. Pearl, 1012
- Nemas, the Free-living, of the Belgian Coast, L. A. de Coninck and J. H. S. Stekhoven, Jr. (2), 975
- Nematodes, Classification of, I. N. Filipjev, 220
- Neolithic: Man: British, The Skeleton of, including a comparison with that of other Prehistoric Periods and more Modern Times, Dr. J. Cameron; Dr. F. G. Parsons (*Review*), 604; Stone Implements found at Regina in the Western Transvaal, Margaret Orford, 335
- Nerve Degeneration, Temperature Coefficient of, T. W. Torrey, 472
- Neutrino or Ergon, Dissymmetry of the Positive and Negative  $\beta$  Spectra and the Intrinsic Mass of the, F. Perrin, 191
- Neutron: and the Proton, Binding Energies of the, Prof. L. Strum, 497; Bombardment, Radioactivity Induced by, T. Bjerger and C. H. Westcott, 286; Mass of the, Prof. W. D. Harkins and Dr. D. M. Gans, 968, 974; Nuclear Magnetic Moments and the Properties of the, Prof. I. Tamm, 380

- Neutrons : and Protons, Interaction of, Prof. I. Tamm, 1010, 1011; from Beryllium, Liberation of, by X-Rays: Radioactivity induced by means of Electron Tubes, A. Brasch, F. Lange, A. Waly, Dr. T. E. Banks, T. A. Chalmers, Dr. L. Szilard and Prof. F. L. Hopwood, 880, 901; from Radioactive Isotopes, Spontaneous Emission of, H. J. Walke, 215; liberated from Beryllium by Gamma Rays: Detection of, A New Technique for inducing Radioactivity, Dr. L. Szilard and T. A. Chalmers, 494; of Different Energies, Radioactivity Induced by Bombardment with, T. Bjerge and C. H. Westcott, 177; Secondary Emission from Elements Bombarded with, Dr. Z. Ollano; M. L. Oliphant, 735; Spontaneous Emission of, by Artificially Produced Radioactive Bodies, M. Goldhaber, 25
- Newcastle-upon-Tyne, Museum of Science and Industry at, 133
- New Guinea : Head-Hunters of, Dr. H. H. Sharp, 220; Mountain Tribes of, E. W. P. Chinnery, 328
- New South Wales : Physiography of the Middle North Coast District of, A. H. Voisey, 983; Sooty Moulds of, Lilian Fraser (2), 471
- New Zealand : Agriculture in, Lord Bledisloe, 455; Australia and, Research in, G. V. Jacks, 51; Forest Policy in, 1015; Fresh-water Research in, D. F. Hobbs, 853; Importance of Grassland in, 907; Industry in, Lord Bledisloe, 694; Royal Society of: award of the Hector medal and prize of the, to Prof. C. E. Weatherburn, 213; Inaugural Meeting, 59; 427
- New Zealand's Timber : Lord Bledisloe on, 1015
- Newton's Laws of Cooling, Application of, to the Measurement of very small Thermal Effects, Prof. W. Swietoslawski and J. Salewicz, 947
- Nickel : and Cadmium, Carbon Constitution of, Dr. F. W. Aston, 178; and Cobalt, Structural Demagnetising Factor in, Thermal Variation of the, T. Kahan, 470; Electrolytic Potential of, L. Colombier, 430; Hydride Spectrum of, A. G. Gaydon and Dr. R. W. B. Pearce, 287
- Nicotiana*, Crossing-over in the Species Hybrids of, D. Kostov, 192
- Night : Clouds, Luminous, Prof. C. Störmer, 219; Sky : Bands at 4450 and 4180 Å. in the Spectra of the, and of the Aurora, H. Hamada, 851, 854; Spectrum of the, Ultra-violet Extremity of the, J. Gauzit, 298
- Nile, S.S., Trials of, 430
- Nitric : Acid, A Catalyst for the Production of, by the Oxidation of Ammonia, L. Marmier, 863; Esters at a Low Temperature, Decomposition Velocity of some, M. Lambrey, 787
- Nitro Group, Structures of the, H. O. Jenkins, 217
- Nitrocellulose Films, Linear Deformations of, as a Function of the Atmospheric Humidity, A. Charriou and Mlle. S. Valette, 227
- Nitrogen : A New Band System in, Prof. J. Kaplan, 538; Afterglow, New Features of the, H. A. Jones and Prof. A. C. Grubb, 140; Conservation, Biochemistry of, An Introduction to the, Dr. G. J. Fowler (Review), 48; Cycles in Fruit Trees, Seasonal, Dr. D. V. Karmarkar, 816; Deficit in Aerobic Microbial: Cultures, Origin of, M. Lemoigne and R. Desveaux, 471; Molecule, Situation of the  $A(^2\Sigma)$  Level in the: E. T. S. Appleyard, N. Thompson and S. E. Williams, 322; Prof. L. Vegard, 697; Translocation of, T. G. Mason and E. Phillis, 184
- Ortho*-Nitrophenols, Volumetric Micro-determination of, with Methylene Blue, A. Bolliger, 747
- Nitrosylsulphuric Acid, Raman Spectrum of, W. R. Angus and A. H. Leckie, 572
- Nitrous : Gases and Ozone, Determination of, C. Wakker, 674; Oxide, Absorption Spectrum of, and Energy of Dissociation of Nitrogen, L. Henry, 498
- Nobel Prize: for Chemistry for 1934, award of the, to Prof. H. C. Urey, 803; for Medicine and Physiology for 1934, award of the, jointly to Dr. G. R. Minot and Dr. W. P. Murphy and Dr. G. H. Whipple, 691
- Noise : Excluding, by means of Double Windows, 781; Scientific Studies of, Dr. G. W. C. Kaye, 149; Sound and, Dr. G. W. C. Kaye, 929; Traffic: and the Ministry of Transport, 315; P. J. H. Unna, 937; Reduction of, Dr. E. O. Turner and others, 633
- Nomina Nuda*, Publication of, Sir Sidney F. Harmer, 973
- Northern : Conquest: The Story of Arctic Exploration from Earliest Times to the Present, Jeannette Mirsky (Review), 884; Hemisphere, Weather in the, 667
- North-East Coast Institution of Engineers and Ship-builders: Annual Meeting, presidential address by J. T. Batey, 656; award of gold medals to W. T. Bottomley, E. W. Corlett and F. Piercy and to N. M. Hunter, 415
- North Pole: The Conquest of the, Recent Arctic Exploration, J. G. Hayes (Review), 884
- North Sea: Currents and Fisheries of the, Dr. J. B. Tait and others, 543; Monster, D. A. Spencer and W. Randerson (Review), 85
- North-West: Frontier, Meteorological Conditions affecting Aviation over the, Flight-Lieut. R. G. Veryard and A. K. Roy, 904; Passage, 637
- Nosu Tribes of Western Szechwan, Dr. E. R. Cunningham and others, 294
- Nucifraga*, Phylogeny of the Genus, B. K. Stegman, 507
- Nuclear : Disintegration Experiments with Pure Isotopes, M. L. Oliphant, E. S. Shire and B. M. Crowther, 904; 'Photo-Effect': A, Disintegration of the Diplon by  $\gamma$ -Rays, Dr. J. Chadwick and M. Goldhaber, 237; Spins, Negative, and a Proposed Negative Proton, Dr. S. Tolansky, 26; Structure and Excited Radioactivity, G. Guében, 626; Transmutations: Artificial, Lord Rutherford (Ludwig Mond lecture), 964; with Heavy Hydrogen, M. L. Oliphant, P. Harteck and Lord Rutherford; and others, 69
- Nummulitic Breccia, with Wildflysch Facies, from Elba, L. W. Collet, 582
- Nutrition : and Disease: The Interaction of Clinical and Experimental Work, Dr. E. Mellanby (Review), 830; in Relation to Disease, Dr. H. H. Green and others, 557; of Animals, Combined Action of Zinc and Vitamins in the, G. Bertram and R. C. Bhattacherjee, 75
- Ocean Waves and Kindred Geographical Phenomena, Dr. Vaughan Cornish, and additional notes by Dr. H. Jeffreys (Review), 398
- Oestrin: Action of, on the Coagulating Glands and on certain Vestigial Structures in the Mouse (*Mus musculus*), Dr. H. Burrows, 570; Group, Synthesis in the, Dr. J. C. Bardhan, 217; Specific Action of, P. G. 'Espinasse, 738
- Official Statistics, Current, Guide to, 624
- Oil : and Gas in Western Canada, G. S. Hume. Second edition, 375; Well Drilling Record, New, 21
- Old Age, Extreme, Potentialities of, F. G. Benedict and H. F. Root, 548
- Onions, Cultivation of, 660
- 'Onium' Salts, Fused, as Acids, L. F. Audrieth and M. T. Schmidt, 335
- Opals, X-Ray Study of, F. P. Dwyer and D. P. Mellor, 583
- Opaque Minerals, Method of Electrolytic Attack of, and its Application to the Technique of Etching Polished Surfaces, P. Wenger, G. Gutzeit and T. Hiller, 507
- Opossum, Female, Unique Structure in the Adrenal of the, G. Bourne, 664; Opossums, American, G. H. H. Tate, 423
- Optics : Modern Tendencies in, Dr. L. C. Martin (Review), 989; W. H. A. Fincham (Review), 989
- Optische Messungen des Chemikers und des Mediziners, Dr. F. Löwe (Review), 199
- Orchid, Rare, in Bloom, 546
- Ordnance Survey: and National Needs, 677; Professional Papers, New Series, No. 16: The National Plans, Brig. H. St. J. L. Winterbotham, 678; 870; Report of the, 531
- Ore Deposits: History of the Theory of, with a Chapter on the Rise of Petrology, T. Crook (Review), 988; Origin and Nature of, an Historical Study, Dr. F. D.

- Adams (*Review*), 988 ; Origin of, History of Theories of the (*Review*), 988
- Organic : Analysis, History of, Dr. Nierenstein, 95 ; Compounds, Dictionary of. Vol. 1 : Editor-in-Chief : Prof. I. M. Heilbron (*Review*), 751 ; Syntheses. Vol. 14. W. W. Hartman, Editor-in-Chief (*Review*), 164 ; Vapours, Magnetic Properties of, S. Ramachandra Rao and P. S. Varadachari, 812
- Organomagnesium Compounds, Preparation of Mixed, V. Grignard, 262
- Oriental Institute, The, [Chicago University], Prof. J. H. Breasted, 78
- Orissa, Art in, Rai Bahadur Ramprasad Chanda, 539
- Orkneys, Geology of the, Sir John Flett, 976
- Ornithological Stations on a Lake in the Plains, Distribution of, N. A. Gladkov, 263
- Ornithology of the Philippines (*Review*), 438
- Orthogonal Matrix, The, Transforming Spearman's Two-factor Equations into Thomson's Sampling Equations in the Theory of Ability, Prof. G. H. Thomson, 700
- Oscillations with Hollow Quartz Cylinders cut along the Optical Axis, Ny Tsi-Zé and Tsien Ling-Chao, 214
- Oscillograph, Sixteen Element, 176
- Ovimbundu of Angola, The, W. D. Hambly, 423
- Ox Bile, Spectrographic Study of, C. Gautier and R. Ricard, 155
- Oxford : University : Abstracts of Dissertations for the degree of Ph.D., 389 ; Bequest by Mrs. Mary Jane Williams, 429 ; Oration of the Vice-Chancellor, 637 ; Inaugural lecture of Dr. R. T. Gunther, 709 ; New Building of the Radcliffe Science Library, 729 ; Lecture by Dr. R. T. Gunther on members of Merton College distinguished by Scientific Achievements, 746 ; Contributions to Science by early members of Balliol College, Dr. R. T. Gunther, 821 ; proposed appointment of C. G. T. Morison as reader in Soil Science, 861 ; and the History of Science : with an Appendix on Scientific Collections in College Libraries, Dr. R. T. Gunther, 907 ; Early Science in, 907 ; Scientific work by members of Corpus Christi College, Dr. R. T. Gunther, 908
- Oxide Films on Metals, Orientation of, Dr. R. F. Mehl, E. L. McCandless and F. N. Rhines, 1009, 1011
- Oxidising Agents as Fertilisers, Iyer, Rajagopalna and Subrahmanyam, 940
- Oxygen : Absorption Spectrum of, at High Pressures, and the existence of  $O_4$  Molecules, H. Salow and Dr. W. Steiner, 463 ; and Nitrogen, Magnetic Double Refraction of, in the Gaseous State and of Aqueous Solutions of Chlorates, A. Cotton and Tsai Belling, 115 ; Isotopic Ratio of, and the Atomic Weight of Hydrogen, H. Muckenthaler, 977 ; Preparation from Sodium Peroxide : a Dangerous Experiment, Dr. J. Newton Friend and S. Marks, 778 ; G. H. Cheesman and D. R. Duncan, 971 ; The (Light) Absorption of, between 7000 and 3000 Å., L. Herman, 227 ; The 1933 Everest Climbing Expedition and, Sir Leonard Hill, 969
- Oyster, The Australian, T. C. Roughley, 66
- Oysters, Cleansing of, 412
- Ozone, Spectrum of, Suppression of certain Bands of the, under the Action of Low Temperature, Mme. Lucie Lefebvre, 507
- Pagan Survivals in Mohammedan Civilisation, Dr. E. Westermarck (*Review*), 305
- Paixhans, General, death of (1783-1834), 261
- Palaeolithic : Caves in Derbyshire, L. Armstrong, 464 ; Man and the Nile Valley in Nubia and Upper Egypt, Dr. K. S. Sandford and W. J. Adkell, 165 ; Pottery, J. Reid Moir and J. P. T. Burchell, 766
- Palestine, Palaeolithic Affinities in, Miss Dorothy Garrod, 30
- Pangolins and Aard-Varks, R. T. Hatt, 630
- Paper : Metamorphosis of, 921 ; Parasitic Cellulolytic Fungi of, Differentiating between the, A. and R. Sartory, J. Meyer and H. Bäunli, 506
- Papers Collected, late Prof. H. A. Lorentz. Vol. 7 (*Review*), 514
- Papyrus, Before, . . . beyond Rayon, Dr. G. J. Esselen, 283
- Paraffin : Hydrocarbons, Normal, Energies of the Atomic Linkages in the, F. D. Rossini, 547 ; in Heavy Water, Alleged Stimulation of Moulds by, T. C. Barnes, 573 ; Wax, Cyclic Components of, J. Müller and Dr. S. Pilat, 459
- Paramagnetic Solutions of Salts of Rare Earths, Thermal Variation of the Magnetic Double Refraction of, C. Haenny, 1019
- Paris, Zoological Park of, 211
- Parsons Steam Turbine, The, First, 33
- Particles, The New Elementary, Prof. E. N. da C. Andrade, 345
- Paschen Series : in Stellar Spectra, Merrill and Wilson, 466 ; of Hydrogen in the Infra-red Solar Spectrum, Photographic Intensity Measurements of Lines of the, Dr. A. H. Rosenthal, 533
- Pastoral Poisons (*Review*), 607
- Patagonia : and South Chile, Diptera of, 221 ; Miocene, E. W. Berry, 472
- Patent Law, Reform of, Advocated, Dr. H. Levinstein, 525
- Pathology : and Bacteriology, *Journal of*, July (Birthday greeting to Sir Robert Muir), 94 ; Prehistoric, Prof. A. V. Vallois, 902
- Pawnee Ritual Games, Dr. A. Lesser, 939
- Peace : Scientific Approach to, 749 ; Dr. C. B. O. Mohr and Dr. Nora Wooster, 854 ; and War in the Air, G. E. Woods-Humphery, 433
- Penguin Embryos, C. W. Parsons, 630
- Perchlorates with Methylene Blue and Picric Acid, Volumetric Micro-determination of, A. Bolliger, 76
- Periodic : Functions Related to Periodical Physical Phenomena, Asymptotic Developments of, Dr. S. C. Bagchi, 216 ; Law, Lord Rutherford (Mendeléeff Centenary lecture), 211
- Perkin and Kipping's Organic Chemistry. New edition, Prof. F. S. Kipping and Dr. F. B. Kipping. Part 3 (*Review*), 556
- Permian Foraminifera of New South Wales, Revision of the Nomenclature of the, F. Chapman, W. Howchin and W. J. Parr, 675
- Pérou, les textiles anciens du, et leurs techniques, R. d'Harcourt (*Review*), 201
- Perseveration, Dr. Wynn Jones, and others, 860
- Periodicals : and Reference (*Review*), 435 ; The Subject Index to, 1933 (*Review*), 757
- Petrie Medal of London University, award of the, to the Abbé H. Breuil, 861
- Petroleum : Industry, United States, H. B. Soyster, and others, 767 ; Products as Horticultural Spray Materials, Utilisation of, Dr. H. Martin, 977 ; Technologists, Institution of, Sir John Cadman elected president of the, 770
- Pharmaceutical Codex, British, 259
- Phasmidæ, Spermatogenesis of the, M. Favrelle, 741
- Phenylglycides, Hydration of Two, Mlle. M. Darmon, 227
- Phenyl Isocyanate, Action of, on Insulin, Dr. S. J. Hopkins and Dr. A. Wormall, 290
- Philine aperta*, L., a Tectibranch Gastropod Mollusc, H. H. Brown, 226
- Philippines, Plant Diseases in the, Dr. T. G. Fajardo, 107
- Philosophical Method, An Essay on, R. G. Collingwood (*Review*), 648
- Phlorhizin in the Liver and Kidneys after Intravenous Injection in the Dog, Quantity of, A. Lambrechts, 155
- Phloxes, Summer-flowering, 667
- Phosphatic Calculi in Silurion Polyzoa, K. P. Oakley, 1014
- Phosphomolybdic Acid in Chemical Analysis, Use of, J. W. Illingworth and J. A. Santos, 971, 974
- Phosphoric Anhydride, Hydration of, A. Travers and Yu Kwong Chu, 227
- Phosphorus, Liquid, Viscosity of, S. Dobinski, 155
- Photo-Cell, Galvanometer Amplification by, Prof. A. V. Hill, 289
- Photo-Cells with Colouring Matters, Relation between the Curve of Spectral Sensibility and the Curve of Absorption in, Mlle. Cécile Stora, 39

- Photochemical Reactions: Prof. A. J. Allmand (Bedson lecture), 693; F. Diéner and F. Villemaine, 982
- Photoelectric: Cell, Dr. N. R. Campbell and C. C. Paterson, 526; Cells of the Boundary Type, Mme. Roy-Pochon, 190; Illumination Meter, A, 108; Theory and Applications, G. Windred, 332; Thresholds of some Turned Metallic Surfaces, J. S. Hunter, 115
- Photographic: Centenary, Henry Fox Talbot, 769; Desensitisers and Oxygen, Marietta Blau and Hertha Wambacher, 538; Emulsions, Sensibility of, Influence of Antioxygen Bodies on the, A. Charriou and Mlle. S. Valette, 190; Reproduction, Apparatus for, 966
- Photography as an Aid to Scientific Work, 213
- Photosynthesis: and Free Nitrogen Assimilation by Leguminous Plants, E. B. Fred and P. W. Wilson, 711; Chemistry of, 331; Kinetics of: Dr. R. Emerson and L. Green, 289; Prof. E. C. C. Baly, 933, 938
- Phthalocyanines, R. P. Linstead and others, 386
- Physic, Fifteenth Century (*Review*), 270
- Physical: and Chemical Apparatus, Catalogue of, Griffin & Tatlock, Ltd., 285; Culture, Medical Aspects of, 96
- Physician: The, as Man of Letters, Science and Action, Prof. T. K. Munro (*Review*), 394
- Physico-Chemical Practical Exercises, Prof. W. N. Rae and Prof. J. Reilly (*Review*), 615
- Physics: International Conference on: 488; 560; Modern, The New World-Picture of, Sir James H. Jeans, 355; Recent Advances in, Lectures on, 20; Romping Through, O. W. Gail. Translated by H. S. Hatfield (*Review*), 85; Theoretical, International Congress on, at Kharkov, 109
- Physik in Regelmässigen Berichten, Die*, 844
- Physiography of Victoria, Some Fundamental Concepts in the, E. S. Hills, 675
- Physiological Function, Architecture of, Features in the, Dr. J. Barcroft (*Review*), 340
- Physiologically Active Substances, Dielectric Potentials of, Prof. B. Kamienski, 776
- Phytoplankton of the *Discovery* Expedition, T. G. Hart, 500
- Picture Telegraphy, 732
- Piezoelectric Quartz, Utilisation of, for the Study of certain Biological Phenomena, etc., M. Gomez and A. Langevin, 863
- Pique*, H.M.S., Launch of, 114
- Pit-Head Generation of Electric Power, 558
- Pituitrin in the Organism, Neutralisation of the Poisonous Action of, H. Heller and F. F. Urban, 392
- Planarian Regeneration, Correlation in, E. D. Goldsmith, 984
- Plane Polished Surfaces, Micro-Chemical Analysis of, by means of Monochromatic X-Ray Images, Dr. L. v. Hámos, 181
- Planets, Giant, The Atmospheres of the: Dr. A. Adel and Dr. V. M. Slipher, 148; Dr. R. Wildt, 418
- Plankton, Origins of, 672
- Planning: and Economics, 503; Idea of, Major L. R. Urwick, 542; in Great Britain, Public Efforts at, K. M. Lindsay, 542; Production and: 1; Sir Richard Paget, Bt., 140; The Writer of the Article, 141
- Plant: Biochemistry, An Introduction to, Dr. Catherine C. Steele (*Review*), 795; Chimaeras and Graft Hybrids, Prof. W. Nielson Jones (*Review*), 515; Collecting in Asia, F. Kingdon Ward, 492; Cytology, Application of the Altmann Freezing-Drying Technique to, T. H. Goodspeed and F. M. Urer, 911; Ecology, Quantitative (*Review*), 606; Growth, Micro-Organisms and, Dr. H. Nicol; W. B. Mercer, 218; Hybridisation before Kölreuter, Dr. C. Zirkle, 623; Life and the Philosophy of Geology, Prof. W. T. Gordon, 367; Physiology, Periodic Table in, late Prof. R. W. Thatcher, 221; Virus Diseases, Intracellular Inclusions in, Dr. F. M. L. Sheffield, 741
- Plants: Anatomical Structure in, Inheritance of, 708; Growth of, Effect of Yeast Extract on the, B. Viswa Nath and M. Suryanarayana, 27; Life Forms of, and Statistical Plant Geography: being the Collected Papers of C. Raunkiaer (*Review*), 606
- Plasticity as the Servant of Industry, Prof. H. Freundlich, 509
- Platinum: Mineral, A New, Prof. O. Zvjaginstsev, 318; under Pressure, Direct Oxidation of, P. Laffitte and P. Grandadam, 116
- Pleochroic Haloes, Quantitative Study of, G. H. Henderson, S. Bateson and L. G. Turnbull, 576
- Plessey Coal Seam, Northumberland, 703
- Poland: and Germany, 245; Magnetic Survey of, 1002; Nature Protection in, 659; Science in, 246
- Polar Aurora, Dr. A. Dauvillier, 631
- Polarity, Induced, A General Equation for, Dr. W. A. Waters, 178
- Political Principles and Native Affairs in Africa, 949
- Politics, Human Biology and, Prof. J. B. S. Haldane (Norman Lockyer lecture), 865
- Pollen: Carried by Dust Storms, K. Biswas, 492; -Tube Growth: in Selfed Self-sterile Plants, Reaction of the Stigmatic Tissue against, E. M. East, 548; Norms of, in Incompatible Matings of Self-sterile Plants, E. M. East, 335
- Pollinia of Orchids of a Growth Factor for Micro-organisms, Existence of the, W. H. Schopfer, 227
- Polonium: Colloidal State of, Criticism of the Photographic Method as Applied to the Investigation of the, I. Starik and M. Deisenrot-Mysovskaja, 191; in Bismuth Crystals, Segregation of, A. B. Focke, 977; Spectrum of, B. Karlik and H. Pettersson, 547
- Polycarboxylic Aromatic Acids, A Simplified Method of Mercurisation and Degradation of the, K. Dzewonski, 823
- Polymerised Substances, Osmotic Pressure of, Mme. Alma Dobry, 430
- Polynesia: Law and Order in, a Study of Primitive Legal Institutions, Dr. H. I. Hogbin (*Review*), 832
- Polynesian Mosses, E. B. Bartram, 329
- Polyporus ostreiformis* and *Polystictus hirsutus*, Sexuality of, Prof. S. R. Bose, 146
- Porcellana* Larvae, Phototropism in, G. E. H. Foxon, 104
- Positron Radioactivity, Induced, Prof. F. H. Newman and H. J. Walke, 288
- Positrons: and Electrons from Artificial Radio-Elements, Limits of the Energy Spectra of, A. J. Alichanow, A. J. Alichanian and B. S. Dzelepow, 254; in Induced Radioactivity, Energies of the, Y. Nishira, R. Sagane, M. Takeuchi and R. Tomita, 941
- Postage Stamps, Designs upon, 376
- Post Office: Activities of the, 659; Steam Packet Service, 333
- Potassium: Cyanide, Action of on an  $\alpha$ -Chloroketone, G. Richard, 299; Induced Radioactivity of, M. Zyw, 64; Nitrate, Manufacture of, C. W. Whittaker and F. O. Lundstrom, 781; Radioactivity of, Prof. G. Hevesy, M. Pahl and R. Hosemann, 377; Resonance Lines of, Hyperfine Structure of the, D. A. Jackson and H. Kuhn, 25
- Potato: Eelworm (*Heterodera schachtii*): Hatching Experiments on the, J. Carroll and E. McMahon, 66; Investigations, J. Carroll, 334; Epidemic in Great Britain, A New, Dr. R. N. Salaman and Miss Cecilia O'Connor, 932, 938; in North America, Influence of High Latitudes on the Agricultural Yields of the, J. Costantin, 787; Wart Disease in Incipient Infections on Varieties Immune in the Field, Infectivity of Summer Sporangia of, Mary D. Glynné, 253
- Potatoes: Diseases in, 637; South American, Juzepczukii and S. M. Bukasov, 540
- Poverty, The Extent and Causes of (*Review*), 342
- Prehistoric: and Protohistoric Sciences, First International Congress of, Proceedings of the, London, August 1-6, 1932 (*Review*), 613; Elements in Our Heritage, Prof. H. J. Fleure, 855
- Pressure Wave sent out by an Explosive, The, W. Payman and D. W. Woodhead, 976
- Primitive: Contemporaries, Our, Prof. G. P. Murdock (*Review*), 164; Fossil Fishes (*Review*), 200
- Princeton Institute for Advanced Study, 769
- Production and Planning: 1; Sir Richard Paget, Bt., 140; The Writer of the Article, 141

- 'Protective Coloration' Protect ? Does, F. B. Sumner, 984
- Protein : Metabolism in Man, A Theory of, H. Borsook and G. Keighley, 263 ; Pattern, Chromosome Behaviour in Terms of, Dr. D. M. Wrinch, 978 ; Titration of, with Trichloroacetic Acid, Dr. R. K. Schofield and L. W. Samuel, 665
- Proteins, Structure of, Prof. Abderhalden and Heyns, 296
- Protium Oxide, Preparation of, and Determination of the Proportion of Deuterium in the Hydrogen of Normal Water, H. Whitaker, Prof. R. Whytlaw-Gray, E. H. Ingold and Prof. C. K. Ingold, 661
- Protoactinium, Preparation of, G. Graue and H. Käding, 386
- Proton : and Diplon, Ratio of the Magnetic Moments of, F. Kalckar and E. Teller, 180 ; and the Deuteron, Magnetic Moments of the, I. I. Rabi, J. M. B. Kellogg and J. R. Zacharias, 466 ; Neutron and the Binding Energies of the, Prof. L. Strum, 497 ; Proposed Negative, Negative Nuclear Spins and a, Dr. S. Tolansky, 26
- Protons : Intense Sources of, Applicable to Transmutations, H. Hulubei, 390 ; Neutrons and, Interaction of, Prof. I. Tamm, 1010, 1011 ; Through Matter, Passage of Very Fast, H. J. Bhabha, 934
- Prout and the Atomic Theory, 74
- Psychic Thumb Print Controversy, 18
- Psychical : Investigation, University of London Council for, Formation of, 93 ; Research, Science and, Prof. J. S. Huxley, Dr. F. C. S. Schiller and Prof. E. W. MacBride, 458
- Psychological Needs in Animals, Prof. D. Katz, and others, 744
- Psychology : and Social Problems, Dr. S. Dawson, 371 ; and Psychotherapy, Dr. W. Brown. Third edition (*Review*), 269 ; and Social Problems, Dr. S. Dawson, 517 ; Everyday, Dr. A. E. Carver (*Review*), 269 ; Industrial, and its Social Significance, 985 ; Social, Power in, H. G. Wells ; Prof. H. Levy, 972
- Psymphyllum*, A New Species of, from the Upper Carboniferous of Scotland, Jessie A. R. Wilson, 115
- Public Health, International Co-operation in, Sir George Buchanan (Milroy lectures), 491
- Puerperal Fever, Administration Measures in, 249
- Pulfrich-Stufen-Photometer, Kinetic Measurements with the, Dr. A. Wassermann, 101
- Pulkova Observatory, 333
- Pulmonates, Systematics of, H. A. Pilsbury, 540
- Pulpwood for Paper in the United States, Dr. Herty, 452
- Pumping Engine, A Famous Dutch, Eng.-Lieut. J. J. Bootsgezel, 766
- Purine Derivatives, Influence of, on the Permeability of the Heart, A. Fröhlich and E. Zak, 300
- Pygmies and Bushmen, Dr. W. Hirschberg, 815
- Pyramid Prophecy, R. Gleadow, 956
- Quantum Theory : The, (*Review*), 608 ; The General Principles of, Prof. G. Temple (*Review*), 85
- Quarantine Regulations, International (*Review*), 341
- Quartz in the Infra-Red, Refractive Indices of, Corrections to the, Dr. D. G. Drummond, 937
- Queen Mary College, new name of East London College, 873
- Queen Mary* : Cunard White Star Liner, 488 ; Electrical Launching Gear for Lifeboats on the, 565
- Raasay, Island of, Inner Hebrides, Tertiary Geology of the, C. F. Davidson, 862
- Rabbit : Embryos : Blood-group Incompatibility in, and in Man, Dr. C. E. Keeler and Dr. W. E. Castle, 472 ; Young, Survival of, on Artificial Media, A. J. Waterman, 263 ; Influence of Pregnancy upon the Titre of Immune (Blood-group) Antibodies in the, Dr. C. E. Keeler and Dr. W. E. Castle, 823
- Rabbits : and Steel Traps, 529 ; and Traps, 318 ; Blood-groups of, Dr. C. E. Keeler and Dr. W. E. Castle, 1012 ; Creatinine Excretion in, Influence of Testicular and of Urinary Extracts on the, R. W. S. Cheetham, I. Schrire and H. Zwarenstein, 947 ; Normal and Syphilitic, Rotatory Dispersion of the Sera of, M. Paic, 471
- Radcliffe : Observatory, The, 56 ; Science Library, New Building of the, 729
- Radiation, High-Energy Biological Effects of, W. V. Mayneord, 857
- Radicals : Free, A General Discussion held by the Faraday Society, September 1933 (*Review*), 85
- Radioactive : Element beyond Uranium, A New, Dr. O. Koblitz, 55 ; Elements between a Liquid Phase and a Solid Crystalline Phase, Distribution of, A. Polesitskii, 675 ; Ions in Gelatine, Autophotographic Localisation of, Mlle. Suzanne Veil, 910 ; Minerals : Actinium-Uranium Ratio in, Mlle. Ellen Gleditsch and E. Foeyn, 506 ; Correlation by, W. G. Foye and A. C. Lane, 425
- Radioactivity : Artificial, Produced by Neutron Bombardment, E. Fermi, E. Amaldi, O. D'Agostino, F. Rasetti and E. Segré, 668 ; Artificially Induced by Neutron Bombardment, M. S. Livingston, M. C. Henderson and E. O. Lawrence, 823 ; Excited, Nuclear Structure and, G. Guében, 626 ; Induced : Prof. F. H. Newman and H. J. Walke, 537 ; Prof. F. L. Hopwood, 942 ; and Transmutation, Prof. F. H. Newman and H. J. Walke, 64 ; by Bombardment with Neutrons of Different Energies, T. Bjerge and C. H. Westcott, 177 ; by means of Electron Tubes, Liberation of Neutrons from Beryllium by X-Rays : A. Brash, F. Lange, A. Waly, Dr. T. E. Banks, T. A. Chalmers, Dr. L. Szilard and Prof. F. L. Hopwood, 880, 901 ; of Potassium, M. Żyw, 64
- Radio : Broadcasting, American System of, L. Tyson, 260 ; Communication Conference, Third Meeting, 490 ; -Electric Waves, Short, Fluctuations in the Time of Propagation of, B. Decaux and J. B. Gallé, 262 ; Principles of, K. Henney. Second edition (*Review*), 45 ; Reception : Electrical Disturbance of, 765 ; Interference with, by Electric Lighting, V. Z. de Ferranti, 58 ; Short Waves in, Angle of Incidence of, A. F. Wilkins, 859 ; Research : Board, Report of the, January 1-September 30, 1933, 332 ; in Great Britain, 332 ; Technique (*Review*), 45 ; -Telephony, Secret, Dr. S. Chiba, 58 ; Union, International Scientific : 413 ; Fifth General Assembly ; Prof. E. V. Appleton elected president, 502 ; Waves, Long, Polarisation of, A. L. Green and G. Builder, 257
- Radiography, Detection of Small Flaws in Metals by, A. G. Warren, 942
- Radiologie, Handbuch der. Herausgegeben von Prof. E. Marx. Band 6 : Quantenmechanik der Materie und Strahlung. Zweite Auflage der "Theorien der Radiologie". Teil 1 : Atome und Elektronen. Teil 2 : Moleküle (*Review*), 478
- Radiolympia, 1934, 294
- Radium : and Cancer : A Monograph, Dr. H. S. Souttar (*Review*), 791 ; D,  $\beta$ -Rays of, H. O. W. Richardson and Mrs. Alice Leigh-Smith, 772 ; Emanation, Ultraviolet Spectrum of, H. Petterson, 392 ; Medical Uses of, 928 ; Radiation, Penetrating, Chemical Actions of, A. Kailan (20), 155
- Rail Transport, Future of, Prof. H. M. Hallsworth, 369
- Railway Journey at High Speed, An Experimental, 875
- Rain, Splashing of, S. E. Ashmore, 38
- Rainfall Records and Drought Periodicity, W. R. Baldwin-Wiseman, 656
- Raingauges, Exposure of, 390
- Raman : Effect : K. W. F. Kohlrausch and A. Pongratz (33 and 34), 392 ; of the Hydroxyl Radical, New Results on the, L. Médard, 506 ; Introduction à l'étude de l'effet, ses applications chimiques, Prof. P. Daure (*Review*), 10 ; Scattering, Rotational, in Benzene Vapour, Dr. S. C. Sirkar, 850, 854 ; Spectra of Decahydro- and Tetrahydro-Naphthalene, Dr. S. K. Mukerji, 811 ; Spectrum : of Carbon Bromotrichloride, J. Wolters, 787 ; of Conjugated Double Links in a Nucleus, R. Truchet and J. Chapron, 116 ; of Nitrosylsulphuric Acid, W. R. Angus and A. H. Leckie, 572 ; of Water, I. Ramakrishna Rao, 147

- Ramsay Memorial Fellowships, award of, 846
- Rapidly Changing Systems, Spectrophotometry of, Dr. E. R. Holiday and F. Campbell Smith, 102
- Rat, Female, Peculiar Behaviour in a, Dr. A. M. Hain, 778
- Rats : Temperature Range in, N. Yagi and J. Shimoizumi, 145 ; Young, Dietary Depigmentation of, Dr. F. J. Gorter, 382
- Reactions : in Solution, Velocity of, Dr. A. E. Bradfield, 421 ; with Regularly Varying Temperatures, Recording Apparatus for the Study of, P. Vallet, 75
- Reading University, Acquisition of the Percival Collection of Seeds of British Plants, 59
- Rebel Destiny : Among the Bush Negroes of Dutch Guiana, Dr. M. J. Herskovits and Frances S. Herskovits (*Review*), 613
- Rectifier Photoelectric Cell, Measurement of the Current Generated by a, Dr. H. H. Poole and Dr. W. R. G. Atkins, 810
- Red : Blood Proteins, Molecular Weights of, Prof. The Svedberg and I. B. Eriksson-Quensel, 577 ; Filters for Improving Vision, Suggested Use of, Dr. A. Berliner, 1000 ; Sea : Biological Station of the University of Egypt, Dr. C. Crossland, 743 ; Bird Migration and the, Dr. C. Crossland, 574 ; 'Water-Bloom' : in Iceland Seas, Prof. O. Paulsen, 974 ; in South African Seas, T. J. Hart, 459
- Reflexes, Conditioned (*Review*), 792
- Refractive Indices of some Liquids in the domain of the Short Electric Waves, M. Miesowicz, 155
- Registrar-General's Statistical Review of England and Wales for the year 1933 (Tables, Part 1 : Medical), 929
- Regulation in the Organism, Principles of, Prof. A. Krogh (*Review*), 340
- Relativistic Mass Formula and Classical Mechanics, Relations between the, E. Guth and A. Haas, 911
- Relativity, Recent Work on, J. Delsarte ; Sir Shah Mohammed Sulaiman, 501
- Religion : A Psychiatrist on, J. C. Hardwick, 825 ; and the Sciences of Life : with other Essays on Allied Topics, Prof. W. McDougall (*Review*), 7 ; Studies in Comparative (*Review*), 305 ; East and West in, S. Radhakrishnan (*Review*), 305
- Religions, A Short History of, E. E. Kellett (*Review*), 305
- Research : and Development Lectures, 727 ; and Industry in India, 789 ; and Road Traffic, M. O'Gorman, 310 ; Industries in, Co-operation of, 509 ; Movement, and its Modern Development, A. L. Hetherington, 208 ; Planning of, 117 ; The Uneven Front of, Sir Harry McGowan, 510
- Resistances of the Order of  $10^{12}$  Ohms, Measuring, with a Ballistic Galvanometer, Dr. J. H. J. Poole, 154
- Resonance Radiation : and Excited Atoms, Prof. A. C. G. Mitchell and Prof. M. W. Zemansky (*Review*), 953 ; Quenching of, O. S. Duffendack and Dr. J. S. Owens, 817
- Rhætic Mammals, Miss Erika von Huene, 31
- Rhesus Monkey (*Macaca mulatta*), The Anatomy of the, T. H. Bast, and others. Edited by C. G. Hartman and W. L. Straus, Jr. (*Review*), 47
- (*Rhineodon typus*), Whale-Shark, in South Africa, Second Occurrence of the, K. H. Barnard, 66
- Rhizoctonia lamellifera*, Small, Parasitism of, J. C. Hopkins, 812
- Rhodesia : Northern, The Native and his Industries in, Prof. A. G. Ogilvie, 588 ; Southern, Meteorology in, 211
- Rhodesian Meteorite, First, Gift of, to the British Museum, 469
- Rhone Delta, Development of the, R. D. Oldham, 703
- Ricketts, Experimental, F. Rogozinski and Z. Glowczynski (6), 431
- River Gauging, 352
- Road : Making and Administration, Dr. P. E. Spielmann and E. J. Elford (*Review*), 754 ; Traffic : Research and, M. O'Gorman, 310 ; Science and, M. O'Gorman, 965 ; Travel a Century Ago, 673
- Rock : -Engravings in Central South Africa, Abbé H. Breuil (*Review*), 679 ; of Griqualand West and Bechuanaland, South Africa, The, Miss M. Wilman (*Review*), 679 ; -Salt : Absorption of Cosmic Rays, Dr. S. Ziemecki, 773 ; Irradiated with X-Rays : Electrical Resistance of, A. Vorobjev, 1020 ; Influence of Illumination on Dielectric Losses in, A. Krasin, 583 ; Natural Blue, Prof. K. Przibram (4), 911
- Roman : Empire, Map of the, 807 ; Remains at Ipswich, J. Reid Moir and G. Maynard, 384
- Rook, The Life of the, G. K. Yeates (*Review*), 893
- Root Studies, W. S. Rogers (4), 780
- Rose, Brand Canker of, caused by *Coniothyrium Wernsdorffii*, Laubert, Dr. Cynthia Westcott, 631
- Ross, Sir John, Paris Geographical Society and, 298
- Rothamsted Experimental Station, J. R. Moffatt appointed farm manager, 878
- Royal : Aeronautical Society, award of the British silver medal to C. W. A. Scott and T. C. Black, 728 ; Agricultural Society, award of the gold medal for 1934 to Sir Arnold Theiler, 878 ; College of Physicians of London, appointment of lecturers, 176 ; Commission for the Exhibition of 1851, appointments to overseas Scholarships, 73 ; Geographical Society : Early Exploration Efforts, 153 ; Gunpowder Factory, Waltham Abbey, Dr. R. C. Bowden appointed superintendent of the, 60 ; Horticultural Society, Gift to, by Miss L. Jones-Bateman, 60 ; Institution : Chemistry lectures at the, [1834], 470 ; Gas Lighting at the, [1834], 709 ; Meteorological Society, award of the Buchan prize for 1935 to Dr. F. J. W. Whipple, 846 ; Photographic Society's Annual Exhibition, 427 ; Sanitary Institute, Health Congress of the, 1935, the Earl of Malmesbury to be president of the, 249 ; Scottish Museum, T. Rowatt appointed director of the, 808 ; Society : Council of the, 727 ; Medal awards of the, 727 ; Lord D'Abernon elected a member of the, 733 ; Anniversary Meeting, [1834], 841 ; Anniversary Meeting and presentation of medals, 905 ; Elections to the, [1834], 945 ; of Edinburgh : new honorary fellows of the, 16 ; Election of officers, 660 ; of Medicine of Ghent, Centenary of the, 60 ; of New Zealand : Inaugural Meeting, 59 ; 427 ; Statistical Society, Annals of the, 1834-1934, 592 ; Wedding Service, Broadcast of the, 874
- Rubber : Electrodeposition of, Dr. D. F. Twiss, 742 ; from Vegetatively Propagated Clones, Yield of, Mann, Billington and Kaimal ; Rhodes and Mann, 31 ; Unstretched, Structure of, Studied by means of Electron Rays, G. Bruni and G. Natta, 507
- Rural Crafts, The Passing of, Dr. R. K. Schofield (*Review*), 159
- Russia, Arctic, Population of, 285
- Rust Fungi, British, W. B. Grove and C. G. C. Chesters, 184
- Rustic, Gone, C. Roberts (*Review*), 894
- St. Andrews University : Dr. R. J. D. Graham elected professor of Botany, 16 ; Conferment of honorary degrees, 37 ; Dr. A. M. Taylor appointed lecturer in Natural Philosophy and R. Jackson lecturer in Philosophy ; offer of annual prizes by the Sir Henry Jones Memorial Committee, 73
- St. Paul's School Field Club, 95
- Sakura-jima (Japan), Deformations of the Coast around, Prof. C. Tsuboi ; Prof. N. Miyabe, 940
- Salamander Embryo, Heterotopic Spinal Cord Grafts in, W. M. Rogers, 336
- Salicylic Acid, On a new Chemical, Theory and Researches on, Archibald Scott Couper (*Review*), 49
- Saline Solutions, Electrolysis of, with Distilled Water Electrodes, P. Jolibois, 787
- Salisbury Plain, Celtic Earthworks on, 20
- Salmacis bicolor*, Agassiz, Development of, Prof. R. Gopala Aiyar, 899
- Salters' Institute of Industrial Chemistry, awards of the, 73
- Salts : Dilution of, Heat of, Mlle. M. Quintin, 75 ; in Anhydrous Hydrogen Cyanide, Electrical Conductivity of, Prof. J. E. Coates and E. G. Taylor, 141

- Samaria, J. W. Crowfoot, 730
- Samarium, Radioactivity of, Herszfinkiel and A. Wronberg, 334
- Sandal, Insects and Spike-disease of, C. Dover and M. Appanna, 424
- Sanitary Aviation, Third International Congress of, 1004
- Sanitation of Rural Areas in the Tropics, Prof. D. B. Blacklock (Chadwick lecture), 696
- Sap in Trees, Movement of, Prof. G. J. Peirce, 385
- Sanriku (Japan) Earthquake Sea-waves of 1933, Dr. C. Davison; Imamura and Kawase; Prof. N. Miyabe; K. Musya, 820
- Saturation Magnetisation at Low Temperatures, Variation of, P. Weiss, 115
- Scenic Amenities, Preservation of, Dr. Vaughan Cornish, 843
- Schneider, Rudi, Further Tests of the Medium, T. Besterman and O. Gatty, 965
- Schumann Ultra-violet, Photodissociation of Molecules in the, Prof. A. Terenin and H. Neujmin, 255
- Science: and Armaments, Dr. H. Levinstein, 964; and Everyday Life, R. Brightman (*Review*), 889; and Food Supplies, 798; and Human Values, Archbishop of York, 764; and Industry: The Fertility of Ideas, Dr. J. T. Dunn, 509; and Intellectual Liberty, Prof. R. Woltreck, 27; and Psychological Research, Prof. J. S. Huxley, Dr. F. C. S. Schiller and Prof. E. W. MacBride, 458; and Road Traffic, M. O'Gorman, 965; and Sanity: an Introduction to Non-Aristotelian Systems and General Semantics, A. Korzybski (*Review*), 617; and Society (*Review*), 83; and the Modern Highway (*Review*), 754; and the Spirit of Man: a New Ordering of Experience, J. W. Friend and J. Feibleman (*Review*), 233; and Values (*Review*), 233; at the Universities: H. T. Tizard, 405; 629; Prof. J. B. S. Haldane, 571; Forthcoming Books of, 620; française depuis la xvii<sup>e</sup> siècle, La, Prof. M. Caullery (*Review*), 832; Frontiers of, 670; in an Irrational Society: delivered at Conway Hall, Red Lion Square, W.C.1, on April 25, 1934 (Conway memorial lecture), Prof. H. Levy (*Review*), 889; in the Public Press, Sir Richard Gregory, Bt., 474; Major Mysteries of, H. G. Garbedian (*Review*), 3; Museum: Gift of Handley Page Aeroplane to the, 134; Low Temperature Exhibition at the, 55; 210; News a Century Ago, 38; 73; 113; 153; 189; 225; 261; 297; 333; 389; 430; 470; 505; 545; 581; 637; 673; 709; 746; 786; 821; 862; 909; 945; 981; 1018; Obligations of, Dr. G. Sarton, 670; or Propaganda? (*Review*), 917; Progress of, An Account of Recent Fundamental Researches in Physics, Chemistry and Biology, J. G. Crowther (*Review*), 3; Progressive, and Social Problems, 301; Simple, Prof. E. N. da C. Andrade and Prof. J. Huxley (*Review*), 896; The Man of, and the Science of Man, Prof. J. L. Myres, 17; 41; Unity of, Dr. Henriques, 670
- Scientific: and Industrial Research: Advisory Council to the Committee of the Privy Council for, Sir John Cadman and Sir James Jeans appointed members of the, 531; Department of, E. Barnard appointed director of Food Investigation, and Dr. F. Kidd superintendent of the Low Temperature Research Station, Cambridge, 97; and Technical: Books, Recent, July 28, iii; August 25, iii; September 29, iii; October 27, v; November 24, v; December 29, iii; Periodicals in the Libraries of Australia, Catalogue of the, Supplement 1928-1933. Edited by C. A. McCallum and D. W. I. Cannan (*Review*), 400; Congress in France, [1834], 470; Life, Memories of a, Sir Ambrose Fleming (*Review*), 881; Management: International, 769; Sixth International Congress for, 319; Meetings and the Public, T. Sheppard, 601; News, The Service of, 473; Periodicals: Language Distribution of, Sir Charles Sherrington, 625; Published in the years 1900-1933, A World List of. Second edition (*Review*), 435; Research: and Social Needs, Prof. J. S. Huxley, and others (*Review*), 83; Present-day, Sir James Irvine, 926; Taxation and, R. W. Western, 92; Societies and Museums, Sir Henry Lyons, 374; Thought and Social Reconstruction, Dr. C. E. K. Mees (Steinmetz memorial lecture), 601; Unions: International Council of, Meeting at Brussels, 89
- Scilla, section *Euscilla*, Characteristic Structure of the Bulb in, P. Chouard, 155
- Scott Head Island: the Story of its Origin, the Plant and Animal Life of the Dunes and Marshes. Edited by J. A. Steers (*Review*), 892
- Scotland, the Historic Sequence of Peoples, Culture and Characteristics in, 400 B.C.-A.D. 950, Dr. A. B. Scott, 858
- Scott Polar Research Institute, 729; 818
- Scottish: Bishop, Physical Characters of a, Prof. D. Waterston, 815; Fisheries in 1933, 580; Hydro-Electric Stations, W. T. Halcrow, 451; Marine Fauna, A. C. Stephen, 384
- Sea: -Fish Commission for the United Kingdom. First Report: The Herring Industry, 594; Fisheries, Science and State Regulation of the, 593; Fishing, A. E. Cooper (Editor), (*Review*), 895; Transport, Modern Refrigerated, 212
- Seale Hayne Agricultural College, Tenth Annual Report, 249
- Search, The, C. P. Snow (*Review*), 890
- Secondary: Emission from Elements Bombarded with Neutrons, Dr. Z. Ollano; M. L. Oliphant, 735; Schools, Admission to, 1018
- Sedimentary Rocks: On the Mineralogy of, a Series of Essays and a Bibliography, Prof. P. G. H. Boswell (*Review*), 615
- Sedimentation Measurements in Intense Centrifugal Fields, Possibility of, Prof. The Svedberg, G. Boestad and Inga-Britta Eriksson-Quensel, 98
- Seeds: Dry, Irradiated, Faulty and Germinative Energy of, Mme. Suzanne Lallemand, 911; Longevity of, Sir Daniel Hall, 932
- Seismology, Bibliography of. Edited by E. A. Hodgson, 213
- Selenium, Anomalous Diamagnetism of, S. S. Dharmatti, 497
- Sense Organs, Practical Physiology of the, Dr. R. J. Lythgoe, 97
- Serial Universe, The, J. W. Dunne, 729
- Serum: Albumin, Alcoholysis of, V. S. Sadikov and V. A. Vadova, 432; Inactivated by Heat, The pH of, Dr. P. Lecomte du Noüy, 628
- Sex: and Reproductive Physiology, Recent Advances in, Dr. J. M. Robson (*Review*), 643; Hormones, Chemistry of the, Recent Progress in the, Dr. J. W. Cook, 758
- Sexual Physiology as applied to Practice, Dr. F. H. A. Marshall (*Review*), 643
- Shamanism in North America, L. L. Leh, 575
- Shear Waves through the Earth's Core, L. Bastings, 216
- Sheep Sweat a factor in Blowfly Attack of Sheep, F. G. Holdaway and C. R. Mulhearn, 813
- Sheffield: Radium Centre, X-Ray Equipment at the, 134; University: Mining and Fuel Research in, 212; A. J. Holland appointed the Society of Glass Technology research fellow, and N. E. Densem a research fellow in the department of Glass Technology, 821; J. C. Anderson appointed lecturer in Applied Anatomy and demonstrator in Anatomy; A. W. Fawcett lecturer in Surgical Pathology; E. F. Skinner lecturer in Psychology, 1018
- Shetland, Archaeological Excavations in, A. O. Curle, 943
- Ships and Engines, A Survey of, L. St. L. Pendred (Thomas Lowe Gray lecture), 875
- Siamese Fishes, H. W. Fowler, 740
- Siberian Meteor of June 30, 1908, Dr. F. J. W. Whipple, 816
- Siderose, Paramagnetic Rotatory Power of, J. Becquerel, W. J. de Haas and J. van den Handel, 154
- Silica: Fused, X-Irradiation of, F. Twyman and F. Brech, 180; Infra-red Spectra of, Dr. D. G. Drummond, 739
- Siliceous Cements, Formation of Definite Crystallised Compounds at the Commencement of the Hardening of, L. Chassevent, 747

- Silicon at Low Temperature, Oxidation of, A. Sanfourche, 787
- Silver, Photoelectric Emissivity of, Effect of Oxygen on, A. K. Brewer, 857
- Skating Rinks and Wave Bathing Pools, D. Mettler, 209
- Sky Light, Polarisation and Spectrum of the, during the Total Solar Eclipses of August 31, 1932, and February 14, 1934, Dr. W. M. Cohn, 99
- Skymeter, A New, 209
- Slavery in British Colonies, Abolition of, 153
- Sleep and Hypnosis, Dr. W. Brown; R. J. Bartlett, 980
- Smithfield Culture from a Cave on the Pondoland Coast, A New Variation of, E. C. Chubb, G. B. King and A. O. D. Mogg, 334
- Smithsonian Institution, Expeditions of the, 1933, 317
- Smoke Abatement Outlook, Dr. H. B. Meller, 224
- Snakes, Speed of, Dr. W. Mosaner, 318
- Social: Biology, Problems of, 393; Hygiene Congress, 493; Insurance, Prof. J. P. Dalton, 659; Interactions, Industrial and, 549; Problems, Progressive Science and, 301; Psychology, Power in, H. G. Wells; Prof. H. Levy, 972; Research, The Need for, A. Blair, 898
- Societies and Centenaries, Prof. A. Ferguson, 592
- Society: and Caste in the India of To-day, late Sir Claude Hill, 70; Islands, Petroglyphs in the, K. P. Emory, 740; of Chemical Industry, American Section, award of the Perkin medal of the, to Dr. G. O. Curme, Jr., 878
- Sodium: Hydride, Band Spectrum of, Isotope Effect in the, Dr. E. Olsson, 697; Nitritopentacyanide and Alkali Sulphides, Reaction between, G. Scagliarini and F. Monforte (4), 983; Peroxide: Oxygen Preparation from: a Dangerous Experiment, Dr. J. Newton Friend and S. Marks, 778; G. H. Cheesman and D. R. Duncan, 971; Phosphate, Fluoride as an Impurity in, Prof. A. Harden, 101
- Soil: Electrical: Constants of, Measurement of the, by a Lecher-wire method at a Wave-length of 1.5 m., Dr. R. L. Smith-Rose and J. S. McPetrie, 74; Properties of, at very High Frequencies, Dr. R. L. Smith-Rose and J. S. McPetrie, 781; Experimental Study of the, Dr. B. A. Keen, 566; 'Intoxication' of, Causes of, G. Luchetti, 392; Physics, International Conference on, 354; Science in Hungary (*Review*), 46
- Soils: Light, Treatment of, A. J. Hosier, and others, 329; Relationship of, to Manganese Deficiency of Plants, G. W. Leeper, 972, 974
- Solar: Corona, Proposal of a Method of Observing the, without an Eclipse, A. M. Skellett, 823; Spectrum, Light of very Short Wave-length (2100 Å.) in the, Prof. E. Meyer, M. Schein and B. Stoll, 535; System, Origin of the, H. P. Berlage, Jr., 668
- Solid State, Complexity of the, Prof. A. Smits and N. F. Moerman, 698
- Solids: Chemistry of, Dr. C. H. Desch (*Review*), 888; Dissipation Constants of, H. Walther, 704; Structure of (*Review*), 888
- d*-Sorbitol, N. H. Strain, 577
- Sound: and Noise, Dr. G. W. C. Kaye, 929; Perception, Apparent Duration Unit of, S. Lifshitz, 431; Recording for the Cinematograph, Dr. C. E. K. Mees (Sir Henry Trueman Wood memorial lecture), 260
- South: Africa: the Toxicology of Plants in, together with a Consideration of Poisonous Foodstuffs and Fungi, Dr. D. G. Steyn (*Review*), 607; African Literary and Scientific Institution (1833-1857), L. Crawford, 352; Australia, Mining in, 1003; -Eastern Union of Scientific Societies, Annual Congress, 186
- Space: and Time: Through, based on the Royal Institution lectures, Christmas 1933, Sir James Jeans (*Review*), 894; Evolution of Ideas of, Prof. H. T. H. Piaggio (*Review*), 611
- Spaced-aerial Direction-finders, Some Principles underlying the Design of, R. H. Barfield, 1014
- Spaces, Generalised, The Differential Invariants of, Prof. T. Y. Thomas (*Review*), 611
- Spearman's Two-factor Equations, the Orthogonal Matrix Transforming, into Thomson's Sampling Equations in the Theory of Ability, Prof. G. H. Thomson, 700
- Sphaerocarpos*, A Diploid Female Gametophyte of, C. E. Allen, 263
- Spain, National Academy of Medicine in, 1004
- Spark: Discharge, Development of the, Dr. T. E. Allibone and Dr. B. F. J. Schonland, 736; Investigation by the Wilson Chamber, Prof. U. Nakaya and F. Yamasaki, 496
- Sparrows and Bees, Sister Veronica, 420
- Special Libraries and Information Bureaux, Association of, Eleventh Annual Conference, 213; 542
- Species, Competition between, A. Formozov, 823
- Spectra and Latent Energy in Flame Gases, A. Egerton and A. R. Ubbelohde; Prof. W. T. David, 848, 854
- Spectrophotometry of Rapidly Changing Systems, Dr. E. R. Holiday and F. Campbell Smith, 102
- Spectroscopy: Applied (*Review*), 199; in Science and Industry, Dr. S. Judd Lewis (*Review*), 199
- Spherical Particle in an Ionised Field, Law of Charge of a, M. Pauthenier and L. Agostini, 787
- Sphygmometer, Invention of a, 545
- Spices, Medieval, G. M. Meyer, 414
- Spider Venoms, Variations of the Reactions of, J. Vellard, 191
- Sponges and Cumacea from East Greenland, M. Burton and C. Zimmer, 385
- Staff Management Association, 1001
- Standards, U.S. Bureau of, Annual Report, 188
- Stanton Moor Edge, Derbyshire, Gift of, by F. A. Holmes to the National Trust, 599
- Star: Colour Index of a, Generalisation of the Russel Formula for the Calculation of the, P. Rossier, 674; Effective Wave-length and the Absolute Colour Index of a, Relation between the, P. Rossier, 674; Neighbour, Our Nearest, 1003; New, in Hercules, J. P. M. Prentice, 963; Prof. F. J. M. Stratton, 974; Temperature Distribution in a, Particular Model of the, G. Tiercy, 582; Temperatures in the Interior of a, Function Introduced in the Calculation of the Distribution of the, G. Tiercy, 582; Variable, Peripheral Layer of a, Equation of Condition for the extremes of Ionisation in the, G. Tiercy, 227
- Starfishes, Pairing in, H. Ohshima and H. Ikeda, 385
- Starlings to Swallows, Hostility of, L. A. Waddell, 19
- Stars: Distribution of the Temperatures in the Interior of the, G. Tiercy, 431; Double, Eccentricities and Periods of, Reality of the Correlation Observed between the, D. Barbier, 946; *F5* and *G0*, Width of the Spectrograms of, G. Tiercy and A. Grosrey, 583; of the *K0* type, Width of Photographic Spectra for, G. Tiercy and A. Grosrey, 431; of the type *G5*, Width of Spectrograms for, G. Tiercy and A. Grosrey, 674; Spectral Classification of, Comparison of Two Criteria of, P. Rossier, 227; the Variable, 355, 1933 Hercules and 354, 1933 Ophiuchi, S. Piotrowski, 822
- Statistics Applicable to Indiscernible Particles, a General Method of, G. Allard, 470
- Steam: Carriages and Steam Boats, 261; Fire Engine, a Floating, 746; Tables, N. S. Osborne and C. H. Meyers, 491
- Steel Wire, Patented, Fatigue Properties of, E. T. Gill and R. Goodacre, 704
- Steels, Special, T. H. Burnham. Second edition (*Review*), 513
- Stellar: Spectra, Accurate Wave-lengths in, Dr. S. Albrecht, 704; Variations, Analysis of, Prof. E. A. Milne, 69
- Stemming Materials, Prof. J. A. S. Ritson and H. Stafford, 492
- Stereochemie: eine Zusammenfassung der Ergebnisse, Grundlagen und Probleme, Herausgegeben von K. Freudenberg. Lief. 4, 5, 6, 7, 8, 9, 10 (Schlusslieferung) (*Review*), 717
- Sterilisation: Laws, German, Dr. A. Lewis, 767; Human, To-day: a Survey of the Present Position, Cora B. S. Hodson (*Review*), 886
- Steric Hindrance and Geometrical Isomerism, Prof. P. Ramaswami Ayyar, 535
- Stone Age Cultures, Classification of, J. Reid Moir and J. P. T. Burchell, 526



- Stratosphere: Ascent: American, of July 29, 1934, Capt. A. W. Stevens, 707; into the, by Dr. M. Cosyns, 281; American Ascent into the, 132; 175; Russian Studies of the, Prof. P. A. Molchanov, 353; Ultra-Violet Solar Spectrum and Ozone in the, Prof. E. Regener and V. H. Regener, 380
- Strawberry, Root Rots of, in Britain, Dr. G. H. Berkeley, and Miss Isabel Lauder-Thomson, 856
- Stream-Line Train, A Fast American, 693
- Streitfeld Scholarships, award of, to I. Griffiths and P. Jacobs, 37
- Street Lighting: Committee on, 22; Modern, C. C. Paterson, 957
- Streptococci in Relation to Man in Health and Disease, Dr. Anna W. Williams (*Review*), 752
- Striated Muscles in Amphibia, Mesenchymatic Development of the, Z. S. Katznelson, 432
- Stromholm's Triaminosulphite, I. I. Chernijaev and A. M. Rubinstein, 431
- Sturgeon on Electrical Kites, 113
- Sturgeon's Electro-Magnetical Experiments, 581
- S-type, the J-type, and the, among Mathematicians, Prof. G. H. Hardy, 250
- Sucrose and *Iso*-Sucrose, Isomerism of, Sir James Irvine and D. Routledge, 143
- Suffering, The Conquest of, R. Calder (*Review*), 896
- Sugar Beet, Metabolism in, at Low Temperatures and the Storage of Beet in a Frozen State, A. I. Oparin, 335
- Sugars, Velocity of Mutarotation of Some, Influence of Circularly Polarised Light on the, P. Souty, 390
- Sulphate of Ammonia, Influence of, on Stubble-sown Oat Crops in Victoria, C. W. Wark, 432
- Sulphides on the Sea Bottom, Occurrence of, W. J. Copenhagen, 780
- Sulphite Waste Liquor, Rate and Extent of Anaerobic Decomposition of, by Bacteria of Sea-Water Mud, H. K. Benson and A. M. Partansky, 984
- Sulphur: Elementary, Microchemical Detection of, Prof. A. Schönberg, 628; Organic, Oxidation of, Applied to its Determination, C. Lefèvre and M. Rangier, 507
- Sulphuric Acid for Spraying Weeds, an Improved Method for the Handling and Dilution of, R. K. Macdowall, 540
- Sun: Horizontal Diameter of the, at the Royal Observatory at Campidoglio during 1901-10, A. De Legge, 639; Horizontal Diameter of the, in 1931, 1932 and 1933, G. Armellini, 299
- Sundial, a Portable, 768
- Sunlight, Denitrification in, Prof. N. R. Dhar, 572
- Sunspot: Number and the Refractivity of the Air, N. Dneprovsky, 853, 854; Numbers, 941
- Super-Novæ: Super-Novæ, Cosmic Rays from, W. Baade and F. Zwicky, 472
- Supraconducting Lead, Dependence of Magnetic Induction on the Magnetic Field in, G. N. Rjabinin and L. W. Shubnikov, 286
- Supraconductivity: and Fermi-Dirac Statistics, J. A. Kok, 532; and the Hall Effect, Dr. B. Lasarew, 139
- Supraconductors, Experiments on, T. C. Keeley, K. Mendelssohn and J. R. Moore, 773
- Surface Colour Formation, Heat Flow during, Dr. F. H. Constable, 100
- Surrey, The Place-Names of, J. E. B. Gover, A. Mawer and F. M. Stenton, in collaboration with A. Bonner (*Review*), 893
- Surveying: Plane and Geodetic, for Engineers, D. Clark. Vol. 2: Higher Surveying. Second edition (*Review*), 919
- Survival, Probability of, under the Mortality conditions of a given Calendar Period, V. Pajevskij, 39
- Swan, Trumpeter, Possible Recovery of the, 184
- Sweden, Magnetic Survey of, Dr. G. Ljungdahl, 146
- Swedish Meteorology, 249
- Sycamore Maple: in A.D. 1300, The, Dr. R. T. Gunther; Dr. J. Burt Davy, 215; in Britain, An Early Record of the, Dr. J. Burt Davy, 61
- Sydney University Field Research Station, 602
- Symbiosis as a Factor Producing Races in Micro-organisms, E. Pruzhanskaja, 1020
- Syntentognathi, Atlantic, C. M. Breder, Jr., 779
- Talbot's and Powell's Bands, application of the Theory of the Transmitting Echelon to the Explanation of, O. Darbyshire, 74
- Tanks, Experimental, William Froude and, 111
- Tannin Chemistry, Dr. D. Jordan Lloyd (*Review*), 611
- Tannins: The Natural Organic, History, Chemistry, Distribution, Dr. M. Nierenstein (*Review*), 611
- Tapirs, Young, Coloration of, 244
- Tartramide, Certain Compounds of, and of Tartramie Acid, Yeu Ki Heng, 154
- Taste and Chemical Constitution, A. J. Mee, 977
- Taxation and Scientific Research, R. W. Western, 92
- Tea Plant, Pruning of the, F. R. Tubbs, 184
- Technical: and Scientific Encyclopædia, Part 1, 568; Education: and Training of Chemists for Industry, W. Rintoul, 819; Industrial and National Aspects of, 819; in Scotland, G. W. Thomson, 819; Institutions, Association of, Annual Summer Meeting, 72; School, Functions of the, J. W. Bispham, 819; Training, etc., in a Large Centralised Industry, A. P. M. Fleming, 819
- Technological Progress, Economic Problems of, 579
- Telegraph Repeater Employing Carrier Currents, New type of, S. P. Chakravarti, 537
- Telephone: Automatic, 567; Statistics of the World, 527
- Telephony, Automatic, Traffic and Trunking Principles in, G. S. Berkeley (*Review*), 344
- Telescope, the 200-inch, 768
- Television: Emissions from London and a Local Station on Short Waves, some Attempts to Photograph the, D. Bodroux and R. Rivault, 430; for the Amateur Constructor, H. J. B. Chapple. Second edition (*Review*), 619; in the United States, 845
- Telford, Death of, [1834], 333
- Tell Duweir, Palestine, Exhibits from, 173
- Tellurium, Conductivity of, C. H. Cartwright and M. Haberfeld, 287; Second Spark Spectrum of, S. G. Krishnamurty, 255
- Temperature, Critical, as a Microchemical Characteristic, J. Harand, 947
- Termites of Java and Celebes, N. A. Kemner, 540
- Terra Nova* Expedition, some Tunicates of the, 112
- Tertiary: Dykes and Volcanic Necks of South Gippsland, Victoria, A. B. Edwards, 583; of the Saleve, Study of the, L. W. Collet and E. Parejas (1), 674
- Tetra-covalent Platinum Compounds derived from Tertiary Arsines, G. J. Burrows and R. H. Parker, 583
- Tetrahedra Conjugated to a quadric  $\Sigma$  and to Tangent Edges of a quadric  $S$ , B. Gambier, 115
- Tetrahydro-Naphthalene, Decahydro and, Raman Spectra of, Dr. S. K. Mukerji, 811
- Textile Microscopy, Modern, J. M. Preston (*Review*), 122
- Textiles and the Microscope, Prof. E. R. Schwarz (*Review*), 122
- Texture and Chemical Resistance, Dr. C. H. Desch, 693
- Thallium Cyanide, Crystalline Structure of, M. Strada, 711
- Thames Estuary Fisheries, L. Wells, 318
- Theodolite Axes, Design of, Prof. A. F. C. Pollard, 420; F. S. Richards; Prof. A. F. C. Pollard, 973, 974
- Thermal Springs, Neglected Factors in the Development of, E. T. Allen, 547
- Thermionic: Valve, a New Multiple-Electrode, E. E. Shelton, 577; Valves for Ultra-High Frequencies, B. Salzberg, 668
- Thermochemie: Prof. W. Swietoslawski. Traduit par M. Thon (*Review*), 991; Premier Rapport de la Commission Permanente de, Union Internationale de Chimie, Prof. W. Swietoslawski and L. Keffler (*Review*), 991
- Thermodynamics: Engineering, Elementary, Prof. T. H. Taft (*Review*), 344; for Chemists, An Introduction to, Dr. D. J. Martin (*Review*), 49; Second Law of, Activities of Life and the, Prof. F. G. Donnan and E. A. Guggenheim, 255
- Thermometer, Graduation of a, Control of the Regularity of, P. Vernotte, 262
- Thiocamphor and Other Cyclic Thioketones, Synthesis of, Sir P. C. Ray, 1010

- Thionine (Lauth's Violet), Acceleration of Respiration of Normal and Tumour Tissue by, Dr. F. Dickens, 382
- Thompson, Capt. David, Death of [1834], 38
- Thomson's Sampling Equations in the Theory of Ability, the Orthogonal Matrix Transforming Spearman's Two-factor Equations into, Prof. G. H. Thomson, 700
- Thorpe's Dictionary of Applied Chemistry. Supplement, Prof. J. F. Thorpe and Prof. M. A. Whiteley. Vol. 1 (*Review*), 556
- Thought: The Horizons of, a Study in the Dualities of Thinking, Prof. G. P. Conger (*Review*), 617
- Thunderstorms and Lightning, Prof. B. F. J. Schonland, 136
- Tidal Friction and Planetary Motion, T. Levi-Civita, 941
- Tide, Range of, Annual Perturbation in the, R. H. Cockran, 185
- Tierreich Das: eine Zusammenstellung und Kennzeichnung der rezenten Tierformen. Herausgegeben von F. E. Schulze und W. Kükenthal, fortgesetzt von K. Heider, seit 1927 von R. Hesse. Lief. 57: Pseudoscorpionidea I., Subord. Chthoniinea et Neobisiinea. Bearbeitet von Dr. M. Beier. Lief. 58: Pseudoscorpionidea II., Subord. C. Cheliferinea. Bearbeitet von Dr. M. Beier. Lief. 60: Acarina; Tydeidae, Ereyneidae. Bearbeitet von Dr. S. Thor. (*Review*), 720
- Tierriehs, Die Rohstoffe des, Herausgegeben von F. Pax, und W. Arndt. Lief. 9, 10, 11 (*Review*), 794
- Tierwelt Deutschlands und der angrenzenden Meeresteile nach ihren Merkmalen und nach ihrer Lebensweise. Begründet von Prof. F. Dahl. Weitergeführt von Maria Dahl und Prof. H. Bischoff. Teil 28: Tausendfüßler oder Myriapoda. 1: Diplopoda, Dr. O. Schubart (*Review*), 648
- Tiger Flathead (*Neoplatycephalus macrodon*), Natural History of the, A. N. Colefax, 391
- Timbers: North American, A. L. Howard (*Review*), 512; of Temperate North America: Identification of the, including Anatomy and Certain Physical Properties of Wood, Prof. S. J. Record (*Review*), 512
- Time System, The 24-hour, 172
- Tin, Magnetism of, Dr. S. Ramachandra Rao, 288
- Tissue Excitation, New Interpretation of (*Review*), 511
- Tissus: L'Excitation électrique des, essai d'interprétation Physique, Dr. A. M. Momnier (*Review*), 511
- Toads: and Toad Life, J. Rostand. Translated by Joan Fletcher (*Review*), 123; Save Sugar Crop, 877
- Tobacco Plants, Dwarf Amphidiploid, Production of, Prof. D. Kostoff, 1013
- Tones, Attributes of, S. S. Stevens, 712
- Toronto Horticultural Society, 746
- Toxic Aluminium in the Soil, Determination of the, A. I. Potapov, 192
- Toxicology of Plants in South Africa: The, together with a Consideration of Poisonous Foodstuffs and Fungi, Dr. D. G. Steyn (*Review*), 607
- Track to By-Pass: From, a History of the English Road, T. W. Wilkinson (*Review*), 893
- Traffic: Control of, by Light Signals, 806; Noise, P. J. H. Unna, 937; and the Ministry of Transport, 315; Reduction of, Sir Herbert Maxwell, Bt., 701
- Trance Personalities, A Quantitative Study of, W. Carington, 187
- Trans-Antarctic Flight, American, 246
- Transmutation, Induced Radioactivity and, Prof. F. H. Newman and H. J. Walke, 64
- Transvaal Museum, *Annals* of the, Indexes to, 97
- Tree Ring Conference, First, 213
- Trematodes: from Deep-Water Fishes, H. W. Manter, 855; Some Monocotylid, T. H. Johnston, 391
- Tribal Migrations East of the Mississippi, D. I. Bushnell, Jr., 30
- m.m'* Trifluorhydrazotoluene, Preparation of, M. Gonze, 787
- Trinidad and Tobago, Forestry in, 658
- Tristan d'Acunha Group, Positions in the, 769
- Trout in Tasmania, Feeding of, Dr. R. J. Tillyard, 328
- Tsetse Fly on the Gold Coast, Bionomics of the, K. R. S. Morris, 939
- Tuamotuan Stone Structures, K. P. Emory, 292
- Tubercle Bacillus: Electrifications of Various Varieties of the, Differences between the, Mlle. N. Choucroun and H. Plotz, 334; Filtrability of the, H. Plotz, 471; Loss of Virulence of the, Resulting from Association with *Bacillus tuberculophilus*, V. Puntoni and N. Favia, 639
- Tulip, The Scarlet, of the East, Sir Daniel Hall, 145
- Tumour and Kidney Respiration, Effect of 2: 6-Dichlorophenol-Indophenol on, Dr. K. A. C. Elliott, 254
- Tunicata: Northern and Arctic, Augusta Årnäck-Christie-Linde, 903; Report on the, Part I. Doliolida (British Antarctic (*Terra Nova*) Expedition, 1010, Prof. W. Garstang, 112
- Turbulence near the Ground, Prof. W. Schmidt, 856
- Turkeys, 'Blackhead' in, E. E. Tyzzer, 292
- Turque Agricole, La (Partie Asiatique-Anatolie), Prof. P. Zhukovsky (P. Joukovsky) (*Review*), 272
- Tusser Caterpillar, Development of the, S. Saito, 815
- Twentieth Century: The Problem of the, a Study in International Relationships, Lord Davies. New edition (*Review*), 10
- Twins, Identical, Studies of, R. Saudek, 1012
- Ulster, Fungus Flora of, A. E. Muskett, H. Cairns and E. M. Carrothers, 226
- Ultra: -Centrifuge, Use of the, for Studying the Golgi Apparatus, Dr. H. W. Beams, J. H. Mulyil and Prof. J. B. Gatenby, 810; -sonic Flame, A High-frequency Water Jet, and, J. J. Hopfield, 737; -Violet Light, Measurement of, Dr. J. R. Baker, 139; Radiation, Toxic Effects of, Dr. Florence E. Meier, 632; Seeing in the, Dr. W. de Groot, 494; Vision in the, Prof. C. Fabry, 736; Dr. Schober, 898
- Uganda and Zimbabwe, E. J. Wayland, 975
- Uncle Joe's Nonsense: for Young and Old Children, Dr. J. W. Mellor (*Review*), 441
- Unconscious: Exploring the, Further Exercises in Applied Analytical Psychology, Dr. G. Groddeck (*Review*), 919
- Underground Water Supply, Prof. W. S. Boulton, 652
- Unemployment Bill, Educational Provisions of the, F. N. Tribe, 72
- Union Radio Scientifique Internationale, Fifth General Assembly, Prof. E. V. Appleton elected president, 502
- U.S.A.: Adult Education in, 785; Airship Developments in, 875; Bilingualism in, 152; Bureau of Standards, Annual Report, 188; Co-operative Unification in Education, 709; Dental Education in, 821; Drought of 1934 in the, J. B. King, 211; Everglades National Park, 21; Foreign Students in, 672; Fur-farming in, 531; Geological Survey of, [1834], 909; Illuminating Engineering in, S. G. Hibben, 490; National Research Council, A History of the, 1919-1933, 319; Review of the School Year, 1933-34, 581; Social Sciences in the, 527; Television in, 845; Unemployment Among Teachers in, 945; United Communities Bill from the Point of View of India's Educational Problems, Capt. J. W. Petavel, 282
- U.S.S.R., Scientific Progress in the, The Mendeléeff Centenary and, 799; Vitamin Research in the, 630
- Units: Electric and Photometric, 329; the Metre, Kilogram, second and 'another unit' system of, Prof. G. Giorgi, 283
- Universe of our Experience, The, Dr. L. M. Parsons (*Review*), 81
- Universities: Bureau of the British Empire, Report for Year Ending July 31, 1934, 861; Science at the, H. T. Tizard, 372; 405; 629; Prof. J. B. S. Haldane, 571; Curricula in the, Prof. L. N. G. Filon, 429
- University: Education, Recent History and Function of, Prof. M. Greenwood, 804; in the New Age, the, Maycock, 491
- Upper: Air, Microbiology of the, B. E. Proctor, 741; Cretaceous in the Alpine Nappe of Elba, L. W. Collet and E. Parejas, 582

- Uranine, Fluorescent Power of Solutions of, Action of Sera on the, C. Achard, A. Boutaric and J. Bouchard, 946
- Uraninite, Crystalline, from Katanga, Composition and Age of, C. S. Hitchen and R. van Aubel, 982
- Urea-Urease System, Mitogenetic Radiation of the, E. G. Prokofiewa, 574
- Urease, Formation of, by *Aspergillus*, T. Miwa and S. Yoshii, 257
- Urobilinogen, Dr. R. Lemberg, 422
- Urocystis tritici*, Koern, Longevity of Spores of the Fungus, R. J. Noble, 76
- Uronectes fimbriatus*, a Fossil Crustacean, Dr. W. T. Calman, 145
- Uruguay, Special Education in, E. Verdesio, 909
- Va Nda, Possession among the, H. P. Junod, 256
- Valency Types and Problems (*Review*), Prof. T. M. Lowry, 267
- Valve Characteristics, Fine Structure of, B. van der Pol and J. T. Weijers, 107
- Valves, Screen-Grid, Grid-Anode Capacitance of, Measurement of the, T. I. Jones, 185
- Vanadium in Marine Animals and in Mineral Oils, A. Vinogradov, 855
- Vapor Pressure-Temperature Data, Line Coordinate Charts for. Prepared by F. E. E. Germann and O. S. Knight. Boiling Points of Ring Compounds. Boiling Points for Chain Compounds. (*Review*), 479
- Vaccine, Constitution of, Miss T. M. Reynolds and Prof. R. Robinson, 142
- Vegetable Tissues, Resistance to Cutting of, H. Prat, 976
- Velocity of Ascent of Aqueous Solutions through Porous Bodies, Influence of the Surface Tension on the, Mlle. Paulette Berthier, 1019.
- Vertebrae, Causes of Formation of Different Forms of, Prof. Himadri Kumar Mookerjee, 182
- Vertebral Column: The Evolution of the, a Contribution to the Study of Vertebrate Phylogeny, Dr. H. F. Gadow. Edited by J. F. Gaskell and H. L. H. H. Green (*Review*), 234
- Vertebrates, An Introduction to the, Prof. L. A. Adams (*Review*), 614
- Verulamium, Proposed Museum at, 695
- Vesalius on China-root, B. Farrington, 947
- Vesuvius, Eruption of [1834], 1018
- Vibration Spectra and Force Constants of 'Heavy' Acetylene, Dr. G. B. B. M. Sutherland, 775
- Vie et rajeunissement: une nouvelle méthode générale de traitement et mes expériences de rajeunissement de Bologne et Paris, Dr. F. Cavazzi (*Review*), 648
- Village, the Eternal, Sir John Russell (*Review*), 887
- Violins, Wood Used in, Structure of the, Dr. K. Lark-Horovitz and W. I. Caldwell, 23
- Virgil the Necromancer: Studies in Virgilian Legends, J. W. Spargo (*Review*), 891
- Viscosity of Liquids, a Theory of the, Prof. E. N. da C. Andrade, 32
- Vision in the Ultra-Violet: Prof. C. Faby, 736; C. F. Goodeve, 416; Dr. H. Schober, 898
- Visual Purple: Action of Light on, Mlle. M. L. Verrier, 39; Anomalies in the Absorption Spectrum of, S. Hecht and A. M. Chase, 335
- Vital's Calculus and its Extensions, E. Bortolotti (1), 711
- Vitamin: A: Cycle in Vision, Carotenoids and the, G. Wald, 65; Fish Liver Oils Rich in, Dr. J. A. Lovren, 422; B<sub>1</sub>, Chemical Constitution of, as Deduced from Ultra-Violet Absorption Spectra, F. F. Heyroth and J. R. Loofbourow, 461; Potency of Marmite, Marmite Food Extract Co., Ltd., 770; B<sub>2</sub> Activity, Synthetic Compound with, R. Kuhn, 966; and Flavines, Non-Identity of, Prof. C. A. Elvehjem and C. J. Koehn, Jr., 1007; (C), Ascorbic Acid, 724; Synthesis of, by means of Tissues *In Vitro*, Dr. B. C. Guha and A. R. Ghosh, 739; Glutathione and, in the Crystalline Lens, Everette I. Evans, 180; T. W. Birch and Dr. W. J. Dann, 383; Synthesis of, by the Infant, P. Rohmer, Miss Ursula Sanders and N. Bezssonoff, 142; (C?) in Milk, Effect of Light on the Reducing Substance, R. G. Booth and Dr. S. K. Kon, 536; Content of Certain African Cereals, M. Camis (1), 471; E, Absorption Spectrum of, A. J. P. Martin, T. Moore, Marion Schmidt and Dr. F. P. Bowden, 214; Research in the U.S.S.R., 630
- Vocational Guidance and Juvenile Employment, 601
- Vortices: Parallel, Stability and Oscillations of Certain Permanent Arrangements of, W. B. Morton, 190; Transported by the Wind, Effect of, A. Lafay, 154
- Vowel Sound Perception, A. Gemelli and G. Pastori, 742
- Waitaki Hydro-Electric Installation, New Zealand, Address at opening of the, Lord Bledisloe, 876
- Waite Agricultural Research Institute, 258
- War: by Poison, A. Marshall (*Review*), 952; Intelligent Man's Way to Prevent, Sir Norman Angell and others, Edited by L. Woolf (*Review*), 683; Peace and, in the Air, G. E. Woods-Humphery, 433; Prevention of, R. Brightman, 683; Science and, 315
- Washington and the American Philosophical Society, 506
- Wasser, Das schwere, Prof. H. Mark, 56
- Water: Bacteriological Examination of, 135; 'Bloom', Red, in Iceland Seas, Prof. O. Paulsen, 974; -Content of the Blood of the Lungs, Ability of Lung-tissue to Regulate the, A. Fröhlich and E. Zak, 300; Diffusion of Heavy into Light, W. J. C. Orr and Dr. D. W. Thomson, 776; Drinking, and Drought, 19; Economy and Supply, 171; Flow of, under Structures on Sand Foundation, Dr. E. McKenzie Taylor, and Harbans Lal Uppal, 425; from the Human Body, Elimination of, Prof. G. Hevesy and E. Hofer, 879; Heavy, Heavy Hydrogen and, H. S. Taylor, 388; Rideal, Hughes, Yudkin and Kemp, 389; in Chemistry, Prof. M. Polanyi, 843; in the Animal Body, E. J. McDougall, Prof. F. Verzár, H. Erlenmeyer and H. Gaertner, 1006, 1011; Some Experiments on, Prof. H. Erlenmeyer and H. Gärtner, 327; Hyacinth, Spread of the, F. P. Jepson, 623; Jet, a High-Frequency and Ultrasonic Flame, J. J. Hopfield, 737; Pressures on Works on Sand Foundations, Dr. McKenzie Taylor and Harbans Lal Uppal, 465; Resources, National, and the Need for a Comprehensive Survey, R. B. Dunwoody, 172; Supplies and the Drought, 134; in Rural Districts, 56; Regional, C. Smith, 172; Supply and Geology of the South-East of England, F. H. Edmunds, 186; Inland, Sir Hilton Young, 93; The Government and, 157; 641; Underground, Prof. W. S. Boulton, 652; Survey, Inland, A. Chorlton, 728; Prof. W. S. Boulton, 777; Capt. W. N. McClean, 814; 913; Wet Glass? Why Does, M. Holderer, 910; with Anomalous Density, Occurrence in Nature of, G. Vereschagin, A. Gorbov and I. Men-delejev, 335
- Wave Mechanics: Advanced General Theory, Prof. J. Frenkel (*Review*), 608; Generalised, R. Zaicoff, (3), 299
- Waves of Shock, Luminosity of, A. Michel-Lévy and H. Muraour, 39
- Way, The, and the Truth, Prof. H. Dingle (*Review*), 81
- Weather: in Great Britain and Ireland in 1933, 695; Natural History of, Sir Napier Shaw, 38; Reports, Weekly, 565
- Webster's New International Dictionary of the English Language. Second edition (*Review*), 603
- Weeds, Common, of the Chicago Region, P. C. Standley, 703
- Wells, H. G.: The Autobiography of, Prof. H. Lévy (*Review*), 882; Reveals Himself (*Review*), 553
- West Indies: Meteorology of the, 940; Three Deep-water Fishes from the, G. S. Myers, 740
- West Kennet Avenue, Avebury, Excavation of, A. Keiller, 566
- Western Civilization and the Natives of South Africa: Studies in Culture Contact. Edited by Dr. I. Schapera (*Review*), 587

- Wever and Bray Phenomenon, Origin of the, C. S. Hallpike, 419
- Whale-marking in South Georgia, 599
- Whale-Shark (*Rhineodon typus*) in South Africa, Second occurrence of the, K. H. Barnard, 66
- Whales and Caisson Disease: J. A. Campbell, 629; R. W. Gray, 853; of the Far East, B. Zenkovitch, 583
- Whaling Industry (Regulation) Bill, 174
- Wheat: Extract of, Preparation of, for the Study of the Growth Factor of Micro-organisms, W. H. Schopfer, 507; in Great Britain, Dr. J. Percival (*Review*), 606; History of, Sir John Russell (*Review*), 606; Mummy, W. H. Parker, 730; Problem of the Rust of, and, Mountains, J. Constantin, 154; Spring, Drought Resistance and its Outward Signs in Different Varieties of, I. Kolomic, 335
- Wheats, Irrigated, of the Transvolga Areas, Grain Quality Control of, N. Petinov, 583
- Wheelwright's Shop, The, G. Sturt ('George Bourne'). Reprint (*Review*), 159
- Whewell: on Inductive Science, 114; on Tides, 297
- White Flies in Asia, Insect Enemies of, C. P. Clausen, 184
- Wicklow Mountains, Glaciation of the, A. Farrington, 75
- Wild Flowers in Literature, V. Rendall (*Review*), 124
- Williams, Stenhouse, Memorial Library, Opening of the, 600
- Wind: Speed, High, at Mount Washington, 658; Tunnel Interference on Wings, Bodies and Airscrews, H. Glauert, 68; Tunnels for Aeronautical Research, 453
- Wine Makers and Bottle Makers: a Parable, Prof. V. Karapetoff, 625
- Wireless: Communication: and the Mercantile Marine, J. A. Slee, 95; Short Wave, A. W. Ladner and C. R. Stoner. Second edition (*Review*), 45; Communications with the Mount Everest Expedition, 1933, D. S. Richards, 247; Echoes from Regions above the *F* Layers, Prof. H. R. Mimno, 63; Telegraphists, Technical Instruction for, Handbook of, H. M. Dowsett. Fifth edition (*Review*), 45
- Wolf Rayet Stars and Novæ, Spectra of, C. S. Beals, 147
- Wollaston, William Hyde (1766-1828), Unveiling of Memorial Plaque, Prof. W. T. Gordon, 86
- Woodlands, Natural, Preservation of, W. Dallimore, 694
- Wood: Preserving Association, British, Sir John Stirling Maxwell re-elected chairman of the, work of the, 1003; used in Violins, Structure of the, Dr. K. Lark-Horovitz and W. I. Caldwell, 23
- Worcestershire Natural History Society, 225
- Working Hours in Industry, Reduction of, 927
- World: in Modern Science: The Matter and Quanta, L. Infeld. Translated by L. Infeld (*Review*), 125; Power Conference, Transactions of the, Sectional Meeting, Scandinavia, 1933. 7 Vols. (*Review*), 645; Problems, Present and Past, Dr. N. M. Butler, 602
- Xanthyl- $\alpha$ -naphthylmethyl, magnetic Properties of a Free Radical, Mme. Simonne Allard, 982
- Xenopus*: *laevis*, Muscle Creatine, in, Effect of Hypophysectomy and Castration on, B. G. Shapiro and H. Zwarenstein, 947; Variations in the Ovarian Response of, to the Gonadokinetic Principle of the Anterior Pituitary, S. Honikman, H. A. Shapiro and H. Zwarenstein (1), 982
- X-Ray: Absorption Edges, Fine Structure of, D. R. Hartree, R. de L. Kronig and H. Petersen, 446; Emission, Fluorescent Yield of, Prof. G. Hevesy and H. Lay, 98; Lines, Natural Width of, L. Pincherle, 983; Plant at the Davy-Faraday Laboratory, Dr. A. Müller and Dr. R. E. Clay, 942; Region, very soft, *L*-Absorption Spectra in the, V. H. Sanner, 100
- X-Rays: and Electrons, The Diffraction of, by Amorphous Solids, Liquids and Gases, J. T. Randall (*Review*), 895; and Radium, Protection against, 807; and the Coarse Structure of Materials, Sir William Bragg (Mackenzie Davidson Memorial Lecture), 942; Atomic Scattering Factor of Copper for X-Rays, Effect of Dispersion and of Lattice Distortion on the, G. W. Brindley and F. W. Spiers, 850, 854; Exploration of the Mineral World by, Prof. W. L. Bragg, 401
- Xylose from Maize Cobs, preparing, C. Antoniani, 507
- Yale North India Expedition, G. E. Hutchinson, 87
- Yard, The Imperial Standard, Sears and Barrell, 147
- Yarrovisation, Factors of, Results of Varying the Intensity of the, V. Cerling and A. Chepikova, 1020
- Yeast: Cells, Suspensions of, Electric Impedance of, Dr. H. Fricke and H. J. Curtis, 102; Extract, Effect of, on the Growth of Plants, B. Viswa Nath and M. Suryanarayana, 27; Nucleic Acid of, Enzymic Scission of the, Contardi and Ravazzoni, 857
- Yellow: Earth, Children of the, Studies in Prehistoric China, Dr. J. Gunnar Andersson. Translated by Dr. E. Classen (*Review*), 121; Fever, Three Thousand Vaccinations against, in French Western Africa, C. Mathis, J. Laigret and C. Durieux, 787; Glasses in the Technique of Lighthouses or Aviation Beacons, Utilisation of, A. Blondel, 822
- 'Yerba Maté', Origin and use of, Capt. T. A. Joyce, 370; 722; 760
- Yurok Marriage, T. T. Waterman and A. L. Kroeber, 67
- Zeolites, Studies on the, M. H. Hey (8), 115
- Zeppelin LZ-129, 19
- Zimbabwe, Uganda and, E. J. Wayland, 975
- Zinc Sheathing for Ships, 190
- Zirconyl Iodide and the Alkaline Iodides, Combinations of, E. Chauvenet and Mlle. J. Boulanger, 638
- Zoological Gardens: the, [1834], 546; 710; Society of London, retirement of Sir Peter Chalmers Mitchell from the Secretaryship; Prof. J. S. Huxley to be nominated as successor, 280
- Zoologie: et biologie générale, Leçons de, Prof. G. Bohn (3): Les invertébrés (Coelentérés et vers) (*Review*), 721; Traité de, E. Perrier. Fasc. 10: Les mammifères; Index alphabétiques des 10 Fascicules, Prof. R. Perrier (*Review*), 794
- Zostera*: Distribution of, R. W. Butcher, 68; in American Waters, Wasting Disease of, C. E. Renn, 416; *marina*, The Fungus on, T. G. Tutin, 573; Wasting Disease of, Dr. H. E. Petersen, 143; Dr. Kathleen B. Blackburn, 738

Supplements should be collated and bound  
with the numbers with which they were issued.





A WEEKLY JOURNAL OF SCIENCE

*"To the solid ground  
Of Nature trusts the mind that builds for aye."*—WORDSWORTH.

SATURDAY, JULY 7, 1934

No. 3375

Vol. 134

CONTENTS

	PAGE
Production and Planning . . . . .	1
On Caviar for the Community . . . . .	3
The London Clay Flora. By Prof. A. C. Seward, F.R.S. . . . .	6
Philosophy of Life. By F. S. Marvin . . . . .	7
Studies in Heat. By N. M. Bligh . . . . .	8
Short Reviews . . . . .	9
Geochemistry of Living Matter. By B. P. Uvarov . . . . .	11
Origin and Nature of the Association between Invertebrates and Uni- cellular Algae. By Prof. C. M. Yonge . . . . .	12
Obituary :	
Prof. A. P. Chattock, F.R.S. . . . .	15
Dr. T. G. Pinches . . . . .	16
News and Views . . . . .	16
Letters to the Editor :	
Structure of the Wood used in Violins.—Dr. K. Lark-Horovitz and W. I. Caldwell . . . . .	23
Atomic Theory.—Dr. John Tutin; Prof. R. H. Fowler, O.B.E., F.R.S. . . . .	23
Spontaneous Emission of Neutrons by Artificially Produced Radio- active Bodies.—M. Goldhaber . . . . .	25
Hyperfine Structure of the Resonance Lines of Potassium.—D. A. Jackson and H. Kuhn . . . . .	25
Negative Nuclear Spins and a Proposed Negative Proton.—Dr. S. Tolansky . . . . .	26
The Changing British Fish Fauna.—Dr. E. B. Worthington . . . . .	26
Effect of Yeast Extract on the Growth of Plants.—B. Viswa Nath and M. Suryanarayana . . . . .	27
Science and Intellectual Liberty.—Prof. R. Woltereck; Editor of "Nature" . . . . .	27
Inheritance of Habits.—C. J. Bond, C.M.G.; Prof. J. B. S. Haldane, F.R.S. . . . .	28
Collecting Spilled Mercury.—Dr. C. V. Boys, F.R.S. . . . .	29
Increase of the Percentage of Diplogen in Water during very slow Evaporation.—Dr. T. Tuchsolski . . . . .	29
Chromosome Numbers in Menispermaceae.—Prof. A. C. Joshi . . . . .	29
The "Johannes Schmidt" Ridge in the Indian Ocean.—Dr. Hans Petersson . . . . .	29
Density of Dead Sea Water.—R. J. Clark and F. L. Warren . . . . .	29
Research Items . . . . .	30
The First Parsons Steam Turbine . . . . .	33
Annual Visitation of the National Physical Laboratory . . . . .	33
Jubilee of the Junior Institution of Engineers . . . . .	36
University and Educational Intelligence . . . . .	37
Science News a Century Ago . . . . .	38
Societies and Academies . . . . .	38
Forthcoming Events . . . . .	40
Official Publications Received . . . . .	40

Production and Planning

GRADUALLY the industrial and commercial world is being brought round to the acceptance of the idea of the wisdom of, and the necessity for, planning. Planning is being tried in many ways and described by many names. Sometimes trade interests suffice to exercise the necessary control; more often Government intervention is necessary.

Fundamentally, the fact is that at long last it is being recognised that the excessive individualism either of a person, a firm, an industry or a country may be a danger to a nation or to the world, even to the extent of becoming a social crime. National interests are being regarded as a higher ideal than individual interests, while vested interests are viewed with increasing suspicion: the most enlightened think internationally, of mankind. The Fascists' plan to establish the corporate State with limits, within which interests may operate, laid down by the Government, is receiving increasingly serious consideration and support. The limits will be the welfare of the nation as a whole, to which all lesser interests whether of the Right or Left, whether they be employers or workpeople, bankers or other professional men, are subordinate. The 'small man' has become alarmed at the fact that the old system of government has proved quite unable in the last decade to prevent the world, and to a lesser extent Great Britain, being nearly ruined by an abundance which is produced below cost.

The combination of three factors, ample finance, applied science and industrial technique, including improved transport, has enabled the world to produce goods at an extraordinary rate: rationalisation of industry has added to the power to produce goods, but unfortunately there has been no corresponding machinery to enable the goods to be consumed.

Such ingenious attempts to solve this problem as buying by instalments or hire purchase have not really affected consumption as they have chiefly been confined to luxury articles. The outstripping of demand by production of the primary commodities has piled up a world unemployment problem of disastrous magnitude, and a vicious circle has been set up of falling prices and unemployment which is proving hard to break.

How planning can be most satisfactorily attempted is the question which awaits an answer. The form must undoubtedly vary according to the commodity. In Britain we all agree as to the danger of too much initiation, control or regulation by Government departments—a fact which has recently been acknowledged by Mr. Runciman. Business men seek beyond all else to avoid Government interference, but their freedom from this control must in return involve some obligation on their part not to over-produce.

As one illustration of the kind of thing to be avoided, what is happening in the lead industries which manufacture white lead and a variety of products from the metal may be cited. The existing old-established firms have been seeking successfully to combine into one organisation during several years past, so as to weld a previously competitive trade into an up-to-date organisation engaged in manufacture, treatment and distribution of lead products on a reasonable manufacturing scale and profit basis. Owing perhaps to the large amount of capital at present existing for which no useful outlet can be found, experimental efforts are now once more being made to establish further plants which, as the existing plants are not fully occupied, are in fact surplus. Such unregulated over-production by newcomers can only lead to disorganisation and loss of capital: it is a fallacy that new processes must of necessity show reduced production costs. The lead industry is setting a good example in going into the titanium paint trade jointly with Imperial Chemical Industries and others, instead of each company acting individually: a healthy industry giving steady employment and manufacturing economic-

ally is likely to be set up without detriment to the consumer in regard to the price he will be asked to pay.

The public is already acquainted with the restriction schemes in force for tea and tin, both of which are successfully acting to rescue these industries from impending disaster. The new international scheme of rubber control can be described as highly scientific. Its object is to restrict production so as to bring it into line with consumption and to lessen the present unduly large stocks. Having fixed export quotas for the various producing countries, these are to be maintained at 100 per cent for two months, reduced to 90 per cent for two months, to 80 per cent for two further months and then to 70 per cent. The gradual reduction avoids too great a dislocation at the plantations and likewise prevents too rapid an advance in price at the outset of the scheme which might hinder manufacturing operations. It is expected to take eighteen months at least with export quotas at 70 per cent to bring the world stocks of rubber down to normal. The scheme not only balances output as between the respective producing countries, but also between the plantations and the native small producers: it is a remarkable example of the principles of give and take in the common weal, enforced, let it be said, only with difficulty after all concerned have drunk deeply of the cup of adversity. There are no doubt faults and loopholes for evasion in such a scheme, as Sir Eric Geddes has pointed out, but it is for all concerned to carry it out loyally, for without it the rubber industry could scarcely survive.

In the future it should be possible to put through similar schemes for other commodities with less difficulty. We hold it improper for one nation to hold up any scheme which is in the interest of the world at large merely in order to bargain for better terms. It is likewise improper for a farmer who is planting a restricted acreage by agreement to increase his normal crop on the smaller area by the unusual application of fertilisers. Such action is said to be nullifying many of the attempts to improve things for the farmers in the United States. It should be regarded as unsocial, and penalised accordingly: if the individual will not work for the common good, he invites drastic action by the State.

The world is populated by human beings exercising some degree of thought and not by mechanically controllable units. Consequently



there is always an opportunity for new fields of production which have mass appeal. Salesmanship, above all the selling of new ideas, is the need of the moment, and it is the profession which is the most highly rewarded financially: it should therefore attract the best brains. Motoring, gramophones, radio, the moving and the talking picture, have in turn captured the imagination and the purses of the multitude and given rise to an immense amount of employment. Who knows what other inventions applied physics or chemistry have in store for us? The decaying industries must also take salesmanship and science into partnership as, for example, the railways and shipping. What a difference the pleasure cruise has made to our idle shipping, and the railways will find that we are travel-minded on land too if they produce the right schemes.

A form of national planning which is under trial is that presented by the trade agreements which Great Britain is making with certain countries. The basic idea in these is to ensure more certain markets for certain British commodities, in particular coal, in return for the sacrifice of lesser industries to competition with the foreigner. It is the general view of industry that in the agreements so far made we have sacrificed more than we are likely to gain and that they have been entered into without sufficient expert advice from industry and consideration of their possible repercussions. The principle of these agreements is probably a good one and only experience can enable us to pronounce on their value, but the experiment is one which is undoubtedly well worth trying; nothing is more essential than to stimulate export trade between the nations. Quotas are also an example of planning by the State, though they are best regarded as an offensive and defensive weapon in tariff wars.

Of recent years Great Britain has never been able to make up its mind whether it is to be developed as an industrial or agricultural country. Politically it is the former so far as voting strength is concerned, and it is obvious that so long as our factories could be kept fully occupied in the export trade, it was convenient and necessary as well as cheap to take most of our food from abroad. In the measure that the export trade falls, it is no longer convenient to import and pay for large quantities of foreign food, whilst national considerations of safety in war time demand that a large proportion of our food be produced at home. In

consequence partly of the long period of low prosperity, the organisation of agriculture in all its branches is on a much lower plane than that of industry, and in particular the costs of distribution are unduly high; there is unnecessary wastage and an undue proportion of the profits remain in quarters where the risk and the responsibility are least.

Most of these problems are capable of being solved by planning on a county or national scale, provided that the farmer, renowned as an individualist, is prepared to join loyally in co-operative action.

This analysis is of the slightest, but it would seem clear that individualism has failed, that it must be replaced by planning for the common weal. Such planning is best done on the small scale by industries, on the large scale by nations and eventually internationally. Here science can be helpful and it must not stand aside or let itself be held aloof; the problems are bigger ones than the politicians can envisage, and their solution must profit no party end but bring employment, peace and prosperity to all. Party politics are obsolete and harmful; they must be replaced by a government concerned only with the restoration of prosperity and possessing the ability to plan economic production without putting hindrances in the way of invention.

#### On Caviar for the Community

- (1) *Major Mysteries of Science*. By H. Gordon Garbedian. Pp. 320+64 plates. (London: Selwyn and Blount, Ltd., n.d.) 18s.
- (2) *Electrical Conceptions of To-day: a Lucid Explanation of many of the Latest Theories concerning Atoms, Electrons and other matters relating to Electricity*. By Charles R. Gibson. Pp. 284+8 plates. (London: Seeley, Service and Co., Ltd., 1933.) 6s. net.
- (3) *Exploring the Upper Atmosphere*. By Dorothy Fisk. Pp. 166. (London: Faber and Faber, Ltd., 1934.) 6s. net.
- (4) *The Progress of Science: an Account of Recent Fundamental Researches in Physics, Chemistry and Biology*. By J. G. Crowther. Pp. x+304+12 plates. (London: Kegan Paul and Co., Ltd., 1934.) 12s. 6d. net.

IT is something of a commonplace to say that we might well suspend research work and devote ourselves to the formidable task of ensuring

that the products of achieved research are assimilated into the life-stream of the community. This is just as true, and just as misleading, as another commonplace about the world disease which, with an unconscious irony of bitter flavour, is called 'over-production'. If, in fact, the producers who have done their work so well could readily—and temporarily—be transformed into distributors, of equal merit, then in the wider and narrower sphere alike the world would be better off. But, in both spheres, the bravest of all new worlds would result from leaving the uniquely qualified producers to continue their beneficent work, and entrusting the work of dissemination and assimilation to other minds of quantitatively equal but qualitatively different merit.

Any newspaper will suffice to justify the adjective 'formidable' as appropriate to the task of interpreting, to the individual units of the social system, the significance of science in the life of the world, the nation and the citizen. Any book-shelf will reinforce the evidence. The radical fault lies, probably, no less in the mind of the investigator than in that of the plain citizen. It is by no accident that the epithet 'best-seller' is almost as violently abusive in relation to scientific literature as in æsthetic. The explorer has always been suspicious of the *entrepreneur*. Yet, somehow, by rational process, we must prevent a repetition, in this matter of scientific knowledge, of the disastrous history of distributive trade. Complicated though the problem be by the fact that the scientific mind is scientific only over limited tracts of subject matter, of time and of personal contact, yet its solution is vital to the advance of civilisation.

Huxley and Tyndall intrude so frequently into discussions of this kind that they must be brought into perspective. Without going back to King Charles's Head, or even to Queen Anne, one may at least say, fairly, that it is doubtful whether Huxley or Tyndall were more powerful expositors than are Jeans and Eddington; and it is scarcely so much as doubtful that they did as little to bring science *into* everyday life as do these distinguished contemporaries of ours. All four have been more valuable as anæsthetists than as physicians. The concern of everyone with a sense of the community must, at present, be less with Lethe than with the Clyde.

The four books before us are representative of four approaches to the interpretation of scientific work to the ordinary reader. All succeed in a measure of 'vulgarisation' in the pure French

sense, with no trace of 'vulgarisation' in the English sense. There is in them, that is, no trace of what an inspired reviewer once called "a plumber's dream of Paradise". But in Mr. Crowther's book alone is there any useful approach to the major problem of scientific motive and economic consequence. All four have the characteristic defects of their kind: one can pick from them gems of the customary 'modes', the plain tale, the anthropomorphic, the coyly persuasive, the roseate romantic, the rhapsodic hysteric. But since none of them pretends to be more than its title suggests, and since each honestly and interestingly conveys a truthful picture within the indicated field, they are a little unfortunate to find themselves involved in a conflict between the very different 'realities' of the metaphysicist and the politician. They merit discussion on their selected planes.

(1) Mr. Garbedian's is the least satisfactory of the four, yet it is exceedingly interesting and stimulating. "Each of the twenty-seven chapters deals with a separate distinct problem of modern science", and the problems range from sources of available energy, through lengths of human life, through cosmic radiation to cosmogony. This wide sweep is beyond the powers of any one interpreter from inside, and the lack of a completely satisfying flavour is a natural consequence of a treatment which is necessarily reporting rather than interpretation. The facts are generally accurately reported, the comments of a somewhat assorted team of authorities are cited, but there is a lack of synthesis and correlation.

(2) Dr. Gibson has an easier task, and achieves it more successfully. He has stirred a great population of growing minds to enthusiasm for "the science of to-day", and this issue in a new form of his "Modern Conceptions of Electricity" is well fitted to continue his important work in that direction. The opportunity offered by the re-shaping should, however, have been used for some necessary correction and modification, for the conceptions presented are not wholly those of to-day, but of a yesterday which was in many ways more favourable to simple exposition but far less stimulating than the very thrilling to-day of atomic and philosophic physics. The particular "to-day" of this volume contained no neutron, no positive electron and no isotope of oxygen; it would be unreasonable to demand that it should have reached isotopes of hydrogen, but these intermediate advances ought to have found a

place in any 1933 printing. Up to the chosen yesterday, the conceptions are pleasingly set out; the only really misleading points noticed are the quotation of a shockingly superficial dismissal, by Dolbear, of the problem of earth currents, and the apparent suggestion, a few pages later, that the luminosity of the nebulae is due to bombardment by electrons from our sun. These, together with the over-frequent numerical errors (as in the atomic weight of chlorine), will prove stumbling blocks on an otherwise pleasant and not hazardous path.

(3) Miss Fisk gives a lively, attractive and almost invariably reliable account of the knowledge—fragmentary though it still is—brought down from the upper atmosphere by the manned balloon, the *ballon sonde*, the sound wave, the radio wave, the meteor, the cosmic ray and the gamut of light waves. Her book is unique in its kind, and may be very cordially recommended to those who need convincing that romance is not confined to romances, nor even to bringing up the nine-fifteen. The tight-rope of scientific accuracy within universal readability has seldom been more charmingly walked.

Both the ozonosphere and the ionosphere will want reconstruction in the second edition. Miss Fisk has failed to record the scurvy trick by which the ozone workers, having enticed the acoustic workers into finding data which fitted admirably with an ozone 'layer' at 50 kilometres, have recently destroyed the fit by bringing their ozone down to much lower levels. The situation as to the structure and ionising agencies of the ionosphere is much clearer, that as to radio echoes of long delay much less clear, than Miss Fisk succeeds in making them. The blame for the defects of her discussion of these subjects must be shared with the radio-physicists. She might well, however, eliminate the suggestion that the "D layer varies in height between about 25 to 30 miles"; there is no safe experimental or theoretical basis for believing this. Clearer recognition of the distinction between 'equivalent' and geometric paths in the ionosphere would have modified the author's statements alike about the *F* layer and about echoes of long delay.

It is not easy to understand why the author rejects the officially accepted record for low temperature at ground level,  $-94^{\circ}$  F. at Verkhoiansk, Siberia, January 3, 1885, in favour of a modest  $-76^{\circ}$  F. on the Great Ice Barrier, Ross Sea, July 6, 1911, and Harang's aurora at 40

miles height has escaped mention in the appropriate chapter. These are almost the only points on which the author has gone astray, save in a very misleading juxtaposition of glowing coals and hot-wire microphones. The book is, let us repeat, novel, attractive and accurate, and our distinguished contemporary, *Punch*, had no excuse whatever for misunderstanding Miss Fisk's statement about Martian ballistics.

(4) Mr. Crowther alone offers some hold for the ponderous harpoon with which we embarked on our present fishing expedition. Mr. Garbedian's goldfish—with his frequent sporadic assertion that they may lay golden eggs—Dr. Gibson's honestly anatomical herring, and Miss Fisk's flying fish, should have been taken otherwise, but Mr. Crowther does recognise clearly that scientific culture is not a culture *in vitro*. He recognises that the æsthetic exercise of scientific research, desirable and precious as it is, cannot be understood without reference to the social medium in which it grows. "This book is intended . . . to make him [the general reader] more impatient of leaders who cannot take a scientific view of human problems." It is equally valuable in helping him to take a human view of scientific problems.

The first three chapters give fascinatingly contrasted pictures of the atmosphere of notable research institutions in England, Denmark and the Soviet Union. Later chapters proceed from the already well-explored themes of the expanding universe and stellar evolution to the less remote and less *vulgarisèes* stories of penetrating radiations, the positron and heavy hydrogen. The author then turns to three chapters of biological significance, on "The Chemistry of Human Evolution", on "Human Heredity" and on "Pernicious Anæmia".

The book is full of sound fact, of scientific judgment and of stimulating comment. But the quality which sets it apart from the more superficial 'romance of science' is its steady emphasis on the interrelationship of scientific research and social environment. Mr. Crowther will help the scientific worker to realise that the 'world around us' is after all nearer our hearts than the 'universe around us'. To those who make it a demerit that he brings politics into his science he can fairly reply that this importation is the only available corrective to the older process, already disastrously advanced, of bringing the products of science—without its method or its wisdom—into politics.

### The London Clay Flora

British Museum (Natural History). *The London Clay Flora*. By Eleanor Mary Reid and Marjorie Elizabeth Jane Chandler. Pp. viii+561+33 plates. (London: British Museum (Natural History), 1933.) 50s.

IN this noble volume recently published by the Trustees of the British Museum, Mrs. Reid and Miss Chandler describe the results of an intensive study of thousands of fruits and seeds strewn along the foreshore of Sheppey and Herne Bay by the action of the sea on the cliffs of clay in which the drifted debris was originally embedded. The London Clay, reaching in places a thickness of 500 ft., is exposed at the surface or lies beneath superficial accumulations over a large area in Middlesex, Surrey, Essex, Kent and in the Hampshire basin. In addition to remains of crocodiles, turtles, shells of *Nautilus* and other marine creatures, the clay contains innumerable samples of vegetation, mainly seeds and fruits, which grew on the northern shore of the Tethys Sea.

The authors summarise the history of our knowledge of a flora that has exercised the ingenuity of writers since the early days of the eighteenth century. The first scientific attempt to study the fossils was by Dr. J. S. Bowerbank, F.R.S., a city merchant, who in 1840 published the first part of an incompleting work. Despite the fact that his identifications were largely incorrect, Bowerbank's contribution is described as "one of the masterpieces of palæobotanical literature". More recently compiled lists, notably those by the late Baron Ettingshausen, have little value. Most of the material described in the present work is from the Bowerbank Collection, purchased by the Museum in 1865, also the Reid and Chandler and Jenkins Collections, both of which were presented to the Museum. With very few exceptions the fossils are seeds and fruits, and these, at the hands of the two leading experts in a most difficult line of research, have yielded up the secrets of their structure, their affinities to existing species, and in many instances even the manner of germination. It has been clearly demonstrated that seeds and fruits are more trustworthy records than leaves or other parts of plants.

In the introduction the authors give an account of their methods of attack; they discuss the relative importance of various diagnostic characters, and state reasons for referring certain species to extinct rather than to existing genera. Tables

are given showing the geographical distribution of living representatives of the London Clay genera, and the flora is compared with others of earlier and of later date. Special attention is given to the value of fossil plants as guides to climate, and apt quotations from descriptions of tropical forests facilitate reconstruction of those which were the source of the fossil material. These and other topics of general interest are handled with conspicuous ability and with impartiality. Excluding the diatoms recorded in 1881 by Shrubsole and Kitton, 234 species are described under specific names in addition to eight species *incertæ sedis*: the named species include one *Chara*, six conifers, and sixteen monocotyledons; the rest are dicotyledons, and not a single one is considered to be identical with a living plant. The flora is composed almost entirely of woody plants (ninety-seven per cent): all the species are believed to be extinct: of ninety well-founded genera, twenty-five are recent, sixty-five extinct. One of the many problems to be solved was the degree of importance to be attached to peculiarities in structural features in deciding whether or not the differences between the Tertiary and recent species were or were not beyond a range of variation which might be expected within a single genus. Comparison of many of the fossils with their living representatives also added new links to evolutionary series.

The London Clay families are mainly, or in part, tropical: five are exclusively tropical, fourteen are almost confined to the tropics, twenty-one are equally tropical and extra-tropical, and five temperate. A striking fact is the close relationship of the fossil species with plants that are now living in "the very heart of the East Asian Tropics", mainly in Malaya. There is very little relationship with Europe, West Asia, America and Africa. Statistics based mainly on fruits and seeds from later Tertiary floras show a gradual transformation of the flora of the London Clay into floras that are definitely European. The early Tertiary vegetation represents a stage when the climate of western Europe was warmer than at any subsequent period.

It has long been assumed that the animal and plant fossils of the London Clay indicate a tropical climate. Mrs. Reid and Miss Chandler, after discussing the opinions of some other palæobotanists that the value of fossil plants as criteria of climate has been over-estimated, give their verdict in favour of the more generally accepted belief that, if a flora is considered as a whole, it is a trustworthy index of climatic conditions. In criticising

the view that in the passage of time plants may have changed in their reactions to climate, the conclusion is reached that we have no evidence of greater power of adaptability in the past than at the present day. The facts cited, though they support this view, scarcely constitute a fatal objection to the possibility—a possibility which cannot be proved—that plants have suffered a constitutional change in the course of many million years rendering them more sensitive to the effects of climate. The conclusion is that the mean annual temperature in the area now occupied by the London Clay was about 70° F.

The authors believe that many of the London Clay plants were derived from early Tertiary forests in Malaya: the close resemblance of the western European Eocene flora with the present flora of Malaya may be regarded as an established fact, but this does not necessarily imply a Far Eastern source for the London Clay flora. It is conceivable that when the Malayan genera existed in western Europe they had not reached the Malayan region. We have little exact information on the Tertiary flora of Malaya; the correctness of the authors' conclusion that the London Clay plants were wanderers from the place where their present-day descendants are living may be questioned.

The authors dismiss Wegener's hypothesis of continental drift and shifting poles as inapplicable to the established facts of plant distribution in the Tertiary and Quaternary periods. If the gradual drifting apart of America and Europe occurred as Wegener supposed, one would expect a closer relationship of floras on the two sides of the Atlantic ocean in the earlier stages of continental separation: the evidence points in the opposite direction. It may, however, be suggested that continental drift did not follow the routes postulated by Wegener: the failure of one form of drift does not necessarily invalidate the idea of a mobile crust. The authors believe that the solution of the problem can be found by altering the distribution of land and sea in accordance with the hypothesis of Dr. C. E. P. Brooks and by assuming changes in solar radiation.

The publication of this admirably illustrated volume, embodying the results of seven years' work, is a notable event for which many readers will be grateful to the Trustees of the British Museum and to Dr. Lang, the Keeper of the Geological Department; it is a fitting recognition

of the splendid services rendered to botanical and geological science by two workers whose pre-eminence in a particularly difficult and exacting branch of research is acknowledged by their palaeobotanical colleagues. A welcome supplement to the present work would be a paper illustrated by a few maps and a table of Tertiary and post-Tertiary plant-bearing series giving a general account of the gradual transformation of floras and the wanderings of plants since the dawn of the Tertiary period. A. C. SEWARD.

### Philosophy of Life

*Religion and the Sciences of Life: with other Essays on Allied Topics.* By William McDougall. Pp. xiv+263. (London: Methuen and Co., Ltd., 1934.) 8s. 6d. net.

THERE is an orderliness, a vigour and a sense of conviction about everything which Prof. McDougall writes, which secure a ready attention from his readers and often actually influence one's opinion. This is the case with more than one topic treated of in the present volume. The author tells us that the first essay, which gives its title to the book, contains the thread of thought connecting the whole; it is necessary therefore to state that a little more fully than the rest. It is this. Whereas as a youth he was an ardent student of Darwin, Spencer and other 'agnostic' writers, in later life he has advanced to a more 'religious' position, coming to think that the 'spiritual' in man has an independent existence and value, and is capable in various measures of subjugating the material aspects of the world. This is the starting point; but he goes further and asserts that in these spiritual experiences man makes contact with a real and supremely important aspect of the universe, in which he shares, being influenced by it and in return contributing something.

It will be seen that in these short pages—the essay only runs to sixteen—Prof. McDougall succeeds in raising and summarising in very effective form some of the deepest philosophical questions. It is equally clear that they cannot be adequately discussed in the few lines of a review, and we would here only note them, and note also that he seems to have come to his change of mind chiefly from meditating on the æsthetic aspect of man's activity, and that the two thinkers who have personally most influenced him are the late Poet Laureate in England and M. Bergson in France.

It is easy to understand how this religious or philosophical progress has been bound up in the author's mind with the special lines of scientific inquiry which have interested him, and which form the bulk of the essays in this volume. It is clearly akin to the form of vitalist doctrine which appeals to him. If we connect the 'spiritual' element in man's nature with that which manifests itself in all living things leading up to man, we must postulate this to be of some distinct and intrinsic value, above the physical and chemical changes which we observe in the inanimate. It is also bound up with the work of the two societies of which Prof. McDougall tells us he is an active member—he thinks the only active person belonging to both. These are the Eugenics Society and the Society for Psychical Research of which he has been the president in America, actually founding that in Boston. To find out by scientific methods the nature of the spiritual element is very properly his leading interest; and he adds to this the equally strong practical passion to increase by eugenic methods the number of efficient individuals by whom the spiritual element in the world may be transmitted and increased. His two essays on this topic, and his cogent argument for distinguishing between the eugenic and dysgenic forms of family allowances, are perhaps the part of the book which will seem to call for most immediate and detailed consideration.

On another side of his subject we know that Prof. McDougall feels strongly and will arouse a good deal of sympathy in philosophical circles; that is the need for more scientific psychology at the older universities. He urges this in an essay reprinted from the *Edinburgh Review* of 1927, and it remains substantially true at the present time. But there is one subject on which he is inclined himself to be a little less than philosophic, and that is 'race'. He often speaks, in discussing national characteristics, as if they were mainly to be connected with blood and actual descent, whereas the historian will be much readier to seek them in the historical or sociological environment by which the nation has been formed. The truth no doubt lies in a delicate balance of the two aspects; Prof. McDougall seems to tilt it somewhat on the 'racial' side which we now associate with 'Aryan' echoes.

It is almost needless to say that the book on the whole is highly stimulating and valuable.

F. S. MARVIN.

### Studies in Heat

- (1) *Heat*. By Prof. James M. Cork. Pp. xi+279. (New York: John Wiley and Sons, Inc.; London: Chapman and Hall, Ltd., 1933.) 18s. 6d. net.
- (2) *A Text Book on Heat*. By Dr. A. W. Barton. Pp. xiii+378. (London, New York and Toronto: Longmans, Green and Co., Ltd., 1933.) 7s. 6d.
- (3) *Heat (Matriculation Standard)*. By Robert W. Hutchinson. Pp. vii+266. (London: University Tutorial Press, Ltd., 1933.) 3s. 6d.

(1) **P**ROF. CORK'S treatise is essentially an advanced theoretical survey. Its scope can best be indicated by paraphrasing certain statements in the author's preface. The pioneer work of Fourier in attacking thermal problems gave solutions from which other branches of the science such as electricity and magnetism were able to profit, and the introduction of the quantum in the theory of radiation was the basis of remarkable advances in many related fields. The presentation of this newer matter together with the older classical treatment widens the scope and range of material of an adequate text surveying the whole scheme. The book aims at covering in a not too detailed manner the complete development of the subject.

Such an ambitious scheme in a book of this length obviously involves drastic condensation. Working descriptions of classical experiments are either omitted or indicated only in outline, and the same may be said of practical laboratory experiments; the book not being intended as a practical course, such experiments are only referred to or suggested.

The volume would form a good adjunct to an advanced course of lectures; it certainly has the merit of being complete rather than detailed, and contains information on almost everything which a reader could reasonably require; the presentation brings out clearly the connexion of the subject with physical chemistry and allied branches of science. To offset the condensation, very full references are given to original papers to which the student is expected to refer. A competent mathematical equipment is naturally assumed, if only to bridge the steps in the deduction of important relations and formulæ, and these again can be studied in detail, as the requirements of the reader dictate, from papers or special sources. Important recent work is included; the two concluding chapters deal with the production of high

and of low temperatures; seven out of the remaining nine chapters end with a set of questions and problems, and an appendix of 14 pages gives tables of constants and numerical data.

(2) Before attempting a survey such as that referred to above, the student can be confidently recommended to Dr. Barton's textbook which, as the author states, has been written to satisfy the needs of those reading for university entrance scholarships and various Higher School Certificate and university intermediate examinations. At the same time, the subject is treated so as to show that the study of a branch of natural science may be genuinely cultural. To this end the scientific method and the development and "appreciation of the beauty of the rational scheme which has been created by the mind of man to explain the phenomena of Nature" are kept to the fore throughout.

With regard to the scope of the work, in addition to the form of presentation of the more elementary topics to be expected in an intermediate textbook, chapters are devoted to the kinetic theory of gases, Van der Waals' equation, cyclical operations and adiabatic changes, and the laws of thermodynamics. The possibilities of the quantum theory are hinted at in places, but are not actually introduced. The order adopted is justified in the introduction, which gives a striking logical development of the aspects of the subject, and which a student of the book should on no account omit

to read. The following commendable features of the text are especially evident: new practical methods are given, historical presentation is adopted but much historical dead-weight is omitted, and the mathematical treatment is entirely up to date and extremely clear. The whole text gives a general impression of efficiency and completeness without attempting to be exhaustive, and this impression is supported by the adoption of a uniform and readable style of printing, together with diagrams well above the average in quality and clearness. In subsequent editions the index might be made considerably more detailed.

(3) The well-known style of the Tutorial Press textbooks is preserved in this thoroughly sound introductory course. While the conventional order and treatment is followed, improved practical methods and apparatus are introduced, and special attention is given to modified versions of classical experiments which can be performed by students with simplified but effective devices. It is satisfactory to note the inclusion, among others, of short sections dealing with platinum resistance thermometers and thermocouples, the equilibrium of balloons as an illustration of a practical application of the gas laws, the determination of the calorific value of fuels, and an electrical method of finding the latent heat of vaporisation of a liquid.

N. M. BLIGH.

### Short Reviews

*The Birds of Tropical West Africa: with Special Reference to those of the Gambia, Sierra Leone, the Gold Coast and Nigeria.* By D. A. Bannerman. (Published under the authority of the Secretary of State for the Colonies.) Vol. 3. Pp. xxxv+487+12 plates. (London: Crown Agents for the Colonies, 1933.) 2s. 6d.

WITH the issue of the third volume of Mr. Bannerman's great work, sponsored by the Secretary of State and by the Colonial Governments in West Africa, the project is half completed. In this volume we find the representatives of such cosmopolitan orders as the owls and the swifts, side by side with those of such purely African groups as the plantain-eaters and the mouse-birds; or we may contrast the rollers and the hoopoes, ranging widely in the Old World, with the trogons, discontinuously distributed in tropical forests from South America to Malaya. The representation is often large: for example, twenty-four species of owls and thirteen of kingfishers within the area, and sub-species as well.

The information given for each form includes a description of it and a note on its identification

in the field: this is done even for familiar European species occurring as migrants, so that the work serves as a complete guide for the observer on the spot. There follows a summary of the available information as to the range, local distribution and habits of the bird, and although the data under these heads are often of necessity very meagre, they should provide both a basis for further work and an incentive to its undertaking. Questions for elucidation are abundant: the predatory methods of the fishing-owls do not seem to have been observed; the 'indicator' behaviour of the honey-guides is proved only for one species; the strange nidification of the hornbills is worthy of further study; and knowledge of the migrations of the different nightjars rests upon scanty records.

The illustrations deserve special praise. The principal artist is Mr. Henrik Grönvold, but there are also coloured plates by Mr. G. E. Lodge and the late Major Henry Jones. If one may be singled out for mention, Mr. Lodge's group of bee-eaters—five species vying with each other in the varied brilliance of their plumage—is a thing of beauty.

Publications du Bureau d'Études géologiques et Minières coloniales. *Les ressources minérales de la France d'outre-mer*. 1: *Le charbon*. Pp. iii+245. 24 francs. 2: *Le fer, le manganèse, le chrome, le nickel, l'étain, le tungstène, le graphite, le glucinium, le molybdène, le cobalt, le titane, le vanadium*. Pp. iii+436. 36 francs. (Paris: Société d'Éditions Géographiques, Maritimes et Coloniales, 1933-34.)

THESE two volumes form part of a series the aim of which is to make better known the geology and mineral resources of the French colonies. A preliminary volume, "La géologie et les mines de la France d'outre-mer", was noticed in NATURE last year (vol. 131, June 10, 1933). It was of an introductory nature, and dealt with each colony in turn, emphasising more particularly the geology of these scattered colonies. In the volumes under notice the plan differs, each material or element being treated separately. The general scheme is as follows. An adequate account of the geology of each deposit is given, illustrated by sketch maps and diagrams. This is followed by a description of the nature of the ores and the forms in which they generally occur. In volume 2, which deals with iron and metals important in the metallurgy of iron and steel, the uses and metallurgy of the several metals are discussed. Finally, with the aid of up-to-date statistics as to production, consumption and markets, the present importance and future possibilities of each deposit are summarised. Comparative descriptions are also given of world deposits other than those of the French colonies.

Many of the deposits described are at present comparatively unimportant commercially. Nevertheless, to the geologist and mining engineer the volumes are definitely interesting, since they furnish descriptions, with bibliographies, of the geology and ore deposits of a number of little-known countries, the literature of which is otherwise relatively inaccessible.

To the economist and politician the importance which some of these deposits might assume in the event of another world war may not be without interest.

*The Problem of the Twentieth Century: a Study in International Relationships*. By Lord Davies. New and revised edition. Pp. xvii+819+2 plates. (London: Ernest Benn, Ltd., 1934.) 21s. net.

IT is encouraging to find that a second edition of this masterly book has been called for, and for an estimate of its general content and purpose we must refer to the review of the first edition published in NATURE on January 17, 1931. The three years which have elapsed since then have only added to the urgency of the problem discussed, while they have given Lord Davies the opportunity of urging his solution in the House of Lords, where he spoke with the cordial though guarded sympathy of Lord Cecil and the other friends of the League of Nations and international

peace. The three years since the first edition have added to the difficulties of disarmament the fresh menace of a now triumphant Nazi party in Germany. Germany has left the League of Nations because she will not submit to gentle control. Is she more likely to return, if it is armed, on Lord Davies's plan, with all the resources of scientific warfare? We allude to these things not in a spirit hostile to the book, which is an admirable summary, historical, political and technical, of the whole question of the international prevention of war, but only to show the extreme and recently increasing difficulty of applying the solution of an international police force. The most hopeful line would seem to be that indicated by Lord Cecil in the debate in the House of Lords. Concentrate on the control of the air, a sphere which is most clearly international and in which our means of action are most modern and scientific.

F. S. M.

*Catalogue of the Books, Manuscripts, Maps and Drawings in the British Museum (Natural History)*. Vol. 7: *Supplement J—O*. Pp. iv+513-967. (London: British Museum (Natural History), 1933.) n.p.

WITH this volume more than half the task of cataloguing the "supplementary" works in the Library of the Natural History Museum at South Kensington is completed. No information is given as to the period covered by this supplement, but in its earlier part it includes works published up to 1923 and in its later part to 1931. In addition, there are works of an earlier period—such as the majority of the entries under the heading of "Linnaeus (Carl)", which form a valuable classified index to writings by or about the great botanist, occupying 91 pages of the book. The type is clear, the bibliographical work of the high quality which readers have come to expect in these volumes; the book will be valued as a guide to a great library of natural history, and as a general index to the natural science publications of its period.

*Introduction à l'étude de l'effet Raman: ses applications chimiques*. Par Prof. Pierre Daure. Pp. viii+90. (Paris: Éditions de la *Revue d'Optique théorique et instrumentale*, 1933.) 18 francs.

THIS little work gives a brief and simple, but extremely clearly written account of "one of the greatest gifts bestowed by physicists upon chemists". The five chapter headings are: molecular diffusion and the Raman effect; technique; application of the spectra to chemical analysis; interpretation of Raman spectra; and examples of chemical application. Attention is thus fairly apportioned between the practical and theoretical side. Photographs of Raman spectra are well reproduced. The examples are almost wholly confined to organic substances, and the extensive contributions made by research workers in India and the United States with the help of this rapidly developing physical weapon are almost untouched.

N. M. B.



## Geochemistry of Living Matter

THE chemical composition of living organisms has been studied in the past by many scientific investigators, but not in a systematic way. A new and thoroughly comprehensive approach to the investigation of the whole problem can be seen in the work of the Biogeochemical Laboratory of the Russian Academy of Sciences, under the inspired leadership of Prof. V. I. Vernadsky, whose fundamental idea is to study living matter not as something apart from so-called inorganic Nature, but as an important participant in the extremely complex chains of the geochemical processes proper to our planet. E. Suess already in 1875 proposed the term 'biosphere' for that portion of the earth's crust which contains life<sup>1</sup>, but no attempt has ever been made to investigate the extent to which the multitudinous 'rocks' of the earth's crust are influenced by living organisms. Vernadsky is convinced that the geochemical rôle of organisms is grossly misunderstood and underrated. This fascinating problem was raised by him<sup>2</sup> so far back as 1918, and in 1928 a special laboratory was created for the purpose of investigating it. The enormity of the task before the laboratory makes it impossible to expect any far-reaching results within such a short period, but two reports<sup>3,4</sup> and a series of papers published from the laboratory contain a mass of valuable data, which can be only very briefly reviewed here.

One of the first problems before the laboratory is the quantitative investigation of the chemical composition of living organisms. In this direction, apart from card-indexing all the existing scattered information, some important data have been obtained on the fresh-water plankton (Vinogradov<sup>3</sup>), on a number of insects (Bergman<sup>4</sup>; Vinogradov<sup>5,6</sup>), on Echinodermata (Terent'eva<sup>4</sup>), etc. A general survey of this problem has been presented by Vinogradov<sup>6,7</sup>, who points out that the data, mostly very fragmentary, exist with regard to the elementary chemical composition of only about five thousand species of plants and two thousand species of animals, which is less than 0.5 per cent of the known species. Sixty of the chemical elements have already been found in living organisms, and there are good reasons to expect that the remaining ones will also be discovered in them.

The chemical composition of various organisms is very similar with regard to such elements as carbon, nitrogen, sulphur, phosphorus, hydrogen and oxygen, but the quantity of others, such as iron, manganese, iodine, bromine, arsenic, boron, titanium, vanadium, etc., is subject to great variations from species to species. Certain organisms can be regarded as accumulators of definite elements; for example, ants accumulate manganese (Vinogradov<sup>5,6</sup>), Lycopodiaceæ accumulate aluminium, etc. An extremely interesting graph constructed by Vinogradov demonstrates

that the chemical composition of living matter can be regarded as a periodic function of the atomic weights of elements, and the periods go mainly in sixes, so that every sixth element has a special importance for organisms. Further, it appears that organisms most ancient geologically (such as bacteria, Foraminifera, etc.) are able to concentrate a much wider range of elements, while the range of elements concentrated by the highest modern organisms (Aves, Mammalia) is very much restricted.

Another point of interest is the conclusion reached after a study of several species of *Lemna*, which proved to possess each a definite chemical composition, while the variation within each species was very small (Vernadsky and Vinogradov<sup>9</sup>). Hence it appears probable that the quantitative chemical composition is a specific character. Further, important data have been obtained on the presence in organisms of certain rare elements. Thus, vanadium proved to be present in some plants, but in much more appreciable quantities in *Ascidia* (Vinogradov<sup>4,10</sup>); the rubidium content of the plants *Suaeda maritima* and *Salicornia herbacea* growing on the shores of the Sea of Azov proved to be of the same order as that in the water of that sea (Burkser and others<sup>4</sup>). Special attention was paid in the laboratory to the concentration of radium by various species of *Lemna*, and it was found that the radium content of the water in which they grow decreases in spring when the plants show a rise in radium content; in autumn when the plants die off, radium from them again returns into the water (Brunovsky<sup>3</sup>; Vernadsky<sup>11</sup>). The problem of the carbon content in animals was studied in Acrididæ by Kunasheva<sup>4</sup>, and some indications obtained with regard to the changes connected with the species, sex and the stage in the development. The chemical changes connected with metamorphosis in insects were investigated by Bergmann<sup>4</sup> in a series of species.

Another problem studied by the laboratory is the determination of atomic weights of elements obtained from living organisms. Already in 1926 Vernadsky<sup>12</sup> put forward a hypothesis that living organisms should possess a selective power between isotopes of an element, so that an element obtained from them should not contain a mixture of isotopes as is the case with the many elements in inorganic Nature. Technical difficulties connected with the organisation of these investigations do not yet permit the attainment of any definite results, but in the meantime Loring and Druce<sup>13</sup> have shown that in the potassium from potato the isotope of atomic weight 41 predominates; in ordinary potassium the chief isotope, of course, is of atomic weight 39. In the Biogeochemical Laboratory, work is in hand on the atomic weights of potassium in peas and beans, and of uranium in various organisms.

The geochemical rôle of living organisms is

obviously closely connected with the rate at which the organisms are able to assist in the migration of chemical elements in the biosphere. This rate, or the geochemical energy of living matter, depends on several specific properties of the organisms, namely, the average weight, the volume and surface of the individual, the rate of reproduction and the rate of dispersal over the earth's surface (Vernadsky<sup>14</sup>). Special methods have been elaborated by the Laboratory for the determination of these constants (Vernadsky<sup>15</sup>; Cholodovskij<sup>3,4</sup>).

Since the fundamental idea behind all the studies which have been directed by Prof. Vernadsky is to understand in a quantitative way the whole immensely complex series of processes connected with dynamic biogeochemistry, it is only natural that some of his publications represent attempts at building up comprehensive theories. Here belongs, first of all, his profoundly philosophical treatment of the whole problem of the biosphere<sup>1</sup>, which one would like to see republished, since in the last few years a great number of new facts has been accumulated, and many hypotheses can be either substantiated, or modified. Another remarkable work is the history of natural waters<sup>16</sup>, where 485 'species' of water occurring in Nature are distinguished and classified according to their genesis and properties. A general discussion on the geochemical problems in oceanography<sup>17</sup> represents another brilliant summary of a very difficult subject.

Scientific workers who prefer definitely ascertained facts to far-reaching hypotheses may argue that the time is not yet ripe for an all-embracing treatment of living matter as a factor in the history of our planet. No one, however, after acquainting himself with Prof. Vernadsky's work, will be able to doubt that such a treatment is not only thoroughly scientific, but also is already yielding important results bearing a promise of establishing surprising interrelations between the so-called inorganic and organic worlds. It is a matter of deep regret that most of the publications by Prof. Vernadsky and his school are in a language which prevents his views from becoming more widely known amongst biologists, chemists and geologists, for all of whom they open new and promising fields of study.

B. P. UVAROV.

<sup>1</sup> V. I. Vernadsky, "Biosphera" (in Russian), Leningrad, 1926; "La biosphère", Paris, 1929.

<sup>2</sup> *Mem. Acad. Sci. Ukraine*, No. 3; 1918.

<sup>3</sup> *Travaux du Labor. Biogeochem. Acad. Sci. U.R.S.S.*, 1; 1930.

<sup>4</sup> *idem*, 2; 1932.

<sup>5</sup> *Acad. Sci. Ukraine*, Mem. Class. Phys. Math., 11, No. 3, 369; 1929.

<sup>6</sup> *C.R. Acad. Sci. U.R.S.S.*, 227; 1929; *ibid.*, 127; 1930.

<sup>7</sup> *C.R. Acad. Sci. Paris*, 1673; 1933. *Priroda*, No. 8-9, 1933; 1933.

<sup>8</sup> "Geochemistry of Living Matter" (in Russian). Publ. of the Acad. Sci. U.S.S.R., 1932, 67 pp.

<sup>9</sup> *C.R. Acad. Sci. U.R.S.S.*, 148; 1931. *C.R. Acad. Sci. Paris*, 560; 1931.

<sup>10</sup> *C.R. Acad. Sci. U.R.S.S.*, 465; 1930.

<sup>11</sup> *C.R. Acad. Sci. Paris*, 421; 1930.

<sup>12</sup> *C.R. Acad. Sci. U.R.S.S.*, 215; 1926. *C.R. Acad. Sci. Paris*, 131; 1931.

<sup>13</sup> *Chemical News*, 140, 34; 1930. *l.c.*, 142, 33; 1931.

<sup>14</sup> *Bull. Acad. Sci. U.R.S.S.*, 697, 727, 1053; 1926.

<sup>15</sup> "Instructions for the Determination of Geochemical Constants." Publ. Acad. Sci. U.R.S.S., 1926, 2 parts.

<sup>16</sup> "History of the Minerals of the Earth's Crust", vol. 2. "History of Natural Waters", part 1 (in Russian). Leningrad, 1933.

<sup>17</sup> *Miner. und Petrograph. Mitteil.*, 44, 168; 1933.

## Origin and Nature of the Association between Invertebrates and Unicellular Algæ

By PROF. C. M. YONGE, University of Bristol

THE widespread occurrence of zoochlorellæ or zooxanthellæ within the tissues of invertebrates is now universally recognised, the extent of knowledge on this subject up to 1930 being well summarised by Buchner<sup>1</sup>. Nevertheless the actual nature of this association, or rather of the many forms which this may take and the connexion between these, is greatly in need of clarification. It is unfortunate that of the many workers in this field none, save Brandt, one of the earliest, has studied conditions in more than one or two groups. My own work on the comparative physiology of digestion and on symbiosis between zooxanthellæ and Anthozoa and Mollusca, together with a critical examination of recent, largely experimental, work on this type of symbiosis, has enabled me to throw some light on the origin and nature of this association.

Association with unicellular algæ is almost certainly confined to animals which digest intracellularly. This has been suspected by many workers, but confirmation has had to await the full elucidation of the conditions of digestion throughout the invertebrates (see Yonge<sup>2</sup> for a summary of the present state of knowledge). Unicellular algæ occur in Protozoa, Porifera,

Cœlenterata, Ctenophora, Turbellaria, Rotifera, Gastropoda and Lamellibranchia, all of which digest intracellularly. The conditions both of symbiosis and of digestion in Polyzoa and Echinodermata require further investigation. Zooxanthellæ do occur in compound Ascidiæ from tropical seas as recorded, for example, by Hastings<sup>3</sup> in a number of species collected by the Great Barrier Reef Expedition, but Mr. H. G. Smith, to whom I recently gave these for examination, finds that the algæ are confined to the common test and never occur in the actual tissues. Berkeley<sup>4</sup> has recently definitely established that a green flagellate occurs in the Chætopteridæ which, like all Annelida, digest extracellularly. The work of Wilson<sup>5</sup>, who found indications of intracellular digestion during the metamorphosis of *Owenia*, affords a possible explanation of the origin of this association.

A survey of the animals which contain algæ reveals that some of these are carnivores, notably the Cœlenterata, the Turbellaria and those Gastropoda which harbour algæ, while the others are omnivorous or definitely herbivorous, such as the Protozoa, Porifera and Lamellibranchia. The association with algæ would appear to have arisen in different ways in these two groups.

In the carnivores (Cœlenterates, in particular, are such specialised carnivores that they will neither accept nor ingest plant matter) the association was originally probably one of parasitism by the plant. This is strongly indicated by the very beautiful work of Goetsch<sup>6</sup> on the association of algæ (Chlorellæ) with the Hydrida. *Pelmatohydra* and *Hydra circumcincta* never contain algæ. Spontaneous infection by algæ has been observed in *Hydra vulgaris*, and Goetsch was able to bring about artificial infection and maintain this so long as conditions remained suitable for the algæ, which were, however, confined to certain parts of the body. In *Hydra attenuata*, artificial infection was easier, and the algæ spread more extensively throughout the tissues, becoming increasingly difficult to dislodge as time passed. Finally, according to Goetsch, they so affect the tissues of the host animal as to form a new race, *Hydra viridescens*, where the association may be regarded as a true symbiosis. In both *H. vulgaris* and *H. attenuata*, infection is preceded by an enfeeblement of the animals and is accompanied by pathological symptoms indicating a definite parasitism by the plant. In *Chlorohydra viridissima*, there is a permanent and normal association with algæ, which are extremely difficult to remove experimentally from the tissues, the colourless animals so obtained being very easy to reinfect and actually taking in other algæ (*Oocystis*) if Chlorellæ are not available. In *Chlorohydra* alone are the algæ transmitted from generation to generation by way of the egg.

Goetsch's work probably gives the key to the final establishment of symbiosis between carnivorous animals and algæ. An initial stage of parasitism by the plant is followed by the establishment of tolerance by the animal and later, as in *Chlorohydra*, the algæ are normally always present. Nevertheless, as Goetsch and Van Haffner<sup>7</sup> have shown, *Chlorohydra* can, under appropriate conditions, flourish when deprived of the algæ. Van Haffner has shown that very similar conditions prevail in the freshwater Turbellarian, *Dalyellia viridis*. Further examination of conditions in the Cœlenterata and the Turbellaria reveals that one of two things may happen. The animal may become dependent on the plant, which still remains capable of an independent existence, or the plant becomes dependent on the animal, being specialised exclusively for life within its tissues, while the animal continues to feed normally.

The first of these alternatives is exemplified in the well-known case of *Convoluta roscoffensis* (Keeble and Gamble<sup>8</sup>) where the animal finally ceases to collect food and preys on the contained algæ which, though they become modified within the tissues of the animal, are members of the free-living genus *Carteria*. *Convoluta paradoxa* (Keeble<sup>9</sup>) occupies an intermediate position between *Dalyellia* and *C. roscoffensis*. The second alternative is exemplified by conditions in the reef-building corals (Yonge and Nicholls<sup>10,11</sup>) where the zooxanthellæ are never found free in the sea, have apparently lost the capacity for sexual reproduction,

and have acquired a very thick cellulose wall. The animals are not only capable of feeding normally, but actually display all manner of adaptations for this. They certainly never digest the zooxanthellæ. Similar conditions probably prevail throughout the Anthozoa (and possibly the Scyphozoa), the opposite conclusions of Brandt<sup>12</sup> for anemones being open to question (his results are being reinvestigated).

Turning to the origin and establishment of symbiosis in herbivorous animals, the best indication of the preliminary stages appears to be furnished by the work of Van Trigt<sup>13</sup> on the Spongillidæ. Here the algæ (*Pleurococcus*) are taken in by the collar cells and passed into amœbocytes. Under favourable conditions they maintain themselves for a time but, should other food fail, they are quickly digested. The algæ are apparently capable of no more than prolonging existence for some time under conditions in which other algæ are immediately killed and digested. An increased resistance to the digestive activities of the animal may well have led to the establishment of conditions such as those recorded by Pringsheim<sup>14</sup> and Parker<sup>15</sup> in *Paramecium bursaria*. Here a very well-balanced condition has been established, the infected animals being capable of existing in the light autotrophically for a long period, so long as the necessary nutrient salts and calcium are present. Only in extreme cases are the algæ digested by the animal, which is, however, capable of living without them, feeding on algæ, bacteria and especially yeasts.

Symbiosis may also be established by the transference of an alga, already specialised for such an existence, from one type of animal to another. Naville<sup>16</sup> has recorded the interesting case of the Nudibranch, *Aolidiella alderi*, which feeds exclusively on the Actinian, *Heliactis bellis*, which contains zooxanthellæ. Not only are the nematocysts in the cerata of the mollusc identical with those of the anemone but also the same zooxanthellæ flourish in the ingesting cells of the 'hepatopancreas'. The zooxanthellæ in the test of compound Ascidiæ (which appear to be identical with those of corals and other reef-dwelling Anthozoa) may well be derived in the first place from those contained in planulæ, being in some manner incorporated in the common test during the growth of this. In the Tridacnidae, where is found one of the most striking cases of dependence by animals on contained algæ, the animal literally 'farming' the plants in the thickened mantle edges (Yonge<sup>17</sup>), the zooxanthellæ may also in past time have been acquired from planulæ.

A study of the nature of the association as it exists in different animals at the present day reveals, as the foregoing account has already indicated, many gradations. This can most conveniently be reviewed by discussing first the possible advantages gained by the algæ and then those gained by the animals.

The algæ obtain protection once they have succeeded in establishing themselves. They obtain

ample supplies of carbon dioxide, which would probably always be available, but, more important, also of nitrogen and phosphorus. Many of the early workers in this field emphasised the significance of 'nitrogen hunger' in the sea, but this is no more important, as we now know, than 'phosphorus hunger'. In the reef-building corals, not only is all the phosphorus liberated by the animals immediately utilised by the zooxanthellæ, but phosphorus is also taken from the surrounding water even though the content has been artificially increased to a very high figure (Yonge and Nicholls<sup>19</sup>). The algæ in *Convoluta* can utilise uric acid or urates, but these algæ when living free in the sea may normally feed saprophytically.

In other cases also the algæ appear capable of existing to some extent saprophytically within the bodies of the animals. Thus Pringsheim has found that the Chlorellæ in *Paramecium bursaria* not only survive but also may actually increase in darkness, provided that the animals are well fed. Since the algæ cannot photosynthesise under these conditions, it is clear that they must obtain organic matter from their hosts. Van Haffner has come to similar conclusions in his work on the Chlorellæ contained in *Chlorohydra viridissima*. He states that they may increase in darkness and that they are always especially numerous and increase most rapidly in those regions of the animals where carbohydrate is most abundant. In correlation with this tendency to saprophytic nutrition he finds that the Chlorellæ within the animals have smaller pyrenoids than those which are free-living. The conditions here, therefore, are somewhat akin to those in *Convoluta roscoffensis*.

The advantage which the association brings to the animals also varies very greatly in different cases. In the presence of light, oxygen is continually being formed by the algæ. In corals and other Anthozoa this may, during the middle of the day, be greatly in excess of the amount used by the animals and plants in respiration (see Yonge, Yonge and Nicholls<sup>18</sup>). But it is noteworthy that few workers, though all have mentioned the production of oxygen, lay much stress upon it. Though it has been proved in many instances that, under experimental conditions, 'green' animals will survive for longer periods in deoxygenated water in the light than will 'colourless' animals of the same species, yet it is almost universally admitted that such conditions would seldom, if ever, be encountered by the animal in Nature.

There is also universal agreement that the plants make use of the end-products of animal metabolism, notably carbon dioxide, nitrogen and phosphorus, and that this automatic removal of excrement may be of great advantage to the animal. There can, as already stated, be no doubt that this occurs, though its actual significance in the life of the animals is more difficult to assess. In *Convoluta roscoffensis* and *C. paradoxa* its great significance is placed beyond question by the absence in these animals of organs of excretion. In Protozoa, Porifera and Cœlenterata organs of excretion do

not occur, so that this test cannot be applied. I have previously summarised in NATURE (Yonge<sup>19</sup>) my reasons for thinking that, though individual corals can live well without contained zooxanthellæ, yet, because of the help they give by automatically removing the end-products of metabolism, the zooxanthellæ are "probably an indispensable factor in the necessarily exceptional powers of growth and repair possessed by the marine communities known as coral reefs".

The most disputed point of all is the extent to which the algæ provide food to their hosts. The animal may obtain food from them in one of three ways. In the first place, organic matter (notably fats and carbohydrates) may pass from the living algæ to the tissues of the animal. Pringsheim has shown that this must be the explanation for the autotrophic mode of life possible to green *Paramecium bursaria*. Brandt<sup>20</sup> came to similar conclusions in his work on colonial Radiolarians, stating that starch passes from the living zooxanthellæ into the protoplasm of *Sphærozoum*, *Acanthometra* and *Siphonosphaera*. Famintzin (quoted by Buchner), on the other hand, thought that this starch was derived from degenerating algæ. This matter requires, as Buchner has observed, further investigation. In *Chlorohydra* Goetsch has shown that green individuals will survive starvation in the light for about four months, whereas colourless individuals live for only half this time. He inclines to the view that organic matter, in particular fat, is passed from the algæ to the animal under such conditions, but Van Haffner comes to the opposite conclusion both for *Chlorohydra* and *Dalyellia*. He does think, however, that degenerating algæ may be used as food by the animal. In *Convoluta roscoffensis* and *C. paradoxa* there is an undoubted passage of fat from the algæ to the tissues of the animals, during the early stages of the association. Keeble and Gamble have figured the process and I have myself prepared sections of *Convoluta roscoffensis* which confirm their statements.

The second alternative is that the animals digest the algæ after these have, for some reason or other, probably starvation, died in the tissues. Van Haffner is the only author who has laid great stress on this, but it may be of considerable significance. It does not, however, follow that a degeneration of the algæ necessarily means that they are digested; for in corals, degenerating algæ are continually being ejected from the body of the animal by way of the mesenterial filaments (and the process can be very greatly increased by subjecting the corals to excessive heat, lack of oxygen or starvation) but these are never digested. A starved coral will live no longer in light than in darkness (Yonge and Nicholls<sup>11</sup>).

Finally there remains the possibility that living algæ are killed and digested by their hosts. In extreme cases this occurs, according to Pringsheim, in *Paramecium bursaria*. In the Spongillidæ it continually occurs, as Van Trigt has shown, while I have found that it is an equally normal process

(and a more essential one) in the Tridacnidae. But all of these animals are naturally herbivorous and the powers of resistance to digestion by the algæ are limited, particularly in the Spongillidae. In *Convoluta roscoffensis* and *C. paradoxa* the algæ are certainly digested, the former species finally losing the power of feeding altogether, and becoming completely parasitic on its contained algæ. This appears to be the only case of an animal which becomes completely dependent on the algæ for nutrition.

Several points of interest emerge from this discussion on the possible food value to the animals of the algæ. One is that in herbivorous animals the power to resist digestion by the animal entails specialisation on the part of the algæ (for example, in *Paramecium bursaria*); another is that the ability to feed on the algæ represents a specialisation on the part of the carnivorous animals such as *Convoluta*, though in this case the absence of a cellulose wall around the algæ is possibly of significance. The presence, on the other hand, of an exceptionally stout cellulose wall around the zooxanthellæ of corals and other Anthozoa possibly explains the inability of such animals to obtain nutriment from these even after they have died in the tissues. In *Tridacna*, where the zooxanthellæ are otherwise very like those of the corals, I have been unable to find so thick a cellulose wall. The passage of organic matter from the algæ to the host, as in *Paramecium* and *Convoluta*, probably involves specialisation by the plants, but it also indicates that these are in a position to produce more food than they need themselves for maintenance and multiplication. In the corals the endoderm is invariably packed with zooxanthellæ (as many as 25,000 may occur in a single planula

of *Pocillopora*) and these increase as the coral grows. There is never likely to be any superfluity of food under these conditions; indeed, as already stated, the zooxanthellæ will extract phosphorus from the surrounding water.

This summary will have indicated, if nothing else, that the nature of the association between animals and unicellular algæ varies greatly in different cases. If by symbiosis is meant only a relationship which is mutually advantageous to both parties, then the only adequately investigated cases which meet this requirement are *Paramecium bursaria*, *Chlorohydra* and the reef-building corals (and probably all Anthozoa). In every other instance, one party in the association is exploited in some measure by the other.

In conclusion, I wish to record my thanks to the Royal Society of London for a grant which has assisted the investigations from which many of these conclusions have been drawn, and also to Mr. H. G. Smith for kindly permitting me to mention the results of certain unpublished work.

- <sup>1</sup> Buchner, "Tier und Pflanze in Symbiose", Berlin; 1930.
- <sup>2</sup> Yonge, *J. Con. Intern. Explor. de la Mer*, 6, 175; 1931.
- <sup>3</sup> Hastings, *Sci. Repts.*, G. Barrier Reef Expedition, Brit. Mus., 4, 69; 1931.
- <sup>4</sup> Berkeley, *Quart. J. Micr. Sci.*, 73, 465; 1930.
- <sup>5</sup> Wilson, *Phil. Trans. Roy. Soc. Lond.*, B, 221, 231; 1932.
- <sup>6</sup> Goetsch, *Z. Morph. Okol. Tiere*, 1, 660; 1924.
- <sup>7</sup> Van Haffner, *Z. wiss. Zool.*, 128, 1; 1925.
- <sup>8</sup> Keeble and Gamble, *Quart. J. Micr. Sci.*, 51, 167; 1907.
- <sup>9</sup> Keeble, *Quart. J. Micr. Sci.*, 52, 431; 1908.
- <sup>10</sup> Yonge and Nicholls, *Sci. Repts.*, G. Barrier Reef Expedition, Brit. Mus., 1, 135; 1931.
- <sup>11</sup> Yonge and Nicholls, *ibid.*, 1, 177; 1931.
- <sup>12</sup> Brandt, *Mitt. Zool. Stat. Neapel*, 4, 191; 1883.
- <sup>13</sup> Van Trigt, *Tijdschr. d. Nederl. dierk. Vereenig.*, 2nd ser., 17, 1; 1919.
- <sup>14</sup> Pringsheim, *Arch. Protistenk.*, 64, 289; 1928.
- <sup>15</sup> Parker, *J. Exp. Zool.*, 46, 1; 1926.
- <sup>16</sup> Naville, *Rev. Suisse Zool.*, 33, 251; 1926.
- <sup>17</sup> Yonge, *Sci. Repts.*, G. Barrier Reef Expedition, Brit. Mus., 1, No. 11 (in preparation).
- <sup>18</sup> Yonge, Yonge and Nicholls, *ibid.*, 1, 213; 1932.
- <sup>19</sup> Yonge, *NATURE*, 128, 309, Aug. 22, 1931.
- <sup>20</sup> Brandt, "Fauna und Flora des Golfes von Neapel", 13; 1885.

## Obituary

PROF. A. P. CHATTOCK, F.R.S.

PROF. ARTHUR PRINCE CHATTOCK, emeritus professor of physics in the University of Bristol, died at his home in Clifton, Bristol, on July 1 at the age of seventy-three years. Educated at University College School, University College, London, under Carey-Foster, and at Stuttgart, he started his career as an electrical engineer in the firm of Siemens. In 1885, however, he was appointed as the first lecturer in physics in University College, Bristol. He spent the following year in Liverpool under Sir Oliver Lodge and then returned to Bristol to take up the duties of a newly created chair in this subject.

From 1887 until 1910 Prof. Chattock was known to a generation of students of physics at Bristol as an inspiring and self-sacrificing teacher, and to his contemporaries as an experimenter who, despite meagre facilities, carried out pioneer work of the first rank. Among these researches may be mentioned that on the mobility of gaseous ions, and the Chattock-Fry pressure gauge originally designed for the work of Stanton on the wind

pressure on structures, and later incorporated in wind tunnel measurements. An ingenious magnetic potentiometer devised by him deserves notice, as also an attempt, though negative in result, to verify Weber's theory of electromagnetism.

The foundation of the University of Bristol in 1909 brought additional responsibilities to his office. Modest and retiring almost to a fault, Prof. Chattock felt that he could not face them, and to the great regret of his colleagues, both lay and academic, he retired from his post to live in the country. There he stayed for ten years, engaged in poultry farming and on work for the Ministry of Agriculture on the physics of incubation.

In 1920, however, Prof. Chattock was induced to return to the University laboratories for a few years under the terms of his emeritus professorship, with facilities for continuing his researches in physics. In this later period, he carried out with L. F. Bates a classical determination of the gyromagnetic effect in iron. This, coupled with later work by Bates and Sucksmith, and more recently on paramagnetic substances by Sucksmith in the

Bristol laboratory, has had important consequences in the study of modern physics. He was awarded the honorary degree of D.Sc. by the University of Bristol in 1911, and was elected a fellow of the Royal Society in 1920.

#### DR. T. G. PINCHES

WE regret to record the death of Dr. Theophilus Goldridge Pinches, the distinguished Assyriologist, which took place at the age of seventy-eight years, at Muswell Hill, London, on June 6. Dr. Pinches originally was engaged in his father's business as a die-sinker; but, taking up the study of cuneiform inscriptions, he joined the staff of the British Museum in 1878, retaining that position until 1900, when he retired on pension. He was lecturer in Assyriology at University College, London, and in the University of Liverpool, resigning the latter post, owing to ill-health, only a year or two before his death.

At the British Museum Dr. Pinches' work was especially noted for the beauty of his copies of cuneiform texts. He was responsible for the text of parts of vol. 5 of the "Cuneiform Texts from Babylonian Tablets" and "Cuneiform Inscriptions of Western Asia" published by the Museum; and he compiled a guide to the Nimroud Saloon. For many years, Pinches was one of the foremost workers among the group which included Sayce, Thureau-Dangin and Bertin. He was recognised as an expert in the Assyro-Babylonian and Sumerian languages and had studied Hebrew, Aramaic, Ethiopic and Arabic. He was especially

active in connexion with the work of the Society of Biblical Archæology, the periodical publication of which contains a large number of contributions from him. He was also its editor. For some time he was a member of council of the Royal Asiatic Society.

A very long list of books, monographs and papers on Assyriology stands to Dr. Pinches' credit. He edited and translated the Amherst tablets (1908), the Berens Collection (1915), and the texts belonging to Sir Henry Peek (1888). He also contributed translations to "Records of the Past" (second series). One of his most interesting discoveries was the bilingual story of the Creation which was published in "The Old Testament in the Light of the Historical Records of Babylonia and Assyria" (1908). Among his works of a more popular character may be mentioned "Religion of Babylonia and Assyria" (1906).

WE regret to announce the following deaths:

Mme. Curie, professor of general physics in the Faculty of Sciences at the Sorbonne and director of the Laboratoire Curie at the Institut du Radium, Paris, known for her work with her husband, Pierre Curie, leading to the discovery of radium, and for subsequent researches on radioactivity, on July 4, aged 66 years.

Sir James Fowler, K.C.M.G., K.C.V.O., consulting physician to the Middlesex Hospital, formerly dean of the Faculty of Medicine, University of London, on July 3, aged 82 years.

### News and Views

#### Honorary Members of the Royal Society of Edinburgh

ON July 2, the following were elected honorary fellows of the Royal Society of Edinburgh to commemorate the completion of its 150th year: *Foreign*, Björn Helland-Hansen, Geophysical Institute, Bergen; Prof. Bernardo Houssay, professor of physiology, National University of Buenos Aires; Prof. Frank R. Lillie, professor of zoology and embryology, University of Chicago; Prof. T. H. Morgan, professor of biology, California Institute of Technology, Pasadena; Prof. Paul Sabatier, professor of chemistry, University of Toulouse; Dr. Theobald Smith, formerly director of the Rockefeller Institute for Medical Research, Princeton, New Jersey. *British*, Prof. H. E. Armstrong, emeritus professor of chemistry, Imperial College of Science and Technology, City and Guilds (Engineering) College, London; Prof. J. S. Haldane, director of the Mining Research Laboratory, and honorary professor, University of Birmingham; Prof. Karl Pearson, emeritus Galton professor of eugenics, University of London; Prof. E. B. Poulton, lately Hope professor of zoology, University of Oxford; Sir G. Elliot Smith, professor of anatomy, University College, London; Prof. W. W. Watts, emeritus professor of geology, Imperial College of Science and Technology, London.

#### Dr. Robert J. D. Graham

THE newly elected professor of botany in the University of St. Andrews, Dr. Robert J. D. Graham, is a native of Perth. He was a student in the University of St. Andrews at University College, Dundee, and at the United College. He graduated at St. Andrews in arts and science and held at the University a Carnegie research scholarship in botany. He spent eleven years in the Indian Agricultural Service, where he did important administrative work as economic botanist to the Government of the Central Provinces in organising botanical study, plant-breeding, etc., in these Provinces. He was granted the degree of D.Sc. by the University of St. Andrews for a thesis on "The Economic and Systematic Botany of the Central Provinces, India". During the War he served in Mesopotamia and was released from military service in 1920 with the rank of Lieutenant-Colonel. When, in the following year, he retired from the Indian Service, he was appointed to a post in the Botany Department of the University of Edinburgh and he has been attached to that Department until now under the late Sir Isaac Bayley Balfour and Sir William Wright Smith. He has had an extensive and varied experience in the teaching of students of botany. A long series of

contributions to botanical science stands to his name in the transactions of botanical societies and journals as well as in the Government publications of India and Mesopotamia. The practical aspect of his work in relation to the propagation of plants and the combating of plant-diseases in India, in Mesopotamia, and in Great Britain has been widely recognised.

#### The Chinese Mitten Crab

THE Chinese mitten (or woolly-hand) crab, *Eriocheir sinensis* (see NATURE, June 9, p. 855), was transported to Germany from China in some unknown way and was first caught in the Aller (a tributary of the Weser) in 1912, but was not identified until 1923. It has spread widely in the river systems of Germany—the Elbe, Weser, Rhine and Oder. It is stated that about 700,000 of these crabs were caught in 1931 at Hamburg; the crab has in fact become a pest in some places. The adult crabs wander down the rivers at the beginning of the breeding season; pairing takes place in brackish water of the lower Elbe and Weser, but the crabs bearing eggs are found off the river estuaries in more saline water. In the interests of controlling the crab, Dr. W. Wolterstorff, of the Magdeburg Museum, has addressed questions to the Peking Society of Natural History. These and the answers are contained in the *Bulletin* of the Society, vol. 8, Part 3, March 1934. Dr. Wolterstorff refers to a report that the crabs were cleared out of the lower Liang Ho River about twenty years ago with nets, as they destroyed the fish, and asks if this was successful. He directs attention to the statement of Prof. Lu-fong of Tientsin that the Chinese consider the crabs holy and hence the crabs caught are not eaten but burnt, and points out that this is at variance with the statement of Marquard that the crab is a popular item of food in China. In reply to the questions, Y. T. Mao, of the Department of Biology, Yenching University, states that *Eriocheir sinensis* is one of the edible crabs commonly found along the coastal provinces of China and that the Chinese do not consider the crab holy. He adds that according to his observation it is not necessary for the crab to lay its eggs in salt water and that he has not heard that the crabs had to be cleared out from a river at Tientsin, nor has he heard of any river in China inhabited by such a large number of crabs as were stated to occur in the Elbe.

#### Will the Chinese Mitten Crab Invade British Waters?

THE Ministry of Agriculture and Fisheries has issued a notice (Fisheries Notice, No. 22, June 1934) on this crab, pointing out that it "would in no wise be a welcome addition to the British fauna". During its migrations, particularly upstream, the crab tunnels into river banks and the wash of water in these burrows is liable to cause subsidence and hence serious damage to the banks. Further, the crab is voracious; it clears bait from lines and eats the fish taken thereon, and bites through nets and lines. The note suggests that a careful watch should be kept for this crab, especially on the east coast of Great

Britain; its destruction at all possible times might at least assist in restricting the numbers of this unwanted invader.

#### Science and Social Problems

IN a lecture on "The Man of Science and the Science of Man" delivered at the University of Liverpool on December 7, a copy of which reached us recently, Prof. J. L. Myres discusses the responsibility of science for social disorder. Much of the current confusion of thought in this matter he attributes to the common failure to distinguish discovery from invention, and, more dangerous still, the engineer or inventor from employers or exploiters who require an immediate solution of a particular practical problem in applied science for their own purpose. The man of science has an individual moral responsibility for the full use of his specific powers in investigating Nature and rationalising the world around him, and the growth of personal responsibilities, with the concurrent graver risks of personal abuse, provides some of our most serious social and international problems. One of the problems to which thought has not yet been adequately applied in this way is the problem of leisure, which is one with that of unemployment or disemployment through the growth of rationalisation or mechanisation of industry. For this our system of education, and particularly the high degree of specialisation in the training of students of science, are largely to blame and Prof. Myres enters an eloquent plea for expositors of science who are competent to impart to the general community something of the spirit and methods of science, so as to afford them an adequate general scientific background for the life they lead in this highly technical age.

PROF. MYRES deals also a hard blow at the slovenliness of the scientific worker in his written communications whether for the specialist or a wider public, particularly his neglect to use current linguistic coin, acceptable at its face value of words or sense. These points in a valuable address may easily be overlooked by the scientific worker in his interest in the subsequent discussion of the clash of cultures in modern life and the way in which a science of man could be of service under modern conditions. A field of scientific research is here visualised, the results of which are potentially applicable to a wide range of everyday problems. There is required, too, the capacity to see life as a whole and not as a series of independent units. The latter tendency, no less than excessive specialisation, are major obstacles to the noble conception of citizenship for which Prof. Myres pleads, and which demands the exercise of freedom in speech, in thought and in life.

#### National Art Gallery and Museum for New Zealand

AT the ceremonial laying of the foundation stone of a National Art Gallery and Dominion Museum for New Zealand, at Wellington, on April 14, Lord Bledisloe, Governor-General of New Zealand, gave

an inspiring address on the proper functions of such an institution. This has just been published in pamphlet form with the title "The Proper Function and Scope of a National Art Gallery and Museum". "A public museum . . . should not be a mausoleum of dead specimens, the resort only of monastic specialists or interested collectors, but a vitalising power-house radiating currents of intellectual energy and calling forth latent genius in all classes of the community". The difficulty is to know how best to do it. Lord Bledisloe suggests many possibilities: popular exhibits, the encouragement of school children, travelling collections to country districts, special exhibits relating to sanitation, hygiene, child-welfare or town-planning, a comprehensive department illustrative of British seafaring life from the earliest times, and so on. He summarises with insight the values of an orderly ethnographic collection—the scientific study of early civilisations, the promotion of a more sympathetic understanding of subject races, the provision of useful equipment to prospective Colonial administrators and pioneers, and the stimulation of trade by suggesting new ideas both to importers and exporters. On the museum side and on the art gallery side he warns curators and administrators over and over again against the danger of accepting gifts too readily, and of accepting gifts with conditions. He sees in the foundation of the new institute a landmark in the definite and vigorous intellectual and spiritual progress of all classes and both races of people in the Dominion.

WHILE in New Zealand Lord Bledisloe was laying emphasis upon the educative aspects of museums, at the Toronto Meeting of the American Association of Museums, on May 31, Prof. John R. Dymond, director of the Royal Ontario Museum of Zoology, sounded a warning note about the danger of too much educational policy (Science Service, Washington, D.C.). Education is one of the important functions of a museum, but it is not the only one, or the primary one. The peculiar work for which museums exist is to collect and preserve the irreplaceable materials needed for the advancement of knowledge. Should too great a proportion of time or energy or income be spent on educational activities, the real work of the museum will suffer. There are other agencies in every State devoted to educational work, but there is nothing to replace the museum if it halts in its labour of making and conserving collections. But the problem is not quite so simple as it looks—there are things that are not worth the labour and expense of collecting and preserving, and who is to draw the line between judicious collecting and aimless, useless amassing? Perhaps the educational aspect is one of the soundest criteria.

#### The Psychic Thumb Print Controversy

IN Bulletin 22 of the Boston Society for Psychic Research, published in April 1934, is printed the reply to Mr. Thorogood's lengthy report on the alleged psychic thumb prints produced by the American medium 'Margery', which document was

issued as vol. 22 of the *Proceedings of the American Society for Psychical Research* and which was reviewed in NATURE of April 14, p. 550. The controversy revolves around the report of the discovery that both the right and left thumb prints of 'Walter' (the medium's control) are in reality identical with those of her dentist now living in Boston. These charges were examined by the officials of the American Society for Psychical Research, who came to the conclusion that they were without foundation, although it was admitted that in the case of one of the thumb prints the resemblance was close. Counter charges of bad faith, falsification of material evidence and sinister motives were made, and it was alleged that certain of the wax prints obtained exhibit clear signs of alteration. In the present *Bulletin* these statements are considered, and further counter charges are made against the officers of the American Society for Psychical Research, including the suggestion that counterfeit waxes have been introduced and dates forged. In a well-balanced review of Mr. Thorogood's book, Dr. Harold Cummins examines the theory that the sets of prints are not identical, but finds himself unable to accept the claim. Moreover, he severely criticises certain photomicrographs printed by Mr. Thorogood inasmuch as in his opinion they are not strictly comparable.

#### New 24-Cylinder Aero Engine

AN air-cooled 24-cylinder aero engine, the Napier-Dagger, has just completed its 100-hour Air Ministry type test. It has already been flown for more than sixty hours in a Hawker Hart day bomber aeroplane, and took part in this year's R.A.F. display on June 30. The 24 cylinders are arranged in four blocks of six. Two blocks are set above and two below the crankcase, giving the engine the form of a letter H viewed from the front. This arrangement makes for compactness, especially in frontal area, which is about equal to that of a modern water-cooled engine of similar output. Thus the air-cooled engine gains to the extent of the head resistance of the radiators or such devices as are necessary for cooling the liquid in the other. Each pair of upper and lower cylinder blocks has a separate crank-shaft which transmits the power through gearing to the airscrew shaft. The reduction in this gearing allows the very high engine speed of 4,000 revolutions per minute, while the airscrew travels at such lower speeds as its efficiency demands. One of the most interesting features in the engine is the use of hydraulic impulses to operate the valve gear. This removes the need of rocker arms and also gives a quieter engine. The engine is supercharged to develop its maximum power of 705 h.p. at a height of 12,000 ft., and, at a cruising rate of 3,500 revolutions a minute, it yields 630 h.p. These are with standard fuels; much bigger outputs with 'doped' fuel and higher compression ratios are anticipated. A smaller version of this engine has been flying for some time. This has only 16 cylinders arranged in banks of four. It was known originally as the H engine and is now named the Rapier. The bigger engine makes the type fit for use in military aircraft.



### State Help for Gliding

REPLYING to a question in the House of Commons on June 27, Sir Philip Sassoon, Under-Secretary of State for Air, stated that the Government has reached the conclusion that some measure of financial assistance to the gliding movement from the Air Votes is justified. This will probably take the form of assistance towards the formation and maintenance of a properly organised central gliding school, which is regarded as essential to the sound development of gliding, coupled with a small capitation grant to approved clubs in respect of each certificate taken out by their members. Details are not yet known, but will be worked out in conjunction with the various interests concerned. The proposal is that a sum of not more than £5,000 annually, for a five-year period in the first instance, shall be granted. Sir Philip expressed the hope that now that official recognition is to be accorded to the national importance of gliding, generous financial support will also be forthcoming from private sources in order to ensure the success of the movement.

### Zeppelin LZ-129

A NEW Zeppelin airship, LZ-129, is now nearing completion in Germany (Science Service, June 6), and if satisfactory will be put into service as a sister ship to the *Graf Zeppelin*, now operating for the sixth season between Europe and Brazil. The east-bound crossing of the new ship is expected to take less than two days, and the return against head winds a little less than three days. The calculated range without refuelling is 8,000 miles. Although only slightly longer than the American *Macon*, at present the largest airship extant, LZ-129 will be considerably larger, with a gas capacity of 7,070,000 cubic feet as compared with 6,500,000 of the *Macon*. On her trial flights this summer, she will be inflated with hydrogen gas. It is reported that the use of helium gas is being considered for normal passenger flights. The Diesel engines, totalling 4,400 horsepower, will be in gondolas attached outside the hull, with ladders permitting access to other parts of the ship as in previous Zeppelin designs. German aeronautical engineers have never accepted the recent American procedure of placing the engine compartments inside the 'hull' or skin. The accommodation includes two promenade decks, state-rooms for fifty passengers, running water and baths, and a special smoking room. Besides these appointments are quarters for a crew of 35 and space for a mail and freight load of ten tons.

### International Broadcasting Union

THE issue of *World Radio* of June 29 contains an account of the London meeting of the Union Internationale de Radiodiffusion, which was concluded on June 20, and also the report of the Council of the Union. The meeting was attended by seventy-three delegates, including representatives of the broadcasting organisations of twenty European countries, of the two great American chains of stations and of the Cuban broadcasting organisation; and, in

addition, delegates from thirteen European State administrations. The general assembly and business meetings were held at the Grosvenor House Hotel, but visits were arranged to such places of interest as the International Trunk Exchange of the G.P.O., to Broadcasting House and to two stations of the B.B.C. The report of the Council of the Union concerns the European wave-length situation, and such subjects as international programmes and their future arrangement, and the legal aspects of authors' rights. The impression of the Council is that, since the introduction of the Lucerne plan, the general situation in regard to broadcasting on the long wave-lengths has been appreciably improved by the partial application of certain recommendations made at Geneva in February. The situation is complicated by the presence in the long-wave band of the stations Luxembourg and Madona, which were not given long wave-lengths by the Lucerne conference. No solution of this difficulty can be found at present, but recommendations were made to the Governments and broadcasting organisations concerned to re-examine the situation arising therefrom with the view of reaching an arrangement satisfactory to all the interested services.

THE report also states that 409 programmes of special interest or high artistic value were offered by members of the Union to their colleague organisations during 1933-34. Certain of these programmes, such as the relays of the bells of Bethlehem and the Byrd Antarctic Expedition, were accepted by members in various continents. The Union has decided to repeat, in some new form yet to be determined, the successful Christmas programme of 1933, wherein several European broadcasters contributed, by means of specially prepared records, seasonable expressions of goodwill from their respective countries. At the sitting of the new Council which terminated the London meetings, Vice-Admiral Sir Charles Carpendale, of the British Broadcasting Corporation, was elected president of the Union for the tenth successive time. The next meetings of the Council of the Union will be held in Switzerland in February 1935, while the next annual general assembly will be in Poland.

### Drinking Water and the Drought

DETAILS have been circulated of an emergency organisation which Imperial Chemical Industries, Ltd., Millbank, S.W.1, with the approval of the Ministry of Health, has set up to assist local authorities which may be experiencing difficulties with their supplies of drinking water. In many instances, owing to a shortage of the regular supply, water has to be obtained from other sources, the purity of which may be doubtful and below the usual standard. Such emergency supplies may, however, be rendered quite safe for domestic purposes provided they are first adequately treated and sterilised. Treatment with chlorine in some form is that generally employed, as it is efficient and comparatively simple in application, the four agents generally used being liquid chlorine, 'chlorox', chloramine and

ordinary chloride of lime. Imperial Chemical Industries, Ltd., has accordingly posted a staff of experts trained in water sterilisation at its divisional offices in London, Newcastle, Manchester, Oldbury and Bristol, whose services will be at the disposal of any local authority desiring them for advice and assistance, which will be given free. Once the proper dosage of the particular chemical agent selected has been determined, together with the best method of applying the process, the routine application is comparatively simple.

#### Liverpool and the Atlantic Ferry

A SUMMER meeting of the Institution of Mechanical Engineers in the Liverpool district would not be complete without a paper on ships and their machinery, and during the meeting on June 26-29, Mr. P. Austin, following in the footsteps of the late Mr. A. J. Magennis, contributed a paper on Liverpool and the Atlantic Ferry. Liverpool shipowners have played prominent parts in the long struggle for supremacy on the North Atlantic between such famous lines as the Cunard, White Star, Collins, Inman and others for a century or so. Beginning with the Black Ball line of sailing packets which connected Liverpool and New York in 1816, Mr. Austin traced the development of trans-Atlantic travel down to the present time, mentioning many once famous ships and recalling many great achievements; and in three tables he gave figures of the growth in size, power and speed of typical ships. In concluding his review, Mr. Austin asked, "Is the Liverpool airport to be one of the terminal ports of the Atlantic Ferry of the future?" While not holding that a trans-Atlantic air service is impossible, Mr. Austin has doubts as to its regularity and dependability, due to the vagaries of North Atlantic weather; also there are doubts as to whether such a service ever would be a financial success. As regards the immediate future of the 'Atlantic ferry', the struggle is keener than ever before and the British reply to American, French, German and Italian competition is S.S. *No. 534*.

#### The National Maritime Museum

IN THE House of Commons on June 29, Mr. W. Ormsby-Gore, First Commissioner of Works, moved the second reading of the bill for the setting up of a National Maritime Museum in the buildings recently occupied by the Greenwich Hospital School. The cost of adapting the vacant school buildings is estimated at £29,000 and Sir James Caird has generously offered to defray this sum. Sir James has already given large sums towards the restoration of H.M.S.S. *Victory* and *Implacable* and presented the Museum with the Macpherson Collection of Naval Prints. There is nowhere, said Mr. Ormsby-Gore, where one can study the history of our maritime adventure and development, and no attempt has yet been made to illustrate conveniently for the general public the immense field of British maritime endeavour, historical, technical, geographical and commercial, including not only the exploits of the

Royal Navy but also of the mercantile marine. A Board of Trustees with the Earl Stanhope as chairman has been appointed and the post of director has been offered to Prof. G. A. R. Callender, of the Royal Naval College, Greenwich, whose enthusiasm and scholarship in all matters appertaining to naval history are well known.

#### Recent Advances in Physics

THE Manchester and District Local Section of the Institute of Physics holds each year a summer course of lectures, the primary aim of which is to provide physicists in industry with convenient summaries of recent work in various aspects (both pure and applied) of physical research. This year the lectures were held during June in the Physics Department of the University of Manchester. On June 11, Mr. J. D. Bernal (Cambridge) discussed the properties of "Heavy Hydrogen" and indicated some of its possible chemical uses. Prof. E. N. da C. Andrade (University College, London) dealt with the subject of "Viscosity" on June 13. After considering the relation between temperature and viscosity and its representation by a formula, he discussed a theoretical justification for the use of a formula he has developed and finally dealt with some methods of measurement of viscosities. A comprehensive survey of "Units of Matter" was given by Dr. J. M. Nuttall (University of Manchester) on June 25; he discussed the properties of the proton, electron, anti-proton, positive electron, neutron and neutrino, and gave a summary of the experimental evidence supporting the new ideas on atomic structure. On June 27 short communications on "Alloys" were given by Prof. W. L. Bragg, Dr. A. J. Bradley (University of Manchester) and Dr. C. Sykes (Metropolitan-Vickers Electric Co., Ltd.). This is the fourth occasion on which such a course has been held. Last year the meetings were devoted to accounts of the application of physics to particular industries. On this occasion the original plan was adhered to, summaries of recent work in pure science being presented for the convenience of industrial research workers who do not find it easy to follow the many original papers. There has been a gratifying response to the attempt to organise these meetings, and lively discussions have followed most of the papers.

#### Celtic Earthworks on Salisbury Plain

ARCHAEOLOGISTS are indebted to the Ordnance Survey for further service of no little value in the form of a map of Salisbury Plain, based on the Ordnance Survey map, 1:25,000, and showing the Celtic fields and linear earthworks, which is now in course of preparation. The map will be issued in a series of six sections, of which the first, "Old Sarum" (Ordnance Survey, Southampton, 2s. 3d. net), is now ready. The archaeological features of the Ordnance Survey map have been taken as a basis, and to these have been added material from photographs of the plain taken by the Royal Air Force in the course of routine duties and from data recorded by members of the staff of the Survey. Dr. J. F. S. Stone, who has

made a special study of linear earthworks, has also placed his information at the disposal of the Department. No excavations have been undertaken to fill in gaps, but the hope is expressed that archaeologists, to whom the map is dedicated, will amplify by their labours the next edition. In a foreword, attention is directed to certain features of the map. A large number of 'barrow circles' have been located by air photography which are here recorded for the first time. Accordingly it has been thought necessary for the sake of consistency to show all barrows from neolithic to Saxon, the long barrows being numbered in accordance with the numbering in the map of Neolithic Wessex. Attention is also directed to the information afforded by the map on the movements of settlement in instances in which the site of cultivation appears to have been stationary and also to that bearing on the purpose of linear earthworks.

#### Standardisation in Anthropometry

A PRELIMINARY statement, to form a basis of discussion, has been issued by the International Committee for Standardization of the Technique of Physical Anthropology and is published in *Man* of June. This Committee was appointed by the International Federation of Eugenics Organizations at its New York meeting on the understanding that, in the event of an international organisation for anthropology being formed, the Standardization Committee would be free to transfer itself to that body. As this condition has now been fulfilled by the institution of an International Congress of Anthropological and Ethnological Sciences, the question of the future of the Committee will be discussed at the forthcoming meetings of the Federation and the Congress. In the meantime, the document now published by the Committee makes certain suggestions for future action, pointing out that while anthropologists have met on several previous occasions to deplore the lack of system and uniformity in anthropometric measurement, no practical result has followed. It is now suggested that a number of regional committees should be formed, and that each of these should discuss the revision of systems of measurement on both living and skeletal material, which after testing, criticism and revision, might be put forward as regional schemes to form the basis of international discussion. As the urgent need for reform is widely recognised, a determined effort to arrive at agreement should be possible, even though revision is likely to prove a lengthy undertaking.

#### New Oil Well Drilling Record

A NEW record for deep oil well drilling has been established by the General Petroleum Corporation in the South Belridge Field, San Joaquin Valley, California, by the achievement of a depth of 11,377 ft. (approximately 2.15 miles). This is the first oil well which has been drilled to more than 11,000 ft. and must be considered a remarkable engineering achievement. The well was started in September 1930 and continued until March 1932 when, owing

to a 'cut' in the development programme, operations were stopped. Drilling was resumed in August 1933 and the final depth recorded above was reached at the end of May of this year. An equally notable feature of this performance is that a substantial 4½-in. casing string has been landed successfully at the bottom. There have already been shows of oil and gas in this well, but these have to some extent been smothered by the enforced use of large quantities of very heavy mud held at between 104 and 112 lb. per cubic foot to overcome the high gas pressures met with. The *Oil Weekly* of June 11 gives a detailed account of this well and concludes that improved technique and engineering equipment are the outstanding factors which have made this record possible.

#### Everglades National Park, U.S.A.

AFTER a certain amount of opposition, Bills for the creation of a National Park in the Everglades of Florida have passed Senate and Congress (Science Service, Washington, D.C.). The park to be created will comprise 1,300,000 acres, and will be unique amongst the larger national parks in lacking mountains. The fauna is tropical, comprising snakes and alligators, several beautiful herons, spoon-bills and the almost extinct 'bone-headed' ibis, and characteristic vegetation. Beyond the coast the park will extend to several of the small islands or 'keys', so that a sample of the rich tropical marine fauna will be available to the visitor. Access to the area will apparently be from the present road, the Tamiami Trail, on the northern boundary of the reserve, but further exploration can be made only on foot or in canoes under the guidance of Seminole Indians. Interest is added to the scheme by the proposal to establish a new Seminole reservation to the north of the Tamiami Trail, in close proximity to the Park itself.

#### Health of the Navy during 1932

IN the "Statistical Report of the Health of the Navy for the Year 1932", recently issued (London: H.M. Stationery Office. 2s. 6d. net), the Medical Director-General of the Navy, Sir R. St. G. S. Bond, states that in a force of 83,285, the total number of cases of disease and injury was 39,284, equivalent to a ratio of 471.68 per thousand, an increase of 6.12 in comparison with the five years' average, and a decrease of 19.82 in relation to 1931. Only four cases of typhoid fever and eight cases of paratyphoid fever occurred during the year. Fifteen cases of undulant fever were returned, of which twelve were from the Mediterranean Station. Venereal diseases have declined in number, the fresh admissions totalling 4,638 as compared with 4,962 in 1931. Details are given of some of the cases of interest that have occurred, and of research work.

#### Chimpanzee Twins

DR. ROBERT M. YERKES has described the first authentic recorded case of the appearance of twins in an anthropoid ape family (*Science*, May 11, 1934).

The twins, one male the other female, were born almost a year ago at the Anthropoid Experiment Station of Yale University, at Orange Park, Florida. The parents were chimpanzees, the male about eleven years old and the female about twenty. Although among other primates, such as lemurs, gibbons, baboons and monkeys, twin births, according to Dr. Yerkes, have occasionally been recorded, the higher apes, chimpanzees, orang-outans and gorillas, have not hitherto been known to give birth to more than one young at a time.

#### Committee on Street Lighting

THE following Departmental Committee has been set up by the Minister of Transport to report on the lighting of streets: Mr. F. C. Cook (deputy chief engineer, Ministry of Transport) (chairman); Mr. J. F. Colquhoun (public lighting engineer, Sheffield); Mr. C. A. Masterman (chief technical officer, Gas Light and Coke Company); Major W. H. Morgan (county engineer, Middlesex); Mr. C. C. Paterson (chairman of the Illumination Research Committee, Department of Scientific and Industrial Research; director of Research Department, General Electric Company); Mr. E. S. Perrin (Ministry of Transport); Major L. Roseveare (borough engineer, Eastbourne); Mr. J. R. Taylor (Ministry of Health); Dr. J. W. T. Walsh (National Physical Laboratory). The secretary of the Committee is Dr. H. F. Gillbe, of the Ministry of Transport, and its terms of reference are: "To examine and report what steps could be taken for securing more efficient and uniform street lighting, with particular reference to the convenience and safety of traffic and with due regard to the requirements of residential and shopping areas, and to make recommendations".

#### German Association of Men of Science and Physicians

THE German Association of Men of Science and Physicians will hold its ninety-third meeting in Hanover on September 16-20. The invitation to meet in Hanover is now of more than twenty years' standing. It was accepted at the Vienna meeting of 1913 and planned for the next year, 1914. Since then, the Association has held its centenary in Leipzig in 1922, and has travelled south and west and north and east to Innsbruck, Düsseldorf, Hamburg, Königsberg and west again to Wiesbaden and Mainz. Hanover is easily accessible by land and air. This is the first meeting under the new constitution and an impressive proclamation of German science is desired. Public dinners are to be minimised, but exhibitions and excursions are planned. An associate's ticket costs 20 gold marks, application to be made to Geschäftsstelle G.D.N.A., Leipzig, C.1, Gustav-Adolfstr. 12. A detailed programme is available showing the general addresses and combined sessions, also the 37 separate sections and some twenty allied associations. The *Zweckverband* provides a brief directory of more than thirty German scientific societies. The exhibition dedicated to "Deutsches Volk—Deutsche Arbeit" is to give a picture of the history of the German race, with emphasis on heredity,

genetics and eugenics, and also on chemistry as a domain in which intellectual leadership is fundamental for industry. The local secretaries will be at Hanover, Technische Hochschule, Welfengarten 1. Among the distinguished men who are already announced as likely to be present are Prof. W. Heisenberg, Dr. Eckener and Dr. Sven Hedin.

#### Announcements

THE fifty-third annual meeting of the Society of Chemical Industry will be held at Cardiff on July 16-20, under the presidency of Dr. J. T. Dunn. The presidential address, entitled "Science and Industry—the Fertility of Ideas", will be delivered on July 17. Other addresses include Prof. H. Freundlich on "Plasticity the Servant of Industry", Sir Harry McGowan (to whom the Messel Memorial Medal will be presented) on "The Uneven Front of Research", and Col. C. H. Bressey on "British Roads Development during the past Fifteen Years".

A RECENT Bulletin (No. 70) published by the Ministry of Agriculture and Fisheries (1s.) deals in a thorough way with the keeping and breeding and other activities connected with making the most of "Ducks and Geese".

THE Achema VII Exhibition Guide, a directory of manufacturers of chemical plant and apparatus in Germany, published and issued in connexion with the Achema VII, held at Cologne on May 18-27 (see NATURE, June 2, p. 843) is, we are informed, now available. Copies can be obtained from Dechema, Seelze bei Hannover (1 gold mark, post free).

A VOLUME of "Researches" published from the wards and laboratories of the London Hospital during 1933 has been issued by the Publications Committee, of which Mr. Hugh Cairns is secretary (London: H. K. Lewis and Co., Ltd., 136 Gower Street, W.C.1. 7s. 6d. net). It includes 31 papers dealing with a variety of subjects comprised within the science and art of medicine, and all of them contributing to the advancement of clinical medicine or of medical science.

APPLICATIONS are invited for the following appointments, on or before the dates mentioned:—A lecturer in pharmaceuticals at the Central Technical College, Birmingham—The Chief Education Officer (July 14). An assistant lecturer in zoology at University College, Gower Street, London, W.C.1 (July 18). An assistant keeper (second class) on the higher technical staff of the Industrial Engineering and Manufacturing Department of the Science Museum, South Kensington, London, S.W.7—The Director (July 21). A deputy Government analyst, Ceylon—The Director of Recruitment (Colonial Service), 2, Richmond Terrace, Whitehall, S.W.1 (July 31). A senior lecturer in estate management at the Royal Agricultural College, Cirencester—The Principal. Two demonstrators in the Department of Anatomy, University of Cambridge—The Secretary-General of the Faculties, The Registry, Cambridge.

Letters to the Editor

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, nor to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. No notice is taken of anonymous communications.]

Structure of the Wood used in Violins

THE many recent investigations on string instruments<sup>1</sup> deal mainly with two problems: the theory of the mechanical and acoustical behaviour of the different parts of the instrument (and its experimental verification), and the analysis of the tones produced by the instruments. The question of the proper choice of material has made scarcely any progress since the fundamental investigations of F. Savart<sup>2</sup>. Since it has been repeatedly stated that age, treatment and varnish change the character of the wood, we investigated the structure of the wood in violins of different origin\* with X-rays. Copper  $K\alpha$  (in a few cases also molybdenum  $K\alpha$ ) rays fall (a) through the *F*-hole on to the back of the instrument or (b) are reflected from the edges of either top or back.

In all of the instruments investigated, we found that the spruce used for the top shows definite fibre structure, giving almost identical patterns (Fig. 1a; for comparison see Fig. 1b). But the patterns from the wood used for the back (mostly maple) are different for instruments of different tone quality. Instruments with an even and smooth tone quality, especially for higher pitch (*E*-string), show an almost complete lack of orientation in the wood used for the back (Fig. 2). The maple used in instruments which have a harsh tone quality in general, weak response and shrill upper register show marked fibre structure (Fig. 2b). Since we found that instruments two hundred years old may show such a pattern, it is clear that the ageing of the wood after cutting and working does not change its structure. Whether a special treatment

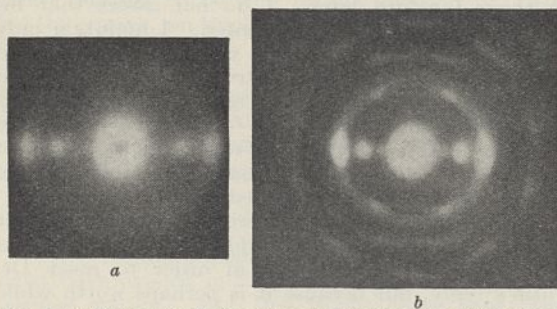


FIG. 1. (a) Spruce (top) from "Geneva" Guarnerius; (b) ordinary spruce.

of the wood or a special varnish has been used by the Italian makers is so far not certain; we found only in one case a diffraction pattern containing one ring which could not be interpreted as belonging to cellulose.

Investigation of untreated maple as used for violin making has shown that sometimes, although rarely, such maple will show as small an amount of

\* We are indebted to Messrs. Lyon and Healey and Wm. Lewis and Son, Chicago, for the possibility of investigating instruments of the following makers: A. and H. Amati, Stradivarius, J. Guarnerius, J. B. Guadagnini, C. Bergonzi, M. Bergonzi, Montagnana, Storioni, Vuillaume, Pique and several modern makers, altogether 24 instruments.

orientation as the wood found in good violins. Occasionally modern violins with properly chosen wood for which Italian varnish and treatment of the wood are not used, show an evenness in tone comparable with the old instruments. All this seems to indicate that the proper selection of the wood is more important for the quality of the instrument than treatment and varnish. We found several instruments with the proper wood, but a poor tone quality. This, of course, can be due to the faulty model of the instrument, but in two cases investigated, a radiographic X-ray study of the interior of the violin revealed a great number of

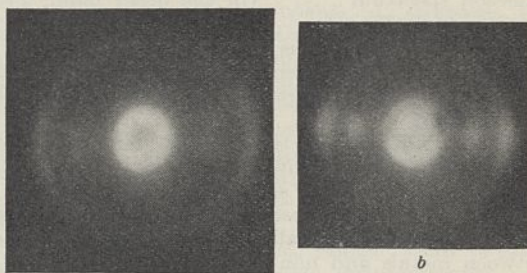


FIG. 2. (a) Maple (back), J. Guarnerius; (b) maple (back) of modern violin.

crude repairs which necessarily would impair the tone of the instrument. We have found that these radiographic studies are of great value in supplementing the knowledge of the connoisseur and collector.

Our investigation indicates that for a fine instrument only the top should be characterised by different velocity of sound in different directions, whereas the velocity of sound in the back should be the same in all directions so as to produce the best results.

K. LARK-HOROVITZ.

Physical Laboratory,  
Purdue University,  
Lafayette, Indiana, U.S.A.

W. I. CALDWELL.

<sup>1</sup> C. V. Raman (summary of all of his important papers); "Handbuch der Physik", vol. 8, pp. 355-424; H. Backhaus, "Handbuch der Experimentalphysik", vol. 17/3, pp. 177-256; 1934. R. B. Abbott, *Phys. Rev.*, August 1933; March 1934.

<sup>2</sup> F. Savart, "Mémoire sur la construction des instruments à cordes et à archet", 1819. The much more important investigations published in *l'Institut*, 8, 55, 69-70, 91, 122, 1840 seem to be entirely forgotten. We found them only quoted in E. Heron-Allen's book on "Violins and Violin Making" and have seen them myself only now. Savart's conclusions should certainly be checked with more modern acoustical methods.

Atomic Theory

MAY I comment briefly on the review of my book in NATURE of June 9, p. 852, by Prof. Fowler, to whom I am grateful for the view that new theories of this nature should always be welcomed. It is to be hoped that serious consideration of the theory will not be prejudiced by what the non-scientific press may have said about it.

(1) *Electrical Conductivity*. It is claimed that it can now be deduced from the *R-B* atom that the alkalis must be metals, and that this can "probably" be extended to the noble metals. This kind of "pious hope", to use Prof. Fowler's own expression, is quite unnecessary with the *A* atom, where the metals, non-metals and sub-metals (for example, boron), automatically fall into their appropriate groups.

(2) *Magnetism*. "It is not, however, yet possible

to say quantitatively that such a metal or alloy will be ferromagnetic and such another one not." This is not surprising, since Prof. Fowler admits that the most the *R-B* atom can do is to suggest that the conditions for ferromagnetism "might" be most easily fulfilled among the metals and alloys of the iron group. This is a long way from explaining, as the *A* atom does in its stride, why ferromagnetism is sometimes *absent* in alloys of the iron group (manganese steel), and sometimes *present* in alloys not of the iron group (Heusler alloys).

(3) *Spectroscopy*. Prof. Fowler must have overlooked p. 39 of my book which begins: "Under suitable conditions, every element will yield an emission spectrum . . ." On the other hand, Prof. Fowler himself refers to the oxygen atom as "stubborn". It is this spectroscopic property of oxygen, and of other elements, qualitative, but none the less real and important, which is predicted by the *A* atom.

(4) *Chemistry*. "In the chemical field, the qualitative successes of quantum mechanics and the *R-B* atom seem even more striking." Now, if there is one fact which more than any other is fundamental in chemistry and metallurgy, it is the distinction between metals and non-metals, and since the *R-B* atom cannot make this distinction, except for the alkalis, it is doubtful whether chemists and metallurgists share Prof. Fowler's enthusiasm for the striking successes of the *R-B* atom in this field.

(5) *Alpha Scattering*. "When it [an alpha particle] passes near one of the protonic complexes it will also be scattered by Rutherford's law with a factor  $P^2$  when the charge on the complex is  $Pe$ ." This criticism, if valid, would effectively dispose of the *A* atom, but it is invalid, because the protonic complexes are not rigidly *fixed* as are the atomic nuclei, but move in quantised orbits, and the recoil conditions are totally different. Since the Rutherford law cannot be applied in the way suggested by Prof. Fowler, he is scarcely justified in basing thereon the claim that: "The alternative atom fails outright, self-strangled at birth."

Nevertheless, in regard to the dimensions of quantised orbits of heavy particles, I admit that the calculations are so difficult that I have not been able to make them, but that does not prove that the *A* theory is wrong, nor can it yet be assumed that the *A* theory is incompatible with Coulombian binding forces, particularly since, as Prof. Fowler admits, it is doubtful whether the scattering experiments are able to test this rather fine distinction.

(6) *Isotopes*. This question does not permit at present either of proof or disproof of the *A* theory, but it does open up certain new lines of research which seem worth pursuing.

(7) *Collision Theory*. Finally, Prof. Fowler reproaches me for not touching on this subject. I remedy this omission, since it throws some light on the question at issue, namely, whether the outer regions of atoms are always negatively charged, as for the *R-B* atoms, or whether, as in the case of the *A* atom, they are positively charged for atoms such as oxygen, and negatively charged for atoms such as argon, or positive *cum* negative for a molecule such as ethylene. Here is something which can at once be tested by mixing these gases under pressure, to see whether there is any tendency towards cohesion. This has already been done by Prof. Irvine Masson, who has observed an abnormal cohesion on mixing oxygen and argon, oxygen and ethylene, and argon

and ethylene<sup>1</sup>. This curious phenomenon, which is precisely what one would expect on the *A* theory, has never been explained in terms of the *R-B* theory.

Thus, in spite of the criticism which Prof. Fowler has directed against the new theory, I hope that it will receive further serious consideration and discussion.

JOHN TUTIN.

26, Fenchurch Street,  
London, E.C.3.  
June 14.

<sup>1</sup> Masson and Dolley, *Roy. Soc. Proc.*, A, 103, 524; 1923.

I SHOULD have been much disappointed if Dr. Tutin had taken my review of his book 'lying down'. Indeed he has not done so, but he has added little or nothing in his reply to his development of the *A* atom. Paragraphs (1)-(4) merely reiterate what he claims that the *A* atom has done and the *R-B* atom has not. These claims are frankly preposterous.

In my reasoned criticism of Dr. Tutin's book, I took some pains to state at length the present position of the quantum mechanical theory of matter based on the *R-B* atom, and great care to avoid any overstatement of its successes. When it was said that this theory leads to such and such definite results, it was implied that these results were logical consequences of the theory, based on its initial postulates and without any *ad hoc* hypotheses whatever. Chapter and verse can be given for the proofs of all such results. Where I expressed the opinion (a pious hope!) that such and such phenomena were probably explicable in the same way, it was again implied that they were probably thus explicable without additional hypotheses, certainty being merely held up by mathematical complexity, a very different thing from difficulties in or uncertainty of physical principles. In contrast to this, there is not one single statement of a result in the whole of Dr. Tutin's book which can be regarded as there presented as a logical deduction from a definitely stated theory; the scattering laws should perhaps be excepted and to these I return later. I do not assert that his results can never be so presented. I maintain only that none of his results has yet been so presented and that most of them never will be. His candid admission in the last part of section (5) of his reply shows this so clearly that comment is scarcely necessary. It is no use just repeating the claim of what the *A* atom can do, in magnetism, for example. What is required is logical deduction.

I return now to the scattering of  $\alpha$ -particles, not because anything need be added to, or withdrawn from, my former criticism, in order to meet Dr. Tutin's reply, but because it is perhaps worth while analysing this reply as a typical example of the vague and unsatisfactory nature of Dr. Tutin's reasoning throughout his book. Briefly, the gist of his objection here is as follows. He has two force centres, *A* and *B*, bound together by certain forces, and a third body *C* collides with them. When *C* goes close to *A*, *A* and *B* are effectively rigidly connected and recoil as a whole. When *C* goes close to *B*, this does *not* happen. Yet the particles are said to obey the laws of quantum mechanics! In any mechanics except the Tutinian, what is sauce for the goose is sauce for the gander, and I cannot withdraw my verdict of self-strangulation, which Dr. Tutin would apparently accept apart from this plea of non-reciprocity.

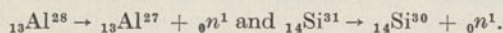
In the last paragraph of his reply, Dr. Tutin directs attention to some interesting experiments by Prof. Masson on the equilibrium  $p$ - $v$  isotherms of binary mixtures of oxygen, ethylene and argon. These experiments on the equilibrium states of gas mixtures have little or nothing to do with collision theory as usually understood; this, however, is unimportant. Dr. Tutin claims that the evidence they supply for a fairly strong attraction between pairs of molecules of these gases is in favour of his theory and against the  $R$ - $B$  atom, because with the  $R$ - $B$  atom all these molecules will be negatively charged on the periphery. He overlooks entirely the fact that for electrically neutral systems (such as these molecules) the residual polarisation effects with which we are here concerned always yield an extra attraction no matter what the unperturbed arrangement of their charges. This is a classical result which prevents discrimination between such theories in any such way.

Here, for the present at any rate, one may well take leave of Dr. Tutin's theory. If it ultimately proves of value and supersedes the  $R$ - $B$  atom, no one will be more surprised than the present reviewer—and no one more delighted. Such success would imply the construction of a logical theory appreciably more successful than current theory in interpreting the properties of matter, and current theory is a lusty infant of whom its parents and guardians, even metallurgical and chemical, are justifiably proud.

R. H. FOWLER.

### Spontaneous Emission of Neutrons by Artificially Produced Radioactive Bodies

I. CURIE, F. Joliot and P. Preiswerk<sup>1</sup> observed that after bombarding silicon or phosphorus by neutrons, the artificially produced radioactive nuclei emitted: (1) negative electrons as previously observed by Fermi<sup>2</sup>; (2)  $\gamma$ -rays of high energy ( $\sim 5 \times 10^6$  e.v.); (3) positrons (which they tentatively suggest to be due to the creation of 'pairs' by the  $\gamma$ -rays, an explanation which does not seem very probable as they state that the positrons have an upper energy limit of  $\sim 1 \times 10^6$  e.v. only); and (4) neutrons. They assume that some of the radioactive nuclei are  $_{13}\text{Al}^{28}$  and  $_{14}\text{Si}^{31}$ , and that the spontaneously emitted neutrons are due to the transformation processes:



If this formal explanation is correct, the neutron must have existed in its parent nucleus in a state of positive energy. But this would mean that there exists in a nucleus a potential barrier for neutrons, which would not only contradict current theoretical views about the interaction forces between neutrons and neutrons or protons<sup>3</sup> but would also be in disagreement with Fermi's<sup>2,4</sup> discovery that neutrons easily penetrate into nuclei of all charges and masses.

The spontaneously emitted neutrons must therefore get into a state of positive energy by some primary radioactive process, and then be immediately emitted. Assuming the potential energy of a neutron in the field of any nucleus to be everywhere negative, and the potential energy of a proton to show a 'barrier', we have two possibilities for explaining the emission of neutrons:

(i) In the radioactive nucleus  $A$ , all negative

energy states of protons are occupied and there exists one proton in a state of positive energy. This proton may either penetrate the barrier of  $A$  or transform into a neutron, emitting a positive electron. We must assume that the neutron can be created in a state of positive energy. It can then either be emitted or fall into a state of negative energy, causing an emission of a  $\gamma$ -ray. But it is rather unlikely that an unstable nucleus produced out of a stable nucleus by neutron bombardment (and therefore short of protons) should not have an unoccupied negative energy state for a proton. If  $A$  has an unoccupied negative energy state, a proton cannot remain an appreciable time in a state of positive energy.

(ii) The radioactive nucleus  $A$  contains two loosely bound neutrons. One of the neutrons ( $n_1$ ) transforms into a proton, emitting a negative electron. The proton may be created in an excited state  $p'$  and then fall down to a lower state  $p$ , whereby it can emit a  $\gamma$ -ray. Alternatively, the transition energy can be handed over to the second neutron ( $n_2$ ) which will thus be raised to a state of positive energy and will then be emitted. This model seems preferable to (i).

Recent observations of M. Mäder<sup>5</sup> seem to show that samarium emits protons spontaneously. As samarium is known to emit  $\alpha$ -rays<sup>6</sup>, it may be that the emission of a proton (or alternatively the emission of a  $\gamma$ -ray) follows immediately after the emission of an  $\alpha$ -ray. If this is not the case, we must conclude that one isotope of samarium contains a proton in a positive energy state. From (i) we might then expect samarium also to emit positrons, for a nucleus with a proton in a positive energy state certainly has a lower unoccupied state for a neutron, which makes a proton  $\rightarrow$  neutron transition energetically possible. The neutrons can then only be emitted if they are created in states of positive energy.

M. GOLDHABER.

Magdalene College,  
Cambridge.  
June 22.

<sup>1</sup> *C.R.*, 198, 2089, June 11, 1934.

<sup>2</sup> *Ricerca Scientifica*, V, 1, 283, 330; 1934. *NATURE*, 133, 757, May 19, 1934.

<sup>3</sup> W. Heisenberg, *Z. Phys.*, 77, 1; 1932. 78, 156. 80, 587; 1933. E. Majorana, *Z. Phys.*, 82, 137; 1933.

<sup>4</sup> *NATURE*, 133, 898, June 16, 1934. E. Amaldi, O. D'Agostino, E. Fermi, F. Rasetti, E. Segre, *Ricerca Scientifica*, V, 1, 452; 1934.

<sup>5</sup> *Z. Phys.*, 88, 601; 1934.

<sup>6</sup> G. Hevesy and M. Pahl, *NATURE*, 130, 846, Dec. 3, 1932.

### Hyperfine Structure of the Resonance Lines of Potassium

THE hyperfine structure of the resonance lines (7699 and 7665 Å.) of potassium has been investigated by means of absorption in a potassium atomic ray. The lines were obtained in emission from a discharge tube containing neon at a pressure of a few millimetres, and potassium vapour at a pressure of less than one two thousandth of a millimetre; the tube was excited by means of external electrodes, and was of the type used by Jackson in previous investigations on the structures of resonance lines.

Before entering the spectrograph, the resonance light passed through a ray of potassium atoms, the direction of the atomic ray being at right angles to the line of sight. The atoms forming the ray passed through a cool tube the length of which was twenty times greater than the width, so that the component

of the velocity of the atoms in the direction of the line of sight was reduced to one twentieth of the normal atomic velocity. The Doppler width of the absorption lines produced by the atomic ray is therefore only one twentieth of that given by potassium vapour at the same temperature with random distribution of velocities; this is equivalent to absorption by potassium vapour at one four-hundredth of the temperature, that is between  $1^\circ$  and  $2^\circ$  Abs. The spectrograph used for examining the atomic ray absorption contained as high resolving power instrument a Fabry-Perot étalon (this instrument is particularly effective in the infra-red on account of the high reflecting power of silver) with a plate separation of 10 cm., and a resolving power of about six million. In the absorption, each of the resonance lines was found to consist of two very close components; the separation of these components was approximately  $0.015 \text{ cm.}^{-1}$ .

The observed doublet hyperfine structure corresponds to a splitting of the  $4 S_{1/2}$  term of the lighter isotope, 39, of potassium (the heavier isotope is present to the extent of about 5 per cent, which is insufficient to give rise to absorption under the experimental conditions). This indicates a value of the nuclear magnetic moment between  $0.3/1838$  and  $0.5/1838$  of a Bohr magneton, according to the quantum number of the nuclear spin ( $I$ ).

The resonance lines of sodium were also examined by absorption in an atomic ray, an étalon of 4 cm. plate separation being used. Both the lines were found to be close doublets, the separation of the two components being  $0.06 \text{ cm.}^{-1}$ . This is in agreement with the structure of the sodium lines found by Schueler, working with a liquid air cooled, hollow cathode discharge tube.

D. A. JACKSON.  
H. KUHN.

Clarendon Laboratory,  
Oxford.  
June 21.

### Negative Nuclear Spins and a Proposed Negative Proton

THE atomic nuclear spin data obtained from the analysis of fine structures in line spectra show that odd atomic weight atoms have nuclear spins. There are two groups of odd atomic weight atoms, namely, those with odd and those with even atomic charges. The nuclei of the first group contain an odd number of protons and the nuclei of the second group an odd number of neutrons. A significant experimental fact is that all the nuclei in the first group have positive nuclear spins, whilst nuclei of the second group can exhibit either positive or negative spin values.

Landé<sup>1</sup> has proposed a theory to account for the nuclear spin properties of the first group by assuming that only the single odd remaining proton, which has both spin and orbital momenta, produces the nuclear spin properties. This theory gives approximately correct values for many nuclear magnetic moments. If the theory is extended to the second group of odd atomic weight nuclei, a difficulty arises because of the negative spins. Schüler<sup>2</sup> has suggested that the remaining nuclear core also has spin properties, and by introducing a new quantum number infers that the neutron has a negative magnetic moment. There are, however, difficulties in the theory.

It seems possible to account for the negative and positive spins of the members of the second group mentioned above by postulating the existence of two types of nuclear neutrons, namely: (a) *proton plus electron*, (b) *negative proton plus positron*. Atoms which have a remaining odd neutron of type (a) will exhibit positive nuclear spin, and those with a remaining odd neutron of type (b) will exhibit negative spin. On this view the numerical values of the positive and negative  $g(I)$  factors should be similar, which is indeed found to be the case.

It is assumed that the negative protons only exist in the bound state of neutrons when they are in the nucleus. Since the difference between the two types of neutrons lies in the relative orientations of the mechanical and magnetic moments, it is not likely that disruption experiments will distinguish between them. The confirmation of the existence of the positron suggests, on grounds of symmetry, that a negative proton might be expected to exist\*.

S. TOLANSKY.

Astrophysics Department,  
Imperial College of Science,  
London, S.W.7.  
June 7.

\* Note added in proof.—After my letter was communicated to NATURE, a note by Schüler and Schmidt (*Naturwiss.*, 22, 418; 1934) was received wherein the existence of two types of neutrons is also suggested. Tamm and Altschuler (*C.R. Acad. Sci. U.R.S.S.*, 1, 455; 1934) have attempted to explain the difficulty of negative spins by assuming that several neutrons can contribute to the spin properties.

<sup>1</sup> Landé, *Phys. Rev.*, 44, 1028; 1933.

<sup>2</sup> Schüler, *Z. Phys.*, 88, 323; 1934.

### The Changing British Fish Fauna

INTRODUCTIONS of foreign species, the results of which deserve close scrutiny, are not confined to mammals. Rainbow trout are now a permanent element in our fauna, black bass are established in certain places, and now the case of the pike-perch in East Anglia deserves to be put on record. On March 4, 1934, a *Lucioperca* of  $11\frac{3}{4}$  lb. was caught in the River Delph, near Welney, in the Ouse basin, and was brought here for identification. Five species of the genus are known, two in the rivers and lakes of eastern and northern Europe, one in the Black and Caspian Seas, and two (placed by some authors in a separate genus *Stizostedion*) in Canada and the northern U.S.A. Comparison with specimens in the B.M. (Nat. Hist.) revealed that the Welney fish resembles the American species in five characters and the European in four, but in view of the structural importance of the American characters (especially the distance between the pelvic fins) it is reasonably certain that it came from the American species *Lucioperca vitrea*, Mitchill.

It seems that only one successful introduction of pike-perch to Great Britain has been made, and that was the European *L. lucioperca*, of which 24 fish were put in a pond on the Duke of Bedford's estate at Woburn in 1878. The only explanation of how an American species came to be in England, however, is that it was introduced in mistake for black bass. Inquiries have shown that some nine years ago 20 fingerlings hatched from American eggs which were supposed to be black bass, were put into the Ouse at Erith Bridge, and Prof. Gardiner concludes from scale examination that the Welney fish was in its tenth winter, which suggests that it was one of these 'black bass'. Now a pike-perch can easily be mistaken for a gaunt black bass, so it is



quite possible that American pike-perch are living in other waters to which black bass have been introduced. The danger to our indigenous fauna which the presence of such a predator entails need scarcely be mentioned, but the fact that it seems to have changed structurally in the new environment may throw some light on fish evolution if a British race of *L. vitrea* becomes established.

E. B. WORTHINGTON.

Zoological Laboratory,  
Cambridge.

#### Effect of Yeast Extract on the Growth of Plants

THE communications on the above subject in the columns of NATURE by Prof. Artturi I. Virtanen<sup>1,2</sup> and Synnove V. Hausen of the Biochemical Institute, Helsingfors, and by Prof. V. Subrahmanyan and G. S. Siddappa<sup>3</sup> of the Indian Institute of Science, Bangalore, are intensely interesting in that they confirm our earlier work on the effect of live and autoclaved yeast and yeast extracts on the growth of plants.

The authors are apparently unaware of our work and so we wish to invite attention to it and to state that it was published in the year 1927<sup>4</sup> as a Memoir of the Imperial Department of Agriculture in India, under the title "The Effect of Manuring on the Vegetative and Reproductive Capacity of the Seed". In this contribution, which deals with the effect of mineral fertilisers and organic manures on the quality of grain as seed and as food, there is a section devoted to the rôle of organic matter in plant nutrition. Here, several experiments on the effect of yeast on different crop plants in sand cultures, soil in pot cultures, and in small plots were reported.

The crops studied were *Eleusine coracana*, *Pennisetum typhoideum*, *Panicum miliaceum*, *Andropogon Sorghum*, *Lycopersicum esculentum* and *Triticum vulgare*. In every case, minute quantities of yeast, either alive or autoclaved, contributed remarkably to growth, flowering and reproduction. It has also been shown that indications were obtained that yeasted grain possessed better nutritive value than unyeasted grain when fed to albino rats. Evidence was given and arguments were advanced to show the possibility of absorption of the growth-promoting factors of the yeast by the plants through their roots, and of the conveyance of these to animals. We also pointed out in the same publication that in the presence of a good supply of organic matter or on soils rich with silt brought down by rivers flowing through forest areas, this effect might not be so marked or might entirely disappear.

One of us (B. V. N.) in recent publications<sup>5,6</sup> discussing the work in progress in our laboratories, directed attention to the hitherto unsuspected rôle of micro-organisms in plant nutrition to which Prof. Virtanen refers in his second letter.

B. VISWA NATH.

M. SURYANARAYANA.

Chemical Laboratories,  
Agricultural Research Institute,  
Lawley Road P.O., Coimbatore,  
India.  
May 26.

<sup>1</sup> NATURE, 132, 408, Sept. 9, 1933.

<sup>2</sup> NATURE, 133, 383, March 10, 1934.

<sup>3</sup> NATURE, 132, 713, Nov. 4, 1933.

<sup>4</sup> Mem. Dept. Agri., India, Chemical Series, 9, No. 4; 1927.

<sup>5</sup> "Some Aspects of Plant Nutrition", Soc. Biol. Chemists, India; 1932.

<sup>6</sup> Soc. Biol. Chem., India, Symposium, July 1932, p. 12.

#### Science and Intellectual Liberty

As a German professor, living abroad and without any official connexion with the National-Socialist Government or Party, I would appreciate the publication of some remarks on the attitude of the German Government towards science. On this topic an article was published in NATURE of May 12 under the title "Science and Intellectual Liberty" and a letter by Prof. J. B. S. Haldane appeared in the same issue. Other articles and letters have been published in NATURE, in one of which (June 17, 1933) it was said that "intellectual companionship" with Germany has been made "difficult".

In NATURE of May 12, 1934, I found the phrase "the revocation of academic freedom in Germany will no more be forgotten than the revocation of the Edict of Nantes". Prof. J. B. S. Haldane cites a sentence from one of the prominent National-Socialists acting as rector of the University of Frankfort; this sentence he designates as "not an isolated example of the attack on objectivity, on, in plain English, truth, which appears to be taking place in modern Germany".

I am sure that every reader of NATURE will realise the very grave situation indicated by these few quotations. For centuries, men of science in Great Britain and in Germany have collaborated, both of them in the first rank of the human fight for truth and progress. Now one of these two groups of scientific men seems to be in danger of losing its credit in the eyes of the other through permitting the suppression of objective truth by the present leaders of its own universities.

The rector of the University of Frankfort said that the task of the German universities to-day is not to cultivate objective science, but to form the will and character of their students. This is considered by Prof. Haldane as one of the German attacks on objectivity and truth. This and the elimination of a considerable part of the staff of German universities seems to indicate that academic freedom in Germany actually is partly suspended and regarded as less important than national education of the future leaders of the people.

Knowing personally many British men of science, and having been a guest of some of your universities and institutions, I realise that it may be exceedingly difficult to understand in Great Britain the present situation of science in my country.

It would be easier to understand the present events in German universities if readers of NATURE for a moment could imagine a situation in the British Empire comparable to the situation of Germany since the War.

A great people like the British or German nation cannot live without full independence or sovereignty, that is, freedom from foreign interference. If you are able to realise—I repeat, only for a moment—a situation of lost independence of your country, you will also realise the necessity of concentrating every mental force, especially of the cultivated classes, on the one most important vital task, namely, to regain the national independence, to obtain deliverance from the humiliating conditions of enforced treaties.

I am sure that no one in England would complain in a national disaster like ours, if every institution of the country had to postpone everything, including scientific research (objective science), in order to strengthen the mental forces of the people, especially of its future leaders.

I have the impression, and I suppose everybody has, that Germany, since the beginning of its new regime, has made some steps nearer to independence, nearer in any event than Herr Stresemann's Germany ever was. I am sure that my country will reinstate the full academic freedom of its universities and science, as soon as political sovereignty in our own country is assured.

R. WOLTERECK.

College of Agriculture,  
Ankara.  
May 25.

It may well be that Prof. Woltereck's restrained and courteous letter will produce upon his colleagues in Great Britain a more painful sense of alienation than the disturbing utterances of those who now control German academic life. We English do not need to be reminded that political excitement often betrays wise and good men into strange company. We are the last people in the world to deny that, in times of panic or excitement, we have said and done things which in retrospect are recognised by us to be wrong and humiliating. But what seems to men of science most deplorable is the elevation of national passion into a principle, the acceptance of a policy which teaches that to attempt to find and hold truth is but a secondary and subordinate activity of the human mind to be postponed or slighted for *any* reason whatever.—Editor of NATURE.

#### Inheritance of Habits

DR. S. MAULIK<sup>1</sup> has well pointed out the necessity for distinguishing between experiments, like maze threading, in which the nervous system of the animal is primarily concerned, and other experiments in which a foreign substance or a new food material is introduced into the organism—when we attempt to decide whether the new experiences “produce any physical change in the organism”.

In regard to the second group, some information can be obtained from a study of the immunity reaction. In the report of the Medical Research Council “On the Chemistry of the Antigens and Antibodies”<sup>2</sup>, Dr. L. R. Marrack describes certain experiments by Landsteiner and others, in which an artificially prepared substance—atoxyl azo protein—when injected into the blood, confers on the serum of the animal so treated a capacity to precipitate any other protein, if it is coupled with the diazotised atoxyl.

A physical change is thus brought about in the organism by the introduction of an artificially prepared protein antigen, of which neither the animal nor its ancestors can have had any previous experience.

It is also significant that the organism modifies the molecular composition of the foreign antigen before assimilating it, somewhat as it breaks up, and resynthesises, ordinary food material, though after the incorporation of the foreign protein the constitution of the organism itself also becomes altered.

The immunity so acquired is, however, not transmitted to offspring, at any rate in the human subject, because experience shows that acquired immunity against subsequent attack by the same disease

organisms, for example, measles, is not hereditarily transmitted in man.

Prof. MacBride's feeding experiments were carried out on the Ceylon stick insect<sup>3</sup>.

It is possible, as I have elsewhere<sup>4</sup> suggested, that human germ cells may be more isolated, that is, more fully protected against influences from the internal environment, than the germ cells of insects, or some other animals. Hence it is not wise to argue directly from one case to the other without further experimental evidence.

C. J. BOND.

Fernshaw,  
Springfield Road,  
Leicester.  
May 30.

<sup>1</sup> NATURE, 133, 760, May 19, 1934.

<sup>2</sup> M.R.C. Special Report Series 194, Chap. iii.

<sup>3</sup> NATURE, 133, 598, April 21, 1934.

<sup>4</sup> Withering Lecture II, University of Birmingham, 1932, “On the Making of Use Acquirements, etc.”

PROF. MACBRIDE<sup>1</sup> and Mr. Maulik<sup>2</sup> have raised in the columns of NATURE the important question of the inheritance of acquired habits. Mr. Maulik, if I understand him correctly, states that the offspring of mice trained to run through a maze acquire the same habit more easily than their parents. A reference to the journal in which this remarkable result is published was not given. Mr. Maulik regards it as necessary, before conclusions are drawn, to obtain information as to the nature of the physical change produced by habit in the organism and its reproductive cells. While such information is desirable, it is surely a biological fact that some habits are inherited, even if we do not know the nature of the process of their inheritance. Thus the statistical laws of inheritance of human stature are known, though we have no idea, for example, how many genes are concerned in the process.

Such an excessive demand can only obscure the important issues raised by Miss Sladden's<sup>3</sup> demonstration of the transference of an induced habit (namely, that of feeding on ivy) from parent to offspring in *Carausius morosus*. At least three possibilities suggest themselves. The young insects on hatching may be so saturated with bitter substances from the ivy eaten by their mothers that ivy is less repugnant to them than to insects not so saturated. They may be affected by a *Dauermodifikation* inherited from the mother only and disappearing in a few generations, such as those described by Jollos. Or they may have acquired a character transmissible by both parents, as are most interspecific differences, or such inter-varietal habit differences as that between broodiness and non-broodiness in poultry, or wildness and tameness in mice.

Only in the latter case would the transference of an acquired habit have the relevance for the problem of species formation which Prof. MacBride claims for it. Nevertheless, it should be perfectly possible in suitable cases to test such claims without the very complete knowledge which Mr. Maulik demands.

J. B. S. HALDANE.

John Innes Horticultural Institution,  
Merton, S.W.19.  
June 8.

<sup>1</sup> NATURE, 133, 598, April 21, 1934.

<sup>2</sup> NATURE, 133, 760, May 19, 1934.

<sup>3</sup> Proc. Roy. Soc., B, 114, 441; 1934.

## Collecting Spilled Mercury

ON four occasions lately in the presence of a number of skilled experimentalists I have asked the question—How would you pick up from a floor, with a smooth cork carpet covering, a quantity of mercury which had been dropped and broken up into innumerable globules? I added on each occasion that I thought it likely that any laboratory boy would know but that no professor would. Not once have I received an adequate answer. I have only asked one laboratory attendant, but he was no wiser than his professor. I specify the nature of the floor covering because a Turkey carpet or floor boards with intervening spaces and nail holes are not suitable. The smooth cork carpet is the best floor covering for laboratories other than metallurgical and for lecture tables, and is in common use for these purposes. The question, therefore, touches most of us. Well, the answer is, sprinkle lightly the area which the globules have reached with drops of water from a wash bottle. Then with a squeegee or the straight edge of a piece of strawboard sweep the wetted globules of mercury together. If dry the process is hopeless, they continue to run away and are essentially elusive, but once wet they are tamed, they have the brake on and will not run, and however small they may be they seem to love one another and all cling together in a mass. Then with the same tool or a smaller one sweep them into a small dust-pan made of thin celluloid or even card. The floor is then cleared of all the mercury. Do it.

C. V. BOYS.

## Increase of the Percentage of Diplogen in Water during very slow Evaporation

It is known that one of the methods of separating heavy water consists in the fractional distillation of ordinary water. I find that relatively strong enrichment of diplogen occurs during the slow evaporation of water. About three years ago a bottle containing 25 litres of distilled water was prepared for an experiment. The bottle was not used, and the water slowly evaporated leaving about 600 c.c. residue. The measurements showed that this water had a density of 1.0016 (4° C.). For comparison, I have evaporated by boiling a certain quantity of water to 1/60 of its initial volume. The residue had, however, a density of 1.0001. It is evident, therefore, that the action of slow evaporation is more efficacious than the action of boiling.

Extrapolating the equation given by Luten<sup>1</sup> for smaller ratios of D<sub>2</sub>O/H<sub>2</sub>O, it is possible to calculate that the density, 1.0016, corresponds to a concentration of 1.65 per cent of D<sub>2</sub>O.

These observations suggest where to search on the earth for sources of water of greater density. Up to the present, practically no difference has been found in the density between samples of water taken from different points on the earth<sup>2</sup>. I think it probable that heavy water will be found in mountain caves rather than in the large surfaces of seas, where the evaporation is very intense.

T. TUCHOLSKI.

Department of Medicine,  
University, Poznań.

<sup>1</sup> D. B. Luten, *J. Phys. Rev.*, **45**, 162; 1934.

<sup>2</sup> H. A. McKay, *NATURE*, **133**, 611, April 21, 1934. E. W. Washburn, E. R. Smith, *Science Abstracts (S.A.)*, **37**, 434; 1934. E. S. Grifflin, *Jr.*, *J. Amer. Chem. Soc.*, **56**, 406; 1934.

## Chromosome Numbers in Menispermaceæ

IN a recent communication to *NATURE*<sup>1</sup>, entitled, "Origin of the Angiosperms", Dr. Anderson puts forward the interesting suggestion of the possible origin of modern flowering plants through the Magnoliales from wide crosses between different groups of Gymnosperms showing 12 and 7 as the base number of their chromosomes, such as the modern Ginkgoales, Cycadales and Coniferales show on one hand, and the Gnetales on the other. The various genera of the Magnoliales show 19 as the base number of their chromosomes, which is rather unusual among other families of flowering plants. We have in this laboratory been working for a considerable time on the cytology of the family Menispermaceæ (results not yet published), a close ally of the Magnoliaceæ, and have found the haploid number of chromosomes in *Tinospora cordifolia*, Miers, to be 12, and in *Cocculus villosus*, DC., 19 (12 + 7). Dr. Lindsay<sup>2</sup>, in *Menispermum canadense*, Linn., has found the haploid number of chromosomes to be 26 = 19 + 7 = 12 + 7 + 7. It may be asked whether there is any significance in these chromosome numbers in relation to Dr. Anderson's hypothesis. The difference of seven chromosomes between each of the three plants and 12 chromosomes in the species with the lowest number are certainly suggestive facts.

A. C. JOSHI.

Benares Hindu University,  
India, May 24.

<sup>1</sup> Anderson, E., *NATURE*, **133**, 462, March 24, 1934.

<sup>2</sup> Lindsay, R. H., "The Chromosomes of some Dioecious Angiosperms", *Amer. J. Bot.*, **17**, 152; 1930.

## The "Johannes Schmidt" Ridge in the Indian Ocean

IN his second report on "The John Murray Expedition to the Arabian Sea" (*NATURE*, May 5, p. 669), Lieut.-Col. Seymour Sewell announces that the echo soundings made from H.E.M.S. *Mabahiss* prove the existence of a vast submarine ridge running diagonally across the north Indian Ocean from the south-east to the north-west and connecting the Chagos Archipelago with Socotra and the Gulf of Aden. May I suggest that the name of Denmark's great oceanographer, the late Dr. Johannes Schmidt, whose discovery of this submarine formation Col. Sewell graciously acknowledges, shall be given to it?

HANS PETERSSON.

Göteborgs Högskola.  
May 22.

## Density of Dead Sea Water

SIR ROBERT ROBERTSON has recorded in *NATURE* the results of some determinations of the density of water from the Dead Sea<sup>1</sup>. We had also determined independently the density of two samples from different places by (a) the use of a 25 c.c. pycnometer, and (b) a differential method employing two sinkers of nearly the same dimensions. The uncertainty in either method is about one in 10<sup>5</sup>. In none of the six determinations made could we detect any significant difference between water from the Dead Sea and redistilled water from the laboratory.

R. J. CLARK.

Egyptian University,  
Cairo, June 5.

F. L. WARREN.

<sup>1</sup> *NATURE*, **133**, 611, April 21, 1934.

## Research Items

**Palaeolithic Affinities in Palestine.** Miss Dorothy Garrod publishes in *Antiquity* for June a survey of the results obtained by her cave explorations on Mt. Carmel in Palestine, bringing them into relation with discoveries of palaeolithic age in other parts of Palestine, and offering tentative suggestions for a correlation of Palestinian palaeolithic with that found elsewhere. As only certain points are noted here, it must suffice to say that the Carmel cave series covers from Natufian (Mesolithic) to Tayacian, the recently recognised rough flake industry, dated as to its phase II here represented at the beginning of the Riss-Würm interglacial. For details of the sequence and their distribution in the caves, reference must be made to the original paper. The outstanding feature of the Lower Natufian is the artistic skill of the people shown in bone and stone carving. M. Neuville also has found recently a fine specimen in a cave near Bethlehem. Four stages of the Aurignacian were found, of which the Upper is not comparable with European Aurignacian, but probably with Magdalenian. The next Aurignacian phase (Wad layer D) resembles closely, not African, as might be expected, but European Middle Aurignacian, hitherto thought to be a local development from Lower Aurignacian, as Europe was then close to Africa. The earliest Aurignacian (Wad layer F) includes a small group of leaf-shaped points which are not known in Europe, but afford a definite link with Africa, where they occur in the Aterian found by Miss Caton-Thompson at the base of the Upper Palaeolithic at Kharga. The Aurignacian fauna indicates a change from wooded to open country, whereas the fauna of the Lower Mousterian (Tabun C) points to warm swampy conditions with heavy rainfall (rhinoceros, hippopotamus, crocodile). Here was found the nearly complete Neanderthal skeleton, dating from the later Riss-Würm. For the earlier palaeolithic stages not represented in the caves, evidence is afforded by Sir Flinders Petrie's recent Acheulean finds at Gaza, in finds by Neuville, south of Bethlehem, and the Chellean and Acheulean tools found by Breuil and Neuville in Jerusalem. Roughly, Tayacian and Acheulean coincide in date with Europe in the Riss-Würm, and climatic conditions suggest correlations with pluvial conditions in East Africa.

**Tribal Migrations East of the Mississippi.** Mr. David I. Bushnell, Jr., has prepared a series of maps (*Smithsonian Misc. Collect.*, 89, No. 12) to show the country traversed or occupied by the tribes east of the Mississippi before they first became known to Europeans, when their distribution was that shown in J. W. Powell's linguistic map, as corrected by more recent research. Mr. Bushnell's evidence is derived from the investigation of ancient sites, as well as a comparison of language, customs, etc. The earliest movements were probably Uchean and Siouan, and the ancestors of the Natchez, Timucua and Calusa may belong to the same early period. These last two are the proto-Muskogean. The Siouan advanced into the valley of the Ohio and may have been responsible for the erection of the great earthworks, while the massive mounds of Cahokia and others as far as Georgia may have been erected by proto-Muskogean. The Iroquoian and Muskogean, with the Caddoan to the west of them, were still on

the right bank of the river. In the next period the proto-Muskogean reached Florida, the States of Tennessee and Kentucky were crossed and recrossed by Siouan, Uchean, Iroquoian and Muskogean stocks; while Algonquian, possibly now and certainly later, frequented the same region. In the third period, fortified camp and village sites have been traced northward from central Tennessee and Kentucky across the Ohio in the eastern counties of Indiana to the north of the State and thence eastward to the traditional home of the Iroquois. These sites were constructed and occupied by Iroquoian tribes. This northern thrust separated peoples of the Algonquian and Siouan groups, who had been in contact in southern Ohio. The groups of tribes continued to move until by the sixteenth century they were located as indicated on Mr. Bushnell's last map, with the Siouan scattered far from their homes in Ohio and the Muskogean occupying the greater part of the south-east.

**Some New Deep Sea Fishes.** Mr. Albert Eide Parr in his paper "Deep Sea Berycomorphi and Percomorphi from the Waters around the Bahama and Bermuda Islands. Scientific Results of the Third Oceanographic Expedition of the *Pawnee* 1927" (*Bull. Bingham Ocean. Coll.*, 3, Dec. 1933) presents a sixth report dealing with the deep sea fishes collected during the *Pawnee* expedition under the sponsorship and direction of Harry Payne Bingham. Two new families, six new genera and eleven new species are introduced. Several hitherto little-known species are also described. The new families *Gibberichthyidae* and *Korsogasteridae* (both in the Berycomorphi) each include a new genus of one species, *Gibberichthys pumilus* and *Korsogaster nanus*: the first seems to occupy a peculiarly isolated position and the introduction of a new family is apparently fully warranted. Unfortunately, only one specimen was available, as is also the case with *Korsogaster nanus*, which shows a fairly close resemblance to *Leiogaster*, differing in the absence of scales and the development of dermal spines in their place, and in several other features. A female specimen of *Parabrotula dentiensi*, Zugmayer, gave birth to living young immediately after capture. One of these young, 6.5 mm. long (the mother being 41 mm. long, without caudal fin), is illustrated, showing a somewhat tadpole-shaped body with attachment cords still remaining, a simple continuous fin round the tail and very small pectorals.

**Phases of the Red-winged Locust.** In the *Bulletin of Entomological Research* of March 1934 (25, Pt. I), Messrs. A. P. G. Michelmores and W. Allan contribute a paper on this subject. The prevalence of a cycle of activity of the red-winged locust (*Nomadacris septemfasciata*) in north-eastern Rhodesia began with the appearance of swarms in an area of marsh country. This event gave opportunity for studying the *gregaria* and *transiens* phases of that insect, but no undoubted examples of the phase *solitaria* were met with. Cage experiments, made with crowded hoppers, suggest that activity is the factor in crowding which influences the production of *gregaria* characters, as maintained by Faure. The prevalent green colouring of *transiens* (*dissocians*) hoppers appears to be associated with high humidity and the

presence of green food. Other colour types of the *transiens* phase are conditioned by those of the environment. An aberrant pallid type of hopper is described and its origin appears to be due to the effects of parasitism by nematodes and possibly also by dipterous larvæ. Factors influencing adult coloration are discussed. Adults crowded in cages, and derived from hoppers reared similarly under crowded conditions, did not undergo the same colour changes observed in the field. The red swarming coloration failed to develop in caged individuals and was replaced by a brown pigment which assumed a similar distribution over the insect. Biometrical data obtained from a variety of types are tabulated and discussed. It is shown that certain characters, especially the relative sizes of the sexes, the degree of development of the femur in relation to the wing, and the relative length and degree of constriction of the pronotum differ greatly in *gregaria* and *transiens* types and afford useful distinguishing characters.

**Australian Sponges.** The study of the collection of sponges brought home by the Great Barrier Reef Expedition has afforded M. Burton (Sci. Reports Great Barrier Reef Exped., 4, No. 14, 1934) the opportunity to review our knowledge of the sponges of the Australian region, especially with regard to their nomenclature. 107 species are recorded, 17 of which are new, and five new genera are created. The author points out that species on the Barrier Reef are found also in the West Indies, the Azores and the Mediterranean and that the sponge faunas of the Indian Ocean and the Malay area include many species showing the same distribution. "So far as can be seen at present, the line of their distribution follows through from the Malay area and Indian Ocean, round the most southerly point of the African continent, up its west coast to the Azores and thence into the West Indies on the one hand and the Mediterranean on the other. Moreover, these same species do not seem to occur outside this area. It is possible that a detailed study of this problem may shed interesting light on the migration of species and the factors limiting distribution."

**Pollen Constancy of Bees.** A useful study entitled "Further Observations on the Pollen Constancy of Bees" by W. H. Brittain and Dorothy E. Newton has appeared (*Canadian J. Res.*, 10, No. 3, pp. 255-263, March 1934). Several authorities have supposed that hive bees do not gather honey from more than one species of plant at the same time, but the present paper shows that this is not always the case. Whilst bees of the species *Apis mellifica* obtained pollen from one species in 56 per cent of their loads, the remaining loads were mixed, and in a few cases, pollen from four different species was found. Bees belonging to the genera *Andrena* and *Halictus* have a lower degree of constancy than the hive bee. It appears that insects which occur most commonly on apple blossoms have also a wide range of other pollen hosts.

**Yield of Rubber from Vegetatively Propagated Clones.** Very rapidly the scientific study of vegetative propagation in the tropics is enabling variable material grown from seed to be replaced in the plantations by more uniform plants multiplied by vegetative propagation from selected parents. In the case of rubber, both budded and grafted material has been

successfully propagated, and it is significant that the *Journal of the Rubber Research Institute of Malaya* of March 1934 contains papers by Mann, Billington and Kaimal and by Rhodes and Mann, upon the yield of latex from such vegetatively propagated clones. The point seems already established that, as might be expected, the trees of a clone, all multiplied vegetatively from one parent plant, are more uniform in growth habit and show a good correlation between growth in girth and yield of latex. It is found, however, in tapping the new plantations, as yet of very young trees, that the yield of the parent may not apparently be a reliable criterion of its value as a founder of a clone. From a group of 19 trees selected from 500, only 4 have given buddings which appear to possess the necessary high-yielding characteristics. This means that progress may be slow, but none the less it should be sure, and the figures supplied by Rhodes and Mann certainly suggest that there is great uniformity in behaviour in the trees of a clone. As the selected clones are studied, naturally various types are eliminated for reasons connected possibly with other characteristics than yield. This appears to have led to some uncertainty amongst practical growers as to the future of the new methods, but an estimate by C. E. T. Mann of yield under commercial conditions from clone plantations shows that the outlook for the new practice is definitely favourable.

**The Genus *Meconopsis*.** The *Gardeners' Chronicle* of June 9 contains a useful review of the development of our knowledge of the genus *Meconopsis*, since it was established upon the single species *M. cambrica* in 1814. The increasing popularity of various *Meconopsis* species for garden use has led to the publication of many systems of classification. Sir David Prain kept pace with the rapidly increasing number of species from 1896 until 1915, and recent plant collecting expeditions have yielded still more material. Mr. George Taylor has published a revision ("An Account of the Genus *Meconopsis*", 130 pp. Flora and Sylva, Ltd., London, 20s.), reviewed in *NATURE* of May 26, p. 777. The group is now divided into four sub-sections: *Cambricæ*, *Eucatheartia*, *Discogyne* and *Polychætia*. Habit, floral colour and pubescence are the distinguishing characters which separate the sub-groups. *Polychætia* are further subdivided into *Eupolychætia* and *Cumminsia*. The latter group contains the most common garden species, and is arranged in six series: *Simplicifoliæ*, *Grandes*, *Primulinæ*, *Delavayanæ*, *Aculeatæ* and *Bellæ*.

**Rhætic Mammals.** Some new teeth of the earliest known mammals have been discovered and described by Miss Erika von Huene, who has lately made an exhaustive study of the fossils in the Rhætic bone-beds of Württemberg (*Jahreshefte Vereins vaterl. Naturkunde in Württ.*, 65-128; 1933). One tooth named *Mucrotherium* seems to belong to a Multituberculate like *Tritylodon*; *Uniserium* is of uncertain relationships; and other unnamed teeth may represent *Plagiaulacids* and *Pantotheria*. With these in the Rhætic bone-beds of both Württemberg and Somerset, there are very small tricuspid teeth, named *Tricuspes*, which probably belong to mammal-like reptiles.

**The Noto (Japan) Earthquake of 1933.** The Noto peninsula branches off from the north-west side of the Main Island of Japan. A strong earthquake that

occurred in the middle of the peninsula on September 21, 1933, is described by Mr. T. Suzuki (*Earthq. Res. Inst. Bull.*, 12, 44-51; 1934). Though of merely semi-destructive strength—three persons were killed and a number of houses were partially destroyed—fissures occurred in the epicentral area and soft ground subsided locally. The epicentre lay in lat.  $37^{\circ} 4' N.$ , long.  $136^{\circ} 57' E.$  During the following November, the central district was re-levelled (*Bull.*, 12, 52; 1934). Comparing the new heights of the bench-marks with those obtained in August and September 1928, it was seen that the whole area had risen slightly, in one part by 29.0 mm. or 1.14 in.

**Alpine Landslips.** M. F. Montandon has done most useful work in compiling a catalogue of great Alpine landslips during the Christian era (*Matér. pour l'Étude des Calam.*, No. 32, 271-340; 1933). The tests for a great landslip are that its volume should exceed three million cubic metres, that it should destroy completely a town or several hamlets or villages, or should block up an important valley. The total number of such landslips is 160, the numbers for the last five centuries being 21, 14, 16, 25 and 43. The number of lives lost since 1501 is nearly 4,000, the numbers in 16 landslips ranging from 30 to about 1,200. The largest six landslips, each containing more than thirty million cubic metres, all occurred in secondary or tertiary formations. The number of places destroyed by landslips or the resulting floods amounts to 9 towns, 48 villages and 73 hamlets. M. Montandon gives three maps, of the western, central and eastern Alps, on which the sites of the landslips are marked. These sites are grouped in three well-defined zones, the north-west end of the Alpine arc with Mont Blanc as centre, the basins of the Reuss, Linth, Tessin and Adda with the St. Gothard as centre, and the massifs of the Dolomites and the Hohe Tauern. On the other hand, landslips are rare in two zones, the upper basins of the Durance and Po, and the districts of the Inn and Adige; and they are entirely absent from an extensive area in Austria and Carinthia. More than a quarter of the whole number occurred in seven bands, which altogether form a very small fraction of the Alpine region.

**A Theory of the Viscosity of Liquids.** In two recent papers (*Phil. Mag.*, 7, 17, 497 and 698) Prof. E. N. da C. Andrade develops a theory of the viscosity of liquids which, unlike earlier attempts, leads to remarkable agreement between calculated and observed values. The liquid state is assumed to resemble the solid much more than the gaseous: the molecules vibrate about equilibrium positions which shift slowly whereas in the solid they are fixed. The frequency is assumed to be the same in both the solid and liquid state, and support is adduced for this view. In a velocity gradient the transfer of momentum between adjacent layers takes place, not as in gases by diffusion of molecules, but by momentary combination of molecules at extreme libration. On these assumptions the viscosity coefficient may be expressed in terms of the atomic weight, the melting point and the atomic volume at the melting point, without an arbitrary constant. The values thus calculated agree very well with experimental data over an astonishingly wide range. The second part of the paper deals with the variation of viscosity with temperature and pressure. The transfer of momentum postulated above occurs only in favourable conditions of energy of the molecules in the intermolecular field, so that

the probability of transfer follows the Boltzmann temperature law. On this basis an exponential formula with only two arbitrary constants is deduced, which agrees closely with experimental data for all liquids except water and some tertiary alcohols, anomalous also in other respects. By assuming that the fundamental frequency varies with pressure in accordance with Einstein's compressibility equation, a formula for the variation of viscosity with pressure is obtained which contains no fresh arbitrary constant and agrees with experiment up to about 3,000 atmospheres.

**Experiments with Heavy Hydrogen.** A. Farkas, L. Farkas and P. Harteck (*Proc. Roy. Soc., A*, April) have carried out a number of experiments on the equilibrium between the molecular species present in a hydrogen isotope mixture and on the *ortho-para* conversion of the heavy hydrogen molecule. In order to analyse the gas mixtures they use the heat loss from a wire at two different temperatures, the wire being surrounded by the gas sample under low pressure. The variation of specific heat with temperature is at low temperature very different for hydrogen and for diplogen. In contact with a nickel wire at  $600^{\circ}$ , the molecules  $H_2$ ,  $D_2$  and HD rapidly come to equilibrium, and thermal measurements made before and after contact with hot nickel enable the authors to determine the HD content of a sample. It was found that the two isotopes tend to separate by diffusion when the mixture is pumped through a fine nozzle; there is, however, no preferential absorption on charcoal. When a mixture diffuses through a palladium tube, there is a preferential transmission of  $H^1$  at lower temperatures and none at higher temperatures. They suggest that this difference arises from different sorption velocities arising from different energies of activation. The *ortho-para* conversion was studied by a similar method to that described above. It was found that the Bose-Einstein statistics applies to the diplogen nucleus, and that the most probable value of the nuclear spin is 1.

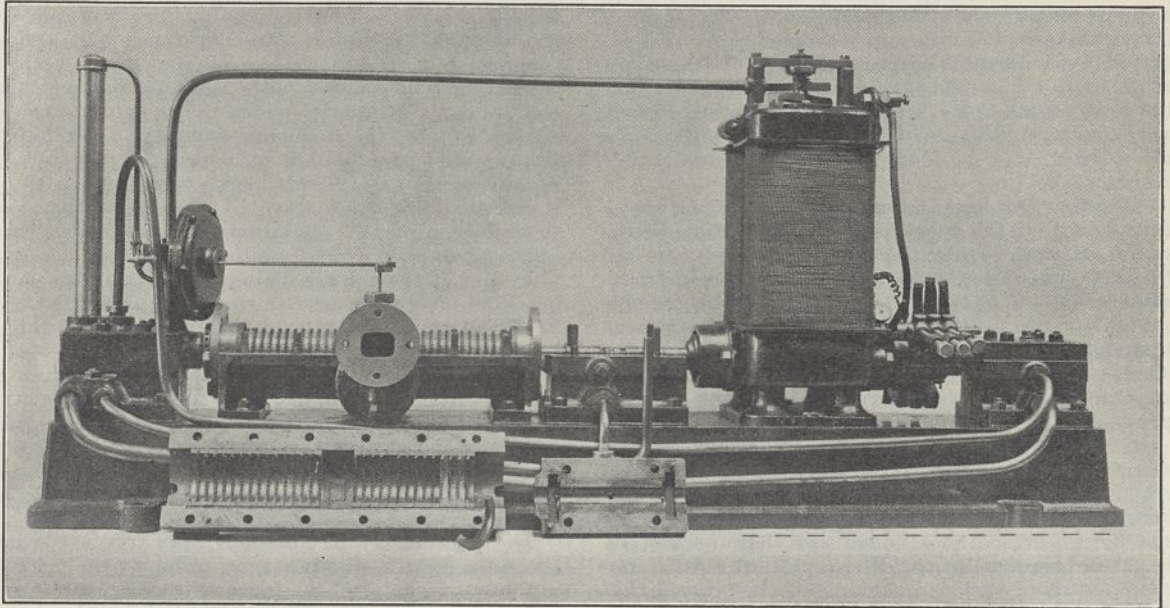
**Synthesis of the Aldohexoses.** When Emil Fischer established the constitutional formula of glucose he was able to forecast the existence of fifteen other aldohexose sugars, differing only in the stereochemical arrangement of their H and OH groups. Fischer set to work to synthesise these—since only four of them occur in Nature—and succeeded in making twelve of the isomerides. Two more, *d*-allose and *d*-altrose, were added in 1910 by Levene and Jacobs consequent on their discovery of *d*-ribose. This chapter of carbohydrate chemistry is concluded by the synthesis, described in the May number of the *Journal of the American Chemical Society* by Austin and Humoller, of the sixteenth and the last remaining aldohexose to be synthesised, *l*-altrose, the same authors having announced the synthesis of *l*-allose some months previously. The epimeric pair were obtained from *l*-ribose by the cyanhydrin reaction, *l*-ribose being produced by the action of perbenzoic acid on the unsaturated arabinol formed from the accessible pentose *l*-arabinose. Both *l*-allose and *l*-altrose were obtained crystalline, and in the same journal Phelps and Bates announce the preparation in crystalline form of *d*-allose, making the ninth aldohexose to be obtained crystalline, the others which have been so obtained being the *d* and *l* forms of glucose, mannose and galactose.

### The First Parsons Steam Turbine

THE jubilee of the first Parsons steam turbine and high-speed generator, as we have already noted (*NATURE*, Jan. 20, p. 97), falls this year. To mark the event, the original turbo-generator, which is preserved appropriately at the National Museum of Science and Industry at South Kensington, has been moved to a prominent position near the main entrance, where it now forms the centre of a special exhibition, which will be continued for several weeks. This also includes copies of the original patent

and *King George V*, all vessels of outstanding interest.

Fig. 1 shows the original turbo-generator of 1884 which ran at the unprecedented speed of 18,000 R.P.M. and developed about 10 H.P. This small set, less than six feet long, is the direct forerunner of the large reaction type turbo-generators used to-day in all parts of the world, culminating in the 160,000 k.w. pure reaction, cross compound set erected in 1928 at the Hell Gate Power Station, New York.



Copyright]

[Science Museum

FIG. 1. Parsons' original steam turbine with dynamo, at the Science Museum. The cover of the turbine is lying in front. The broken line on the right represents a 2-ft. rule.

specifications of 1884; a photograph of the portrait of Sir Charles Parsons, who died on February 11, 1931, painted by the late Sir William Orpen; a chronological table detailing numerous steps in the progress of this type of prime mover, now the most important, with which the name of Parsons will always be linked; and a set of transparencies showing a few of the outstanding stages in the fifty years' development of power-generation with the Parsons turbine on land and sea, such as the Forth Banks, Elberfeld, Carville, Barking, Brimsdown and Dunston Power Stations and the *Turbinia*, *Viper*, *Dreadnought*, *Mauretania*

Visitors to the Science Museum are also referred to other early Parsons turbines which are preserved there, notably the 120 k.w. radial flow turbine installed in 1891 at the Cambridge Electric Light Station, the first condensing turbine, which surpassed in efficiency and economy the equivalent reciprocating steam engine; the original radial flow Parsons turbine from the famous S.Y. *Turbinia*, and the after-half of the *Turbinia* itself with the parallel-flow turbines on three shafts which enabled it to attain the record speed of more than 34 knots in 1897.

### Annual Visitation of the National Physical Laboratory

ON June 26, the General Board of the National Physical Laboratory made its annual inspection of the Laboratory. Many visitors, including members of scientific and technical institutions, of Government departments and of industrial organisations were present, and were received by Sir F. Gowland Hopkins, president of the Royal Society and chairman of the Board; the Right Hon. Lord Rayleigh, chairman of the Executive Committee; and the director, Sir Joseph E. Petavel.

In the Physics Department several researches are in progress for the benefit of the refrigeration industry. The laws of heat transfer between an air stream and gilled pipes are being studied; the viscosities of various refrigerants are being determined over a wide range of temperatures; and the thermal conductivities of materials used in the construction of containers for solid carbon dioxide are being measured at the working temperatures.

An interesting investigation is the study of the

discharge of air from ports in the side of a duct such as is used in the cooling of a stores. Measurements have been made on the outflow and the direction of discharge from a series of ports in a single duct, and it has been found that the quantity and direction of air issuing from a port depends on its position downstream. For certain ratios of port area to cross-section of duct, the maximum discharge can occur at the port farthest downstream.

In the same Department experiments have been made to determine the specific heat of carbon monoxide up to a temperature of 1900° C. by the velocity of sound method. A quartz crystal in the form of a rectangular parallelepiped is arranged to vibrate in either of two modes, giving frequencies of the order of 8,000 and 27,000 cycles per second. The train of waves generated is sent up a heated tube and reflected by a movable graphite piston; the positions of the reflector at which resonance occurs determine the wave-length of the sound. These positions, which are detected by the reaction of the reflected wave on the crystal, can be determined with considerable accuracy.

Attention has been given to the conditions necessary to secure the highest possible precision in the standardisation of platinum thermo-couples. At the freezing point of gold (1063° C.) considerable improvement has been obtained by immersing the crucible containing the gold ingot in a thermostatically controlled bath of molten silver. The method is being employed for other fixed points on the scale; the apparatus used for standardisation at the freezing point of silver was exhibited.

In the Radiology Division extensive work has been carried out on the application of X-rays to industrial research. A technique has been developed to discriminate between strained crystals and extremely small crystals, both of which are characterised by broad diffuse lines in the X-ray pattern. An X-ray examination of various magnet steels has shown that high coercive force is usually accompanied by considerable lattice strain, while low hysteresis loss is generally associated with a crystal structure free from strain. Work has been continued on the experimental realisation of the X-ray unit of quantity, the röntgen, and the accuracy of its determination at the Laboratory is now of the order of  $\pm 0.5$  per cent. Photographic methods of evaluating X-radiation in röntgens are being studied; and the problem of measuring gamma rays in röntgens, for purposes of radium dosage, is being investigated.

The new Acoustics Laboratory of the Department is now in use and was open for inspection. The new laboratory, which comprises a reverberation chamber and two rooms designed for transmission measurements, together with the necessary auxiliary measurement rooms, provides unique facilities for the study of the absorption and transmission of sound using larger scale specimens of materials than has hitherto been possible. The rooms, which are asymmetric in plan and elevation, and isolated both electrically and acoustically to as high a degree as possible, will facilitate in particular the study of noise transmission and abatement in relation to the design and construction of walls and floors of modern buildings.

The differential colorimeter developed in the Optics Division for use with transparent materials has proved valuable in the accurate comparison of transparent samples of almost identical colour. Modifications are being introduced to permit similar comparisons to be made between opaque materials. An

experimental model of a colorimeter, in which the human eye is replaced by a photoelectric cell in combination with suitable colour filters, was exhibited. The instrument gives promise of great utility in certain branches of colorimetry, and is especially useful for the rapid evaluation in international units of the comparative values of similar colours.

In the Electrical Standards Division of the Electricity Department, a study has been made of the use of the multivibrator circuit for the production of frequencies which are an exact submultiple of those of the standard frequency. The method has been successfully applied to the production of a series of standard audio frequencies, and to the derivation of seconds impulses from the tuning fork without the use of a phonic motor. An investigation is also in progress into the variation of the inter-electrode capacitance of valves with changes in operating conditions, a property which is of importance in connexion with the frequency stability of oscillators. It is worthy of note that in a recent comparison of radio-frequency standards, made simultaneously on a standard broadcast wave by the Laboratory and several continental laboratories, agreement was obtained to within one part in one million.

In the High Voltage Laboratory apparatus is in use for producing and measuring high transient voltages. An impulse generator, capable of yielding voltages up to one million volts, is used in this work; the measurements are made with a high-voltage cathode ray oscillograph. The surge characteristics of insulators, dielectrics, and electrical machines, will be investigated. The work has necessitated the development of control circuits to synchronise the operation of the oscillograph with the impulse to be measured.

The photometry of luminous discharge tubes has become a matter of importance, owing to the increasing use of such tubes, more especially for street lighting purposes. The measurement of their luminous efficiency presents considerable difficulty, because of the marked difference in colour between the tubes and the Laboratory standards of candle power. A study has been made in the Photometry Division of the best methods available for carrying out such measurements.

In the Radio Department methods have been developed for the automatic recording, by radio echosounding, of the equivalent height of reflection from the ionosphere. Some of the records obtained were exhibited. The application of the cathode ray direction finder to the location of the place of origin of atmospherics has been investigated. The experience gained at the Radio Research Station, Slough, in the study of these problems has been applied to the design of a compact direction finder for use, at ranges up to ten miles, as a collision preventer in foggy conditions at sea. The equipment comprises two frame aerials, the signals from which are amplified by two identical amplifiers before being applied to the oscillograph. The movement of the spot on the fluorescent screen shows, instantaneously, the direction from which the signals emanate.

The Department has been responsible for extensive work on the electrical properties of soil and liquids, at wave-lengths of the order of 1 metre. A method has been developed involving the investigation of the standing waves on a pair of Lecher wires which are partly immersed in the soil or the liquid. The ratio of the distances between the nodes either of potential



or of current, outside and inside the substance, determines the dielectric constant of the substance.

In connexion with the problem of frequency stability, apparatus has been devised for investigating the variation with temperature of the electrical constants of condensers and inductance coils. The specimens under test are heated artificially with hot air, and their inductance and capacitance are determined by reference to a standard inductor or capacitor the temperature of which is controlled thermostatically.

In the Metrology Department, recent determinations with the wave-length comparator have given values for the yard and the metre in terms of the wave-length of the red radiation from cadmium. The accuracy obtained in the optical measurements of length was from one to two parts in a hundred million. The measurements, which were made both *in vacuo* and in dry air free from carbon dioxide, also gave a value for the refractive index of the air. The apparatus is being used to obtain more precise information concerning the influence of variable atmospheric factors, such as temperature, pressure, humidity and carbon dioxide content, on the refraction and dispersion of air. A new Fabry-Perot interferometer of the variable gap type has been constructed for use in making precise intercomparisons of wave-length under controlled temperature conditions *in vacuo*, and for the examination of possible alternatives to the cadmium radiation.

A new type of free pendulum clock has been developed in the Department. The pendulum, swinging *in vacuo*, is maintained by regular electrostatic impulses controlled by a photoelectric cell to give constant amplitude and very precise seconds signals. An intercomparison of this clock with the other frequency standards will afford valuable information concerning the true behaviour of the various time-keeping devices.

In the Engineering Department, research on the resistance of metals to fatigue stresses occupies an important place. In particular, combined fatigue stresses, such as are encountered in engineering practice, have received attention. A study has been made of the behaviour of similar single crystals of aluminium subjected to reversed bending, to reversed torsion, and to a combination of both types of stress; the results have confirmed the general applicability of the resolved shear stress law. Fatigue tests on various metals *in vacuo* and in air have established that, in general, the exclusion of air increases the resistance to fatigue. Subsequent work, in which both dry and damp air have been used, has indicated that the decrease in strength in air is mainly due to water vapour, acting either directly or as a catalyst.

An investigation into wheel impact is being carried out in the Department on behalf of the Roads Research Board; apparatus has been devised for fitting to self-propelled vehicles of normal design. The measuring equipment consists of electrically recording accelerometers and spring-load gauges, fitted to the rear axle. By means of specially designed electrical circuits, these instruments are made to yield a current proportional to the instantaneous force in either wheel; this current is recorded oscillographically. A six-wheeled lorry equipped for impact tests was exhibited.

The research on the pressure of wind on structures has been extended to include the study of the modification of wind pressure produced on a building by the shielding effect of adjacent buildings; model buildings mounted in a small wind tunnel are being used. In

the case of models with roof inclinations of  $23\frac{1}{2}^\circ$ , it has been found that in general, the stresses on the roof of the shielded building are reduced by the proximity of other buildings. In the case of a building shielded by two others between which there is a narrow gap, it has been found that the suction on the windward side of the roof is even greater than that in the case of a single building freely exposed to the wind. The effect of roof shape is being examined.

The Department is investigating the relative merits of stainless steel and mild steel journals under conditions of ring oiling, and journals made of the two steels have been tested in a journal-friction testing machine. Given similar surface conditions, there appears to be little difference between their performance; the amount of friction appears to depend on the surface condition of the journal. Apparatus employing an optical lever method and capable of high precision has been constructed for studying the roughness of journal surfaces. Curves obtained with it revealed the irregularity of the surface of a polished steel journal.

In the Metallurgy Department, an investigation is being made into the constitution of light alloy systems; for example, magnesium alloys. In this work the addition of cadmium to magnesium alloys has been found advantageous, and a study is being made of the constitution and mechanical properties of alloys of magnesium with cadmium and aluminium. The work on grain size in aluminium castings has been continued; in this connexion the aluminium-titanium system has been examined. Specimen castings of aluminium and aluminium alloys showing the influence of various factors on grain size were exhibited in the foundry. Work is also in progress on the constitution of alloys of iron with reference to the use and properties of special steels. In this connexion the constitution and transformations, in the solid state, of iron rich in manganese are being examined.

A systematic study is being made of the solubility of gases in certain metals, a matter of considerable importance for the soundness of ingots and castings. A molybdenum-wound furnace used for work on gases in iron was exhibited. On account of the permeability of refractory materials to gases, the amount of refractory material in the furnace is reduced to a minimum. The furnace is enclosed in a water-cooled silica vessel.

The influence of surface oxide-film on the free passage of gases into and from molten metals is being examined. A new horizontal electron diffraction apparatus has been constructed for the examination of films in process of formation. The problem of the oxide inclusions in steel is being investigated by two methods. In one method, steel samples are fused *in vacuo* in a graphite crucible, the evolved gases being pumped off and analysed; in the other method, solution in a dry alcoholic solution of iodine out of contact with the air is used.

In the Aerodynamics Department, the research on wing-body interference has reached a stage at which the streamline bodies previously used have been replaced by models of typical aircraft fuselages. Two bodies, of the open cockpit and cabin type respectively, are being studied with and without the airscrews in operation.

Apparatus has been designed in the Department for obtaining the time-history of the rapid change in lift which an aerofoil experiences when the angle of incidence is suddenly altered. Such transient forces

are of importance in connexion with the effect of gusts on wing-load. The angle of incidence of the aerofoil under test is rapidly altered by a spring mechanism; the resulting change of lift on the aerofoil is recorded piezo-electrically.

Much work is being done in the Department on turbulent airflow. Extensive use is being made of shadowgraph methods in which the motion of spots of hot air produced by electric sparks is observed photographically. Apparatus has been devised for obtaining cinematograph records of the air flow, and in this work the *Schlieren* method of photography has proved of assistance.

The equipment of the Department has been augmented by the construction of a high-speed wind tunnel operated from the exhaust of the compressed air tunnel. This tunnel, which is one foot in diameter, is expected to give wind speeds in the neighbourhood of 950 ft. per second. The tunnel is to be used for the study of the behaviour of aerofoils at high wind speeds, with particular reference to the aerodynamic efficiency of the tip sections of airscrews at high speeds.

The William Froude Laboratory is engaged on extensive research on the manoeuvring of ships. The work has shown that in certain cases, the performance of a rudder can be considerably improved by an alteration in propeller design. The effects of introducing a fin in front of the rudder are being investigated in the case of single-screw ships. A model of a single-screw vessel equipped with apparatus for measuring steering qualities was exhibited.

For research on propeller efficiency, a 24 ft. wooden model of a single-screw cargo ship has been constructed, complete with self-propelling gear and automatic recording apparatus for measuring the thrust capacity of propellers. The model is available for testing propellers of any design. A closed circuit tunnel for research on model propellers—the gift of Sir James Lithgow—has been added to the Department. The new tunnel will facilitate the study of the action of propeller blades, with particular reference to the cause of erosion. Stroboscopic methods are provided for observing the propeller while it is in motion.

### Jubilee of the Junior Institution of Engineers

THE Junior Institution of Engineers celebrated its jubilee on June 27–29. The Institution was founded in 1884 by a group of young engineers employed at the works of Messrs. Maudslay, Sons and Field of Lambeth, and it has always fostered “the Junior spirit”. Open to men of all ages engaged in any branch of engineering and allied professions, it demands no examination of its members, and its meetings and discussions are marked by an absence of formality. Its first president was Mr. Freke Field, a grandson of Joshua Field (1787–1863), the partner of Henry Maudslay, who himself in 1818 was the first chairman of the newly founded Institution of Civil Engineers, and its president in 1848. The successors of Mr. Freke Field have included the late Sir Alexander Kennedy, John Perry, Silvanus Thompson, Sir William White, Lord Moulton, Sir Dugald Clerk, and many other distinguished men still living, eleven of whom were present at the luncheon at the Hotel Victoria on June 27 with which the jubilee proceedings were inaugurated, and at which Mr. W. J. Tennant, the present president, presided.

The luncheon on Wednesday was followed by a special service in St. Paul's Cathedral attended by the Institution as “an act of thanksgiving for 50 years of steady progress and attainment”; a reception at the Mansion House by the Lord Mayor and Lady Mayoress, and a conversazione at the Science Museum, South Kensington. A special exhibition of models, tools and drawings relating to the Lambeth firm, and to men who had been associated with it, had been arranged, and during the course of the evening an illustrated lecture on Maudslay, Sons and Field and the Royal Navy, was given by Eng.-Capt. Edgar C. Smith. After a brief reference to the formation of the institution and the world's great debt to young inventors and engineers, of which there were many notable illustrations in the Museum, Capt. Smith said that the history of the firm of Maudslay is of interest for many reasons; first, because of the many eminent engineers who built up its fortunes and maintained its traditions; secondly, on account of its work as a training school for mechanical engineers; thirdly, because it recalls a time

when marine engineering was a flourishing industry on the Thames, carried on not only by Maudslays but also by Penn, Humphry, Miller, Ravenhill, Rennie, Seaward and others; and lastly, as the firm which during the nineteenth century supplied more marine machinery to the Royal Navy than any other.

The first vessel engined for the Navy by Maudslays was H.M.S. *Lightning*, 1823, and she was succeeded by such notable vessels as the *Rhadamanthus*, the first steam man-of-war to cross the Atlantic, the *Terrible*, the largest paddle wheel frigate, the *Rattler*, the first steam screw-driven man-of-war, the *Marlborough*, the *Iris and Mercury*, the *Blake* and many others. In all the various changes and advances in marine propulsion, Maudslays played a great part, and the last engines constructed by them represented the highest pitch of mechanical engineering during the nineteenth century.

The events of Thursday included a visit to the Cricklewood works of Smith's English Clocks Ltd., and the delivery by Sir Frank Smith, secretary of the Department of Scientific and Industrial Research, of the Gustave Canet Memorial Lecture of the Institution at the Royal Society of Arts. This lecture was founded by Madame Canet, the widow of Gustave Canet (1846–1908), the distinguished French ordnance engineer who died while he was holding office as president of the Institution.

Sir Frank Smith took as his subject “The Engineer and Modern Civilisation”. The structural engineer of early times, he said, carrying out great works without a knowledge of science, either consciously or sub-consciously followed the principles which Nature pursues in creating our own structures. The engineer of to-day is distinguished from his predecessor inasmuch as he studies structures of microscopic size as well as those of gigantic proportions, and in this way is able to improve his materials and discover new ones. Modern civilisation, he continued, is a blend of two cultures: the engineering culture embracing the sciences, industry and commerce, and an idealistic culture including the fine arts and philosophy. What distinguishes so markedly our modern civilisation from that of a hundred or even fifty years ago is that

the materialistic culture is much more advanced than ever before.

The composite work which makes up our civilisation looks quite different when seen through the spectacles of an electrical, civil or mechanical engineer. The first would point to the vast output of electrical machinery and appliances, the second to the great railways, bridges and dams, and the last to inventions which made possible the developments of tools and machines. It was Maudslay's slide-rest lathe and Whitworth's accurate straight-edges and surface-plates which made it possible to construct the modern internal combustion engine.

There is also a picture of labour displaced by machinery; sweeping economies in labour being made in factories, mills and offices. With mechanical equipments on farms, 1,000 acres can be ploughed, prepared and sown in a single day, and ten minutes of human labour suffices to produce a bushel of wheat whereas formerly three hours were required. The pleasant picture of the English country-side a century ago with its hay wains and reapers was accompanied by another of long hours and child labour in factories. The engineer by his inventions has made child labour unnecessary and farm work less exacting; many who pine for 'the good old days' labour under deceptions similar to those which often mislead travellers in tropical countries—they see mirages of oases in plenty in the rear while the real oases lie right ahead. Stuart, more than a century ago, estimated that the steam engines in use in Great Britain developed more power than 4,500,000 labourers; to-day, steam turbines develop more power than 450 millions of Stuart's labourers, while in the United States it is estimated that every individual has an average of 900 such 'slaves'. The engineer, too, has banished the fear of famine; he has supplied fertilisers for the soil, agricultural machinery of wonderful efficiency, transport facilities of remarkable speed, and cool controlled atmospheres for keeping food fresh and palatable over long periods. At the conclusion of his lecture, Sir Frank Smith was presented with the Gustave Canet Gold Medal.

### University and Educational Intelligence

**BIRMINGHAM.**—On June 30 the honorary degree of LL.D. was conferred on the following, among others: The Right Hon. the Earl of Derby, Chancellor of the University of Liverpool; Sir John Cadman, emeritus professor of mining in the University, chairman of the Anglo-Persian Oil Company; Sir Harry McGowan, president and chairman of Imperial Chemical Industries, Ltd.; Dr. G. T. Morgan, director of the Chemical Research Laboratory, Teddington; Prof. C. A. Lovatt Evans, Jodrell professor of physiology, University College, London.

THE following appointments have been made: Philip Cloake, joint professor of medicine, to succeed Prof. J. G. Emanuel who has resigned; J. M. L. Burtenshaw, lecturer in bacteriology; T. G. Hunter, assistant lecturer in oil engineering.

**CAMBRIDGE.**—In the annual report of the Committee of Management of the Scott Polar Research Institute it is stated that the formal opening of the new buildings will take place in the autumn, probably on November 16, when the Chancellor of the

University (Mr. Stanley Baldwin) has consented to perform the opening ceremony.

The Harkness Scholarship, valued at £150, awarded for proficiency in geology, has been won by J. K. S. St. Joseph, Bromsgrove and Selwyn. The Wiltshire Prize for geology and mineralogy in connexion with Part I of the Natural Sciences Tripos has been awarded to S. O. Agrell, Bedales and Trinity Hall.

The Frank Smart Prizes have been awarded to G. C. Evans, St. John's (botany), who was placed in Class I in Part 2 of the Natural Sciences Tripos and A. L. Hodgkin, Trinity (zoology and comparative anatomy), who was placed in Class I in Part 1 of the same tripos.

At Magdalene College D. Purdie Kings has been elected to the Charles Kingsley bye-fellowship.

At St. John's College the following have been elected into fellowships:—Dr. M. L. O. Oliphant, of Trinity College, Messel research fellow of the Royal Society, and O. A. Trowell, formerly scholar of St. John's College, University demonstrator in physiology.

**DURHAM.**—At the June Convocation held on June 27, the honorary degree of D.Sc. was conferred on Prof. A. Fowler, professor of astrophysics in the University of London.

**EDINBURGH.**—On June 28 the honorary degree of LL.D. was conferred on the following, among others: Dr. Robert Hutchison, physician to the London Hospital; Prof. Robert Robinson, Waynflete professor of chemistry in the University of Oxford; Dr. Theobald Smith, emeritus director of the Department of Plant Pathology, Princeton, New Jersey, former director of the Rockefeller Institute; Sir John Maxwell Stirling-Maxwell, formerly chairman of the Forestry Commission and chairman of the Ancient Monuments Board (Scotland); Prof. D'Arcy Wentworth Thompson, professor of natural history in the University of St. Andrews.

The degree of D.Sc. was conferred on the following for the theses indicated: G. H. Bates ("Semi-Natural Vegetation and the Biotic Factor"); Charles Ockrent ("Studies in Active Charcoal"); C. M. Scott ("The Sensitivity of Cells to the Lethal Action of X-Rays"); George Taylor ("An Account of the Genus *Meconopsis*"); Dr. S. A. Kinnier Wilson ("The Experimental and Applied Physiology of the Corpus Striatum").

**LONDON.**—The Kent County Council has decided to make a grant of £40,000, payable over ten years, towards the cost of erecting new University buildings on the Bloomsbury site, and the Worshipful Company of Butchers has made a grant towards the Ceremonial Hall.

**ST. ANDREWS.**—On June 29, the honorary degree of LL.D. was conferred on the following, among others: Lord Moynihan, emeritus professor of surgery in the University of Leeds; and Sir Frederick Gowland Hopkins, president of the Royal Society.

**MR. IVOR GRIFFITHS** and **MR. P. JACOBS** have been awarded Streatfeild scholarships under the Royal College of Physicians and the Royal College of Surgeons to carry out an investigation into the tonsil, its anatomy, physiology, and the relations of its lymphatic vessels.

## Science News a Century Ago

### Launch of S.S. *John Randolph*

On July 9, 1834, the *John Randolph*, the first iron steam vessel in the United States, was launched on the Savannah River. She had been built by John Laird at Birkenhead and sent to the United States in sections. She was 110 ft. long, 22 ft. beam, and drew about 2½ ft. Her tonnage by the builders' old measurement rules was about 250 tons. Her engines, of 60 horse-power, had been made by Fawcett, Preston and Co., of Liverpool. The first iron vessel had been built so long before as 1787, but iron shipbuilding made slow progress. There were many objections raised against the use of iron, but practical experience proved most of them to be ill-founded. In the end, iron ships proved lighter and faster than wooden ships, cargoes could be stored more easily and kept in better condition in them, they were more easily repaired, and when fitted with watertight bulkheads were far safer. The pioneers of iron shipbuilding in Great Britain included John Grantham, Sir William Fairbairn and David Napier, but none did more important work in this direction than John Laird.

### Death of Capt. David Thompson

"We have just received the intelligence," said the *Athenæum* on July 12, 1834, "of the decease at Mauritius of the well-known computer and author of the Lunar and Horary Tables and inventor of the Longitude Scale, in consequence of severe injuries received during the hurricane which recently devastated that colony.

"The work which brought Captain Thompson's name into notice among men of science, is his solution of the problem, of clearing the apparent distance of the moon from other celestial bodies, from the effects of parallax and refraction—one of the most useful in nautical astronomy; and he received from the late celebrated Baron de Zach, high commendation for his skill and success in this investigation, and from the late Board of Longitude, a tardy acknowledgement of the high merit of his Tables. . . ."

### David Douglas, 1798-1834

On July 12, 1834, David Douglas, the Scottish botanical collector who discovered 'Douglas spruce', was killed in the Sandwich Islands. On an excursion he inadvertently fell into a pitfall set for wild cattle and was gored to death by a bull. Born at Scone in Perthshire, the son of a stone-mason, he became a gardener, and while employed at the Botanical Gardens, Glasgow, attracted the attention of J. W. Hooker, then professor of botany, and accompanied him on some of his expeditions. He was recommended to Sabine, the secretary of the Royal Horticultural Society, and sent to the United States, where he procured many fine plants. Sent out again in 1824, during the next three years he went as far as north California and the River Columbia, and then made his way to Hudson's Bay, whence he returned with Sir John Franklin. It was during this expedition that he discovered the spruce which bears his name. His third and last expedition began in 1829. After spending a part of the years 1832-34 on the Fraser River, he sailed for the Sandwich Islands. It is said he introduced into Great Britain fifty-three new woods and one hundred and forty-five new herbaceous

plants of a hardy nature. He was a fellow of the Linnean, Geological and Zoological Societies and after his death the botanists of Europe erected a monument to him at Scone. A monument to him was also erected in the cemetery at Honolulu by J. L. Brenchley (1816-73), the traveller.

## Societies and Academies

### LONDON

Royal Society, June 28. W. L. BRAGG: The structure of alloys (Bakerian Lecture). An alloy phase has two characteristics. The first is the pattern of sites occupied by atoms irrespective of their nature. Each phase of an alloy system has a different pattern of sites, and therefore a change from one phase to another involves their complete re-arrangement. The second characteristic is the distribution of the atoms amongst these sites. This distribution may vary continuously without change of phase, from being random at high temperatures to being partially regular at low temperatures. The alloy is a system of dynamical equilibrium. Although interchange of atomic position at room temperature is infrequent, the alloy has received its character at some previous point in its history when the temperature was just sufficiently high for interchange to be important. Maxima and minima in physical properties at certain relative proportions, such as Fe<sub>3</sub>Al and AuCu<sub>3</sub>, are statistical effects, and do not imply the existence of corresponding compounds.

Royal Meteorological Society, June 20. SIR NAPIER SEAW: The natural history of weather. The paper describes an arrangement of the meteorological data for a station with special reference to the encouragement of the study of Nature. I. S. ASTAPOWITSCH: Air waves caused by the fall of the meteorite on June 30, 1908, in Central Siberia. The results of the barograph records obtained by the author at the time of his research expeditions of 1930 and 1932 are given. The time of fall of the meteorite and the force of the explosion were determined by examination of various independent sources. The air wave must have been recorded by microbarograms in Japan, China, India and perhaps America. F. J. W. WHIPPLE: Phenomena related to the great Siberian meteor. This paper is supplementary to one published by the author in 1930. Additional evidence with regard to the illumination of the sky during the nights following the arrival of the meteor is summarised. In view of the fact that recorded observations of this phenomenon are confined to the north of Europe, the meteor probably had a tail which was to be captured by the earth's atmosphere. The air waves produced by the meteor were recorded at Batavia and at Washington as well as at several places in Europe. S. E. ASHMORE: The splashing of rain. The connexion between the rate of rainfall and the splashing produced by it from a horizontal surface has been studied experimentally for a large number of surfaces which may be used as the surroundings for rain-gauges. The splashing from ice and water has also been investigated. W. R. BALDWIN-WISEMAN: The cartographic study of drought. This paper presents a method of setting out rainfall statistics for drought periods. In order to illustrate this method the famous drought in Queensland during 1902 has been investigated. Maps are

given defining the progress of this drought, the rainfall being expressed as deficiencies from the average for groups of consecutive months.

## PARIS

Academy of Sciences, May 14 (*C.R.*, 198, 1729-1820). Gustave Moussu was elected a member of the Section of Rural Economy in succession to the late E. Roux. KAROL BORSUK: The idea of the category of L. Lusternik and Schnirelmann. SPYRIDION SARANTOPOULOS: The existence of holomorph integrals of differential equations of the first order in singular cases. BEPPO LEVI: Ensembles of points which cannot be ensembles of zeros of an analytical function of several variables. ANTONIO MONTEIRO: Additive nuclei in the theory of integral equations of Fredholm. ANDRÉ WEIL: A characteristic property of groups of finite linear substitutions. ELIE CARTAN: Remarks on the preceding communication. STEFAN BERGMANN: Integral and meromorph functions of two complex variables. M. M. RENATA FABBRI: Isoconic rotations. P. SWINGS and B. EDLÉN: The presence of the forbidden lines of Ne V in the spectra of nebulae. R. MAZET: A new definition of the forces of control. HENRI PONCIN: The sudden local variations of density in fluids in motion. J. BERNAMONT: The fluctuations of resistance in a metallic conductor of small volume. M. GUILLOT and M. HAÏSSINSKY: The effect of strong concentrations of electrolytes on the potential of the deposit of polonium. A. MICHEL-LÉVY and H. MURAOUR: The luminosity of waves of shock. A luminous effect (shown in reproductions of photographs) is produced when two shock waves meet and also when a single shock wave meets an obstacle. The spectrographic study of this phenomena is being investigated. M. M. CÉCILE STORA: The relation between the curve of spectral sensibility and the curve of absorption in photocells with colouring matters. By comparison of the sensibility and absorption curves, it is shown that the photosensitive layer is formed of a very thin pellicle of colouring matter. The energy absorbed by this pellicle is responsible for the variation of potential under the action of light. M. M. BRANCA EDMÉE MARQUES: The fractional precipitation of radiferous barium sulphate. A study of the behaviour of the system barium-radium sulphate under different conditions of precipitation. The errors due to filtration are avoided by the use of the centrifuge. The Doerner and Hoskins law holds for the case of slow precipitation. The fractional precipitation of radiferous barium salts by sulphuric acid is less efficient from the point of view of the separation of the radium than the fractional crystallisation of the bromides and chlorides. J. PERREU: The thermochemistry of aqueous solutions of nickel sulphate. M. M. G. ADOLFF and H. HERING: The heterogeneous equilibria in the system: cadmium chloride, sodium chloride, water. A. P. ROLLET and J. WOHLGEMUTH: Study of the binary system: water, lithium hydrazoate. HENRI MULLER: Applications of the method of the lowering of eutectic points. WILFRIED HELLER: The conditions of a mechanical coagulation. IVAN PEYCHÈS: Contribution to the study of beryllium tartrate. The results of measurements of the rotatory power. ANDRÉ DE PASSILLÉ: The method of preparation of pure arsenic. Ammonium arsenate, after purification by repeated recrystallisation, is reduced by heating in ammonia at 1,000° C. and freed from traces of the oxide by sublimation. The arsenic thus obtained proved to be spectro-

scopically pure. GEORGES DENIGÈS: A new reaction of cantharidine, applicable to its estimation by colorimetry. The method is based on the brown coloration produced by heating with formol and sulphuric acid. E. M. BELLET: The alcoholysis of glycerol triacetin in weak alkaline solution. HENRI RAVIER: Phenyltrimethylglycerol and some chlorhydrins of tetrasubstituted glycerols. A. ABLOV: The influence of the electric moment on the number of molecules of base fixed by a salt. C. LEFÈVRE and CH. DESGREZ: Contribution to the study of the organic sulphides. MICHEL FLANZY: The formation of formaldehyde in the oxidation of ethyl alcohol. The production of formaldehyde as an oxidation product of pure ethyl alcohol is proved: the presence of methyl alcohol is not proved by this reaction. M. M. SIMONNE CAILLÈRE: Observations on the chemical composition of the palygorskites. RAYMOND FURON and CONRAD KILIAN: The Primary and Cretaceous between Tibesti and Air. J. GAUZIT: Concerning the theoretical discussion on the distribution of ozone in the atmosphere and the *Umkehr-effekt*. J. VELLARD: The periodic destruction of the fauna of the rivers of the Grand Chaco by variations of salinity. The fish die as the salinity increases through evaporation and are deposited in enormous blocks. This is of interest from the geological point of view as it gives a possible explanation, better than any other hypothesis, of the formation of certain banks of fossil fishes, the origin of which is otherwise difficult to understand. ALPHONSE MALAQUIN: New observations on the germinal strain of the annelid *Salmacina Dysteri*. M. M. L. VERRIER: The action of light on visual purple. The decolorising action of light is only appreciable if working with retinas poor in visual purple or on very dilute solutions: if the visual purple is abundant the action is practically nil. These results are difficult to reconcile with the current view of the mechanism of the visual purple. JACQUES POCHON: The influence of the culture medium on the biological properties of a cellulolytic bacterium from ox stomach. BORDIER: The measurement of the lucimetric index of a given place by a helio-chromometer. The measurement is based on the amount of iodine set free from a solution of iodoform in chloroform. B. S. LEVIN: The influence of oxygen on the antitoxic action of cholesterol on the saponins. MICHEL POLONOVSKI, PAUL BOULANGER and GASTON BIZARD: The formation of ammonia at the expense of aminoacids in the kidney of the dog *in vivo*. An important proportion of the urinary ammonia arises from the natural aminoacids.

## LENINGRAD

Academy of Sciences (*C.R.*, No. 7). S. BERNSTEIN: The linear quasi-continuous chains of Markov. I. VINOGRADOV: Distribution of primitive roots. S. MICHLIN: Dirichlet's problem for a domain with several closed boundaries. D. SHERMAN: A problem of the theory of elasticity for domains with multiple connexions. A. POPOV: A note to the paper by V. Fock "Zur Berechnung des elektromagnetischen Wechselstromfeldes bei ebener Begrenzung" (*Ann. Phys.*, 17, 4; 1933). V. PAJEVSKIJ: A general expression for the probability of survival under the mortality conditions of a given calendar period. For practical computation, the following formula may be used:

$$q_{12}^2 = q_{12} - 2 \cdot 4 \frac{l}{n} (6q_2 - q_{12}),$$

where  $q_2$  and  $q_{12}$  denote the values of probabilities of dying before the age of 2 and 12 months respectively,  $l$  the monthly increase in the number of births, and  $n$  the average monthly number of births. M. BRONSTEIN: The relativistic generalisation of the principle of uncertainty. G. KRUTKOV: Contribution to the theory of Brownian movement. On the function  $f(v, x, t)$  and the equation of the diffusion. V. KUZNETSOV, D. KONVISAROV and V. STROKOPYTOV: The increase in the plasticity of metals during plastic twisting in alternating directions. K. ANDREJEV and J. CHARITON: Some considerations on the mechanism of self-propagating reactions. A certain minimum degree of localisation of the reaction energy is necessary for the self-propagation of the macro-chain. M. KAZNELSON and M. KABACHNIK: Amidation with the help of sodium and potassium amides in the alkaloid series (1). On the  $\alpha$ -aminoanabasin. V. SADIKOV, V. VADOVA and R. KRISTALLINSKAJA: The use of  $H_2SO_4$ ,  $HCl$ ,  $H_3PO_4$ ,  $HNO_3$  and of alkalis in the catalytic splitting of proteins. I. LIASCHENKO: Flowering in the genus *Cucurbita*. Description of hermaphrodite flowers observed in four different species. N. KALABUCHOV: 'Anabiosis' in vertebrates and insects at a temperature below zero. At temperatures of  $-3^\circ$  to  $-10^\circ C.$ , metabolic exchange continues, though very slowly; consequently, the state of prolonged undercooling is only a profound torpor, and not a complete cessation of the vital processes understood by 'anabiosis'. L. VARDANIANC: On the age of the surface relief of Ciscaucasia. The conformation was produced only in the post-Pliocene.

#### ROME

Royal National Academy of the Lincei, Jan. 21. S. MINETTI: Riccati's differential equation and certain results in differential geometry. A. MYLLER: The flexion of scored surfaces. L. SOBRERO: A new hypercomplex variable of interest in the theory of elasticity (1). R. CACCIOPOLI: Elliptic equations with partial derivatives, with  $n$  independent variables. Various simple fundamental results concerning linear equations of elliptic type are established. E. BOMPIANI: Determination of the hyperspatial surfaces for a triply infinite system of normal rational curves. R. ZAIKOFF: Generalised wave mechanics. F. P. MAZZA and L. PANNAIN: Mechanism of the action of histozyme. This enzyme is distinguished from the carboxypeptidases, as it unites, not with the free carboxyl group of the substrate, but with the nitrogen of the  $CO.NH$  bridge. The different activities it shows towards aliphatic and aromatic acyl derivatives are probably due, not to the existence of two different enzymes, but to varying velocity of the hydrolysis catalysed by the enzyme. F. PIRRONE: (1) Studies on indones. Synthesis of  $\beta$ -phenyl-1:2-naphthoindene-11-one. (2) Investigations in the field of high frequency. Biochemical action of ultra-short electromagnetic waves (1). Exposure of brewers' yeast in aqueous suspension to the oscillations of a Hertzian resonator capable of oscillating on the fundamental wave of  $\lambda = 1.885$  metre reveals a slow accelerating action on the development of the yeast. The effect is slight after 1-2 days, but becomes marked after 6-7 days. G. BINI: Determination of the characteristic nitrogen groupings in the muscular tissue of *Mullus barbatus*, L. The proportions of the total nitrogen of this tissue existing as lysine, histidine, arginine, etc., have been determined by the van Slyke method. C. SIBILIA: Sexuality in certain species of the genus *Chaetomium*.

This genus includes many homothallic species, and experiments are being made to ascertain if such homothallism is absolute or prevalent. A. DE AGAZIO: Action of strychnine and strophantine on the isolated heart of *Bufo vulgaris*. ELENA J. ROLAND: Existence of a large sebaceous gland in the external auditory canal of native *Mus* species.

#### Forthcoming Events

- ROYAL SANITARY INSTITUTE, July 9-14.—Health Congress to be held at Bristol. Dr. Stanley H. Badock: President.
- INSTITUTION OF NAVAL ARCHITECTS, July 10-13.—Summer meeting and International Conference on Experimental Tank Work. Right Hon. Lord Stonehaven: President.
- SOUTH-EASTERN UNION OF SCIENTIFIC SOCIETIES, July 11-14.—Annual Congress to be held at the University of Reading.  
July 11, Prof. H. L. Hawkins: "Fossils and Men" (Presidential Address).  
July 13, Prof. E. B. Poulton: "The Power of Changing Colour as a Form of Protective Resemblance" (Public Lecture).
- INTERNATIONAL FEDERATION OF EUGENIC ORGANISATIONS, July 18-21.—Biennial Conference to be held at Zurich.  
Prof. Ernst Rüdin: "Racial Psychiatry—a Scheme for Topographical Research in Europe" (Presidential Address).

#### Official Publications Received

##### GREAT BRITAIN AND IRELAND

- Report of the Astronomer Royal to the Board of Visitors of the Royal Observatory, Greenwich, read at the Annual Visitation of the Royal Observatory, 1934 June 2. Pp. 22. (Greenwich.)
- Report for 1932 (No. 41) on the Lancashire Sea Fisheries Laboratory at the University of Liverpool. Edited by Dr. R. J. Daniel. Pp. 133+2 plates. (Liverpool: University Press of Liverpool; London: Hodder and Stoughton, Ltd.) 5s.
- Imperial Institute. Annual Report 1933, by the Director, Lieutenant Sir William Furse, to the Board of Governors. Pp. 56. (London.) 2s.
- Committee on Bird Sanctuaries in Royal Parks (England). Report for 1933. Pp. 24. (London: H.M. Stationery Office.) 6d. net.

##### OTHER COUNTRIES

- Mémoires du Musée Royal d'Histoire Naturelle de Belgique. Hors Série. Résultats scientifiques du voyage aux Indes orientales Néerlandaises de LL. AA. RR. le Prince et la Princesse Léopold de Belgique. Publiés par V. Van Straelen. Vol. 2, Fasc. 9: Paraperipatus Leopoldi nov. nom. By E. Leloup. Pp. 16+1 plate. Vol. 2, Fasc. 10: Trématodes. By Robert Ph. Dollfus. Pp. 16+2 plates. Vol. 3, Fasc. 8: Rhizocéphales. By H. Boschma. Pp. 8+1 plate. Vol. 3, Fasc. 9: Terrestrial Isopods. By H. Gordon Jackson. Pp. 8+2 plates. Vol. 3, Fasc. 10: Cirripèdes (additional part). By Dr. C. A. Nilsson-Cantell. Pp. 8. Vol. 3, Fasc. 11: Ascidies. By H. Harant and Od. Tuzet. Pp. 6. Vol. 4, Fasc. 1: Heterometabola I. Pp. 85. Vol. 4, Fasc. 2: Neuroptera. Pp. 15. Vol. 4, Fasc. 8: Heterometabola III. Pp. 70+3 plates. Vol. 4, Fasc. 9: Coleoptera II. Pp. 57+1 plate. Vol. 5, Fasc. 2: Reptilla. By L.-D. Brongersma. Pp. 39+4 plates. (Bruxelles.)
- Suomen Geodettisen Laitoksen Julkaisuja. No. 19: The Continental Undulations of the Geoid. By R. A. Hirvonen. Pp. 89. (Helsinki.)
- Reports of the Institute for Science of Labour. No. 19: Studies on the Hardness of Human Muscle, with special reference to its Value for measuring Industrial Fatigue. By Dr. Gîtô Teruoka and Dr. Syôzô Eda. Pp. 9. 30 sen. No. 20: An improved "Rôken" Gas Analysis Apparatus. By Dr. Misawo Okuyama. Pp. 9+1 plate. 30 sen. No. 21: Labour Physiological Studies on the Pregnant Women. By Dr. Gîtô Teruoka. Pp. 31. 60 sen. No. 22: Variations in the Physico-chemical Nature of Urine of Workers in Day and Night Shifts. By Dr. Takatugu Yagi and Miss F. Matubara; Physico-chemical Study on the Urine of the Working Girls in a Spinning Factory, by Sho Sasaki. Pp. 16. 30 sen. No. 23: Infant Mortality in relation to the Climate of Japan, Part I. By Dr. Tuijiwo Iwasaki. Pp. 18. 40 sen. (Kurasaki.)

#### Editorial and Publishing Offices:

MACMILLAN & CO., LTD.  
57, ST. MARTIN'S STREET, LONDON, W.C.2  
Telephone Number: WHITEHALL 8831  
Telegraphic Address: PHUSIS, LESQUARE, LONDON